

A Maryland Instructional Technology Advisory Council Report
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Investing in Instructional Technology: Accelerating Educational Reform in Maryland



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FOREWORD

In 2006 Dr. Nancy S. Grasmick, State Superintendent of Schools, created the Maryland Instructional Technology Advisory Council (MITAC), gathering forward thinking members from local school system educators, MSDE staff, higher education faculty, representatives of state professional organizations, and business and community leaders. During the meeting of March 2008, on one of Dr. Grasmick's periodic visits to the Council, she challenged the group to brand Maryland instructional technology, which led to the development by MITAC of a logo and a video created in partnership with Maryland Public Television addressing the importance of technology to Maryland's educational system.

At the November 2009 meeting, Dr. Grasmick once again challenged MITAC, asking the Council to publish a formalized report with actions behind it and forward thinking recommendations on Maryland's future direction for instructional technology. *Investing in Instructional Technology: Accelerating Educational Reform in Maryland* provides goals, recommendations, and supporting rationale from the Advisory Council to establish Maryland as the leader nationwide in the use of instructional technology in schools. Subsequently, the Council will provide actionable steps in the next Maryland Technology Plan.

The Council would like to thank Dr. Grasmick for her vision and support over the last six years, and to wish her well in her new endeavors after leaving MSDE at the end of June. Our hope is that this report will serve as a catalyst for instructional technology in Maryland for Dr. Bernard J. Sadusky,

as he assumes the role of Interim State Superintendent of Schools, and for future State Superintendents.

The co-chairs would also like to thank MITAC members who have dedicated their time and talents over the years. It is a great pleasure to serve with such a collegial group of individuals. We also would like to express our appreciation to Dr. Kimberly K. Fleming and her company Core Education, LLC. Dr. Fleming was the main researcher and writer of this report, spending many hours perusing Council records and interviewing MITAC members and other stakeholders.

To the readers of this report, it is our hope that you will get a better understanding of the power of instructional technology to help Maryland's educational system meet its goal of providing a world class education for each of our students. MITAC views this report as a piece of an ongoing conversation that will benefit all of us in Maryland.

Co-chairs, Maryland Instructional Technology Advisory Council:

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EXECUTIVE SUMMARY

Workforce readiness does not begin in cubicles or conference rooms; it begins in classrooms. With our country in need of a workforce that can propel the United States into the future and citizens who can lead our nation, we depend on our students to engage at an early age in learning activities that fully prepare them to make meaningful contributions to our global society.

Maryland, with its unique geographic location and highly technical businesses and industries, in close proximity to Washington, D.C., requires a highly skilled workforce, ready to assume positions in critical areas such as cybersecurity, information technology, systems design, and project management. Ours is a great opportunity; we must step up to the challenge of preparing world-class students.

For Maryland to meet these challenges, innovation must be at the forefront of the State's plan to move forward. Although some schools are advanced in their use of technology for teaching and learning, many others are behind. To achieve equity for all students, Maryland needs to increase investments in technology. Specifically, Maryland must make improvements in the following three areas:

- Student Learning;
- Educator Proficiency; and
- Equitable Access.

In this report, the Maryland Instructional Technology Advisory Council (MITAC) identifies three goals and related recommendations that the State of Maryland must pursue to achieve its vision for the future of its students.

Goal I: Student Learning

Student learning is an area that requires the utmost attention if Maryland is to reach the goal of producing world-class students in today's global society. The consequence of our students lacking access to current technologies in their classrooms is that they will not be prepared for their future place in the workforce. Schools must provide increased opportunities for performance-based learning with teachers as facilitators and co-learners, technology-facilitated student learning, and virtual schooling. Students must have access to rich digital content and become proficient in information, media, and technology literacy knowledge and skills. It is imperative that all our students become digital citizens, through ongoing instruction around the issues of cybersafety, cybersecurity, and cyberethics.

To achieve these desired ends, MITAC recommends that students have one-to-one access to computing devices, both for instructional use and for online assessments. Utilizing both student-owned devices and those provided by the district, including mobile technologies such as smart phones and tablets, will allow broader access to interactive web-based tools to support learning. Policy revisions will be needed to support broader access to these technologies. Expanding access to a variety of rich digital resources, beyond paper and electronic textbooks, aligned with the new Maryland Common Core State Curriculum, will enrich teaching and learning in all content areas. Significant attention must be given to Universal Design for Learning (UDL), a framework for incorporating

multiple means of instructional delivery, student engagement, and representations of learning, to meet the diverse needs of all Maryland students. Online learning and common statewide Learning Management Systems (LMSs) enhance the use of technology via the Internet to facilitate student learning across the State and from remote locations. Before any of this can happen, however, educator technology and information literacy proficiency and a robust infrastructure must be securely in place.

Goal II: Educator Proficiency

Workforce readiness requires educators to develop their technology expertise. Creating technology-proficient teachers, library media specialists and administrators is the backbone for using technology effectively in schools and classrooms. To provide the necessary resources for teaching, all classrooms and library media centers in Maryland should be equipped with high-capacity computing devices for teachers and students, other appropriate technologies as defined by the State and districts, and high-speed Internet access. With appropriate professional development in the use of new technologies, including software and digital resources, student learning will be maximized as teachers become more skilled at integrating technology into instruction. Educators are further supported through the utilization of online Professional Learning Communities (PLCs), helping them become technology-proficient, in touch with cutting edge applications and instructional strategies for teaching and learning. Instructional technology infusion specialists need to be an integral part of the faculty of every school, providing differentiated, job-embedded professional development and modeling of appropriate technology use for all staff members. To determine

accountability, and improve the technology proficiency, knowledge, and skills of all educators, the State should develop policies addressing pre-service, in-service, and administrator effectiveness related to the Maryland technology standards.

Goal III: Equitable Access

Equitable access involves providing all schools with the infrastructure to support the technologies and systems that must be implemented to move Maryland forward. The recommendations within this report are predicated on the availability of a robust infrastructure. Increasing connectivity and bandwidth will allow for Internet use at speeds that keep pace with the increasingly rich, interactive content and the current and emerging technology needs of our classrooms. Training, maintenance, technical assistance, and professional development will keep stakeholders moving forward and enable students to be college and career ready. The creation of State and district portals will allow student and family access from remote locations. Where students and community members lack computers and Internet in their homes, access points must be made available in libraries or community centers. In addition, educators must have real-time access to data for instructional decision-making. The investment by the State and local school systems in technologies, infrastructure, and professional development must be combined with a commitment to adequate numbers of information technology staff.

MITAC affirms that an investment in instructional technology in Maryland will enable the attainment of goals set forth in the Third Wave of Reform, Maryland's Race to the Top initiative, and the most recent Technology Plan, *The Maryland Educational Technology Plan for the New Millennium: 2007-2012* (MSDE, 2007a). To create

students that are college and career ready and knowledgeable digital citizens of our society, the State must commit to advancing the use of technology in education to

improve student learning and educator proficiency, and to broaden equitable access to all stakeholders throughout our community.



CALL TO ACTION

Today's world is abundant with technology, and our students are spending many hours every day "wired," be it with computers, smart phones, video games, or other technologies that have become the norm for their generation. Through online social networks, they spend their time both inside and outside of school interacting with their peers via these technologies, and their world is dominated by multiple formats of media delivered to them at the touch of a fingertip. In the most recent national Speak Up survey, 34% of Maryland students report that it is their *teachers that limit their technology use* during the day (Project Tomorrow, 2010). Instead of bolstering this generation through compelling uses of technology in schools, educators often are holding it back. To address this problem, teachers, library media specialists, and administrators must be prepared to utilize instructional technology to engage students in the classroom every day. Technology is an investment in our future, and its integration in the teaching and learning process is critical to the success of our students in Maryland to prepare them for today's rapidly changing workforce.

The State of Maryland has set the goal of providing an educational system that prepares students for college and career success in the 21st century. Currently, Maryland's education system is among the best in the nation, having consistently won awards. Maryland was ranked as number one in the nation by Education Week and the College Board for the past three years (Education Week, 2009, 2010, 2011; College Board, 2009, 2010, 2011). This ranking reflects Maryland's high marks in student performance, education policies,

accountability and standards, school readiness, high school reform, and student preparation for college and the workplace. To remain at the top is a difficult task, and only through constant innovative thinking and actions can Maryland continue to lead the way.

Continuous reform of the current education system has been underway since 1989 with Maryland's First Wave of Reform (initiated by the Sondheim Commission); it continued with a Second Wave through 2009, guided by *No Child Left Behind*. The current range of improvements is encompassed in Maryland's Third Wave of Reform, including the following (see Appendix B for details on Maryland's Third Wave of Reform, national reform measures, and technology acceleration):

- Preparing Students for College and Careers;
- Building a Statewide Infrastructure;
- Developing and Supporting Great Teachers and Leaders;
- Turning Around Low-Achieving Schools; and
- Investing in STEM (Science, Technology, Engineering, and Mathematics) Curricula.

The Third Wave does not call for simple incremental improvement; it will take continued innovation to meet the highly ambitious goals of the reform effort. Innovation is not so much a *thing* as it is a *process* of renewal, the transformation of a system, facilitated by the introduction of an agent of change. The Maryland Instructional Technology Advisory Council (MITAC) believes this change agent is *technology*.

The current educational technology goals of Maryland are closely aligned with the Third Wave of Reform. The State has, in *The Maryland Educational Technology Plan for the New Millennium: 2007-2012*, recognized the need to improve the areas of student learning, educator knowledge and skills, productivity at all levels of the educational organization, access, and instructional use of technology. MITAC was established to provide direction for the implementation of the State plan for educational technology. Additionally, this group makes recommendations to the Office of Instructional Technology and School Library Media and the State Superintendent of Schools regarding issues, initiatives, policies, and procedures related to instructional technology to improve and support teaching and learning. The Council is comprised of statewide representatives, educators, and key stakeholders who have an interest in and/or experience with technology. These include local school system educators, Maryland State Department of Education staff, higher education faculty, representatives of state professional organizations, and business and community leaders.

Taking Maryland's current technology plan into consideration, along with other reports, research, and resources, MITAC has embarked on framing the new vision for the future of educational technology in Maryland. The primary goal of this report is to articulate MITAC's instructional technology recommendations for the next ten years for the State of Maryland to transform its education system, aligning with and supporting the Third Wave of Reform. The content of this report directly aligns with the current Maryland Educational Technology Plan and supports the institution and expansion of many of its goals. In addition, it is supported by national initiatives and associations

such as the Partnership for 21st Century Skills, International Society for Technology in Education, National Technology Plan, International Technology and Engineering Educators Association, and American Association of School Librarians. Most importantly, the report considers State standards, including: the *Maryland Teacher Technology Standards*; the *Maryland Technology Literacy Standards for Students*; the *Maryland Technology Standards for School Administrators*; and the *Maryland Library Media State Curriculum*.

Technology is necessary as an accelerator and enabler of continued growth in Maryland's educational system. MITAC recognizes that, in order to achieve the goals outlined above, Maryland's commitment to improved student learning through instructional technology, educator technology proficiency, and equitable access must be enhanced and confirmed. Technology leadership at the State, local district, and school level is critical in reaching our goals; however, it cannot be accomplished in isolation. Making Maryland a world class education system with technology as a catalyst must include a partnership with parents and families, institutions of higher education, the State and local business community, non-profit organizations, and public libraries. It is the recommendation of this Advisory Council that action must be taken in order to achieve our technology and broader educational goals to accelerate Maryland's reform effort.

THEORY OF CHANGE

Investing in technological aspects of the education system enables Maryland to move toward outstanding academic and professional performance. The belief that the use of technology supports student proficiency in Science, Technology, Engineering, and Math; college and career readiness; and the elimination of

achievement gaps keeps MITAC confident in the recommendations featured in this report. The following graphic displays the logic that MITAC has employed to arrive at its recommendations for instructional technology and the intended short- and long-term outcomes of these improvements.

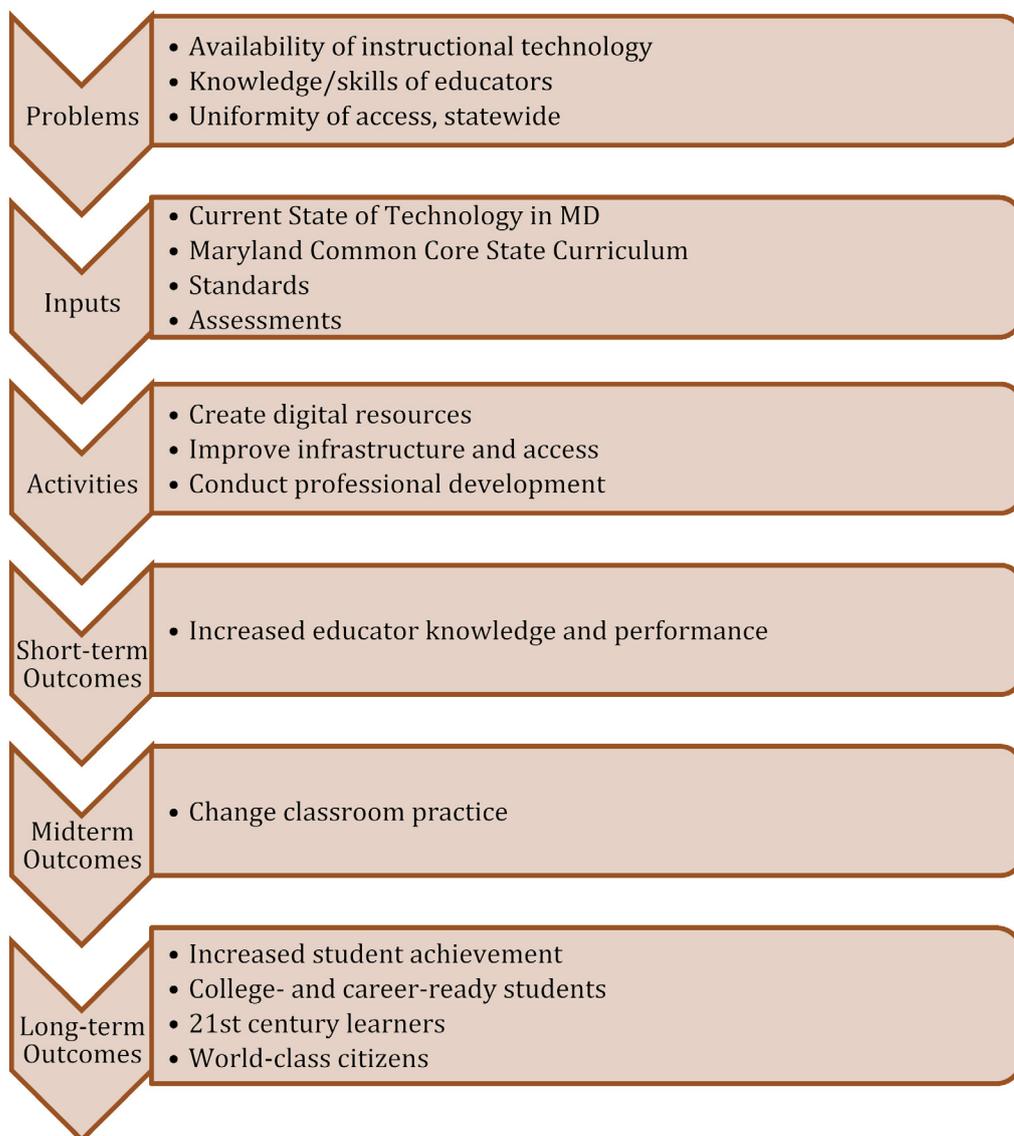


Figure 1. Theory of Change

In the following sections, MITAC has organized recommendations for supporting Maryland’s reform efforts through instructional technology into three broad categories: Student Learning, Educator Proficiency, and Equitable Access. Within

each category, the state of the State is explored, a vision for the future is proposed, goals are set, and recommendations and supporting strategies presented to guide the reader in understanding how the vision might be achieved.

STUDENT LEARNING

State of the State

Student learning is the most important aspect of any education system; indeed, it is an educator's reason for being. Maryland places top priority on student learning and achievement, and technology plays a key role in the success of its efforts. In using technology to reach its educational goals, Maryland is on track for a successful shift toward the Third Wave of Reform initiatives. The *2009 Technology Counts Report* from Education Week analyzed the state of all 50 states and the District of Columbia in the realm of technology use and capacity (Education Week, 2009). According to the report, Maryland received the grade of "A" for technology standards, programs, and policies that are in place.



For example, Maryland has technology standards for students, teachers and administrators, has established a limited virtual school program, and has some online assessments. With the national average at a "B" for this indicator, Maryland seems to be performing well – but overall it ranks only 23rd in the nation according to that report because of needs related to educator technology proficiency, issues of equitable access, and availability of technologies in schools. Other states are in a position to outcompete Maryland in how technologies are used in classrooms and in issues of access and equity. Addressing these challenges is critical for Maryland to reach its goal of providing an educational system that prepares world class students for college and career success.

Currently, only about 165 of Maryland's 1,424 schools are using online student courses (MSDE, 2010a); those which do are mostly secondary. Maryland's virtual schooling enrollments are lower than desired, having dropped 11% in the 2009-2010 school year because of lack of capacity, both in funding and support. Figure 3 shows the comparison of enrollment in Maryland's virtual school with virtual school enrollment in Florida, North Carolina and Alabama. Currently, Maryland enrolls less than 1% of its students in its virtual school (Watson and Gemin, 2010).

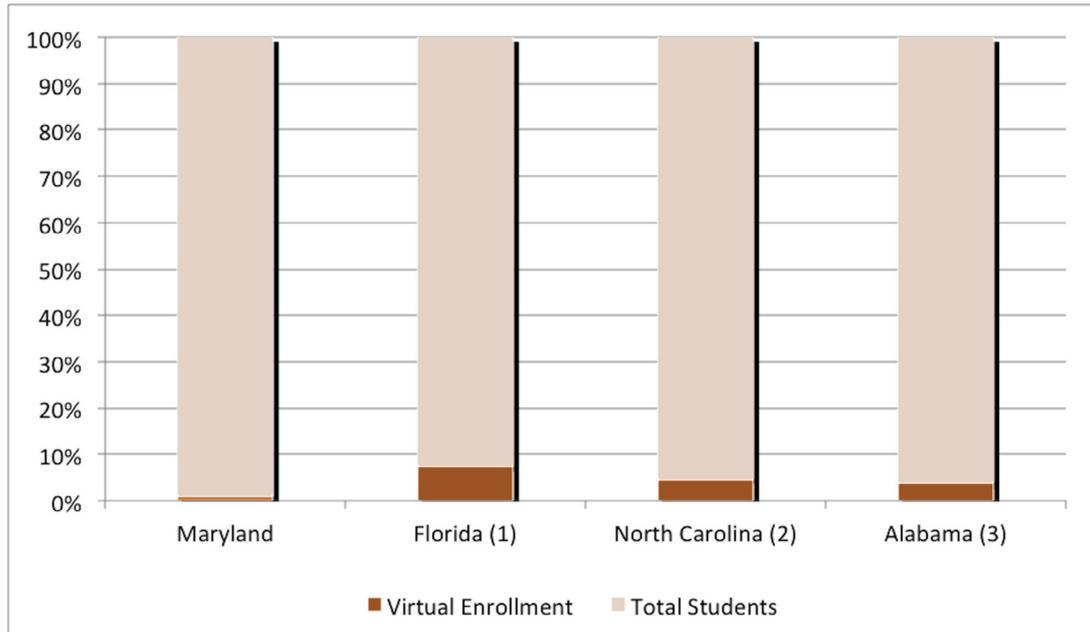


Figure 2. Enrollment in State Virtual Schools, Maryland versus Top Three States

The student to computer ratio for Maryland's 857,610 students is approximately 3:1 for schools at all levels (MSDE, 2010a). Maryland's current technology plan requires a 1:1 computing ratio at the secondary level and a 3:1 ratio at the elementary level. Large-scale 1:1 initiatives exist in South Dakota, Pennsylvania, New Hampshire, Texas, Georgia, Louisiana, California, Virginia, Florida, Kansas, Maine, Massachusetts, and Michigan. In addition, international programs such as the "One Laptop Per Child" initiative and Intel's "World Ahead Program" seek to provide laptop computers for educational purposes to children in third world countries (Bebell & Kay, 2010, p. 6). The National Association of Secondary School Principals, in a May 2011 position statement, asserts the need for 1:1 connectivity: "ensuring that each student has a connectible device—a tablet, a netbook, a laptop, or a smartphone" (NASSP, 2011).

Vision for Student Learning

Students are active users of technology, mainly outside of the classroom. Right now, when they come to school, many students have to "power off." By creating classrooms and school libraries that integrate current technology resources for students and educators as a part of their daily work, Maryland schools will continue to maintain their position as national leaders in education, with all children prepared to be effective citizens that contribute to the world in which we live. The process of creating these engaging classrooms and school libraries includes "anytime, anywhere" access to technology by students and educators. Technology-facilitated, performance-based student learning is the way students learn best. Opportunities to engage students in the learning process increase in classrooms, both physical and virtual, where students have greater ownership of their learning.

Differentiated instruction and greater use of Universal Design for Learning are strongly supported in these types of technology-rich learning environments (see Samson, 2010; Keengwe, 2007; Rose, 2007). Technology-supported Universal Design for Learning will enable a customized learning experience for all students, not just English language learners or others with special needs (Task Force to Explore the Incorporation of the Principles of Universal Design for Learning into the Education Systems in Maryland, 2011). Online and hybrid learning in the classroom through distance education, and educator and student collaboration across time and space are important aspects of today's educational experience.

Technology, particularly with the explosion of digital content, can help to create environments where students are able to explore various avenues that teach them to actively seek knowledge, give them ownership of their learning, and empower them as they move toward adulthood to become contributing members of society. In addition to being consumers of knowledge, it is critical that our students also become creators of ideas, information, and content. As active learners, students will understand the connections between what they learn, what they need, and the importance of the knowledge gained. They will forever be able to define their learning needs and plan how they will meet them. Teachers guide students through this process, helping them define their learning needs, manage time, and develop strategies to become independent learners. In some instances, students will become teachers as well as students. Through this process, there is an evolutionary path to learning shared by the student and teacher as co-learners. Lecture style classrooms cannot meet the needs of today's students who "learn by doing". Through active engagement and application of their own

thought processes, students use technology and digital tools in their everyday life experiences outside of school and want to use them in their classrooms as well.

Imagine a classroom or school library, rich with digital content, where students of all abilities are able to access information, successfully addressing their learning needs to complete a given project or assignment. Students will complete higher-order thinking activities, such as simulations, or use wikis for collaborative learning across classrooms, schools or even states. STEM students will use complex information from websites like NASA, communicating with experts to make real world connections. Students will interact with higher education institutions, ensuring a college-going culture from a young age. Instruction in ethics, digital citizenship, and Internet safety and security will be taught beginning in early childhood, alongside rules for the lunchroom and playground.

The technology goal for student learning supports the desired Maryland outcomes of increased overall student achievement; a decrease in achievement gaps; 100% of students proficient in English language arts and mathematics by 2020; 90% graduation and 75% college-going rates for Maryland students; and a 40% increase in graduates interested in pursuing STEM areas by 2015.

Goal I: Prepare students for college and career readiness through access to online learning, educational technologies, and high-quality digital content, driving student achievement.

Recommendations to Accomplish Goal I:

Online Learning: The State legislature needs to provide an ongoing financial investment in the Maryland Virtual Learning Opportunities Program (MVLO) to increase student access and participation.

The Maryland Virtual Learning Opportunities Program was established by State law in 2002, directing MSDE to provide leadership in online learning for Maryland students and educators. The lack of targeted funding has been a barrier to the growth of MVLO and participation by all local school systems. With appropriate funding, the State and local systems can invest in the development and implementation of a robust statewide virtual learning program, where all students would have opportunities to participate in online learning. Virtual learning provides alternate ways for students to fulfill their educational goals. For example, if one or two students in a school want to take a course that is not offered, an online course could be an alternative. Districts can secure an online teacher to provide classes that cannot be offered because of the lack of a qualified teacher or limited enrollment, or for students who cannot attend school for various reasons. Viable solutions regarding credit recovery for struggling students also need to be examined and implemented.

State and district policies need to be reviewed, revised, or developed to eliminate barriers to online learning. Appropriate funding and effective policies will facilitate broader use of virtual learning, and allow for greater collaboration and sharing of courses and digital content within the State of Maryland and across states.

Student Access to Computing Devices: Every student should have an Internet-enabled computing device with sufficient functionality to be used for instruction, assessment, and access to appropriate digital content.

Access to digital content and infusion of technology into instruction are critical for today's classrooms. The long-term vision of this strategy will require a 1:1 student to computing device initiative statewide, with appropriate funding by both State and county governments. Good instructional practice, the Maryland Common Core State Curriculum, and the new assessments being designed by the Partnership for Assessment of Readiness for College and Careers (PARCC), which will likely be administered online, will demand an improved computing ratio.

Many students already have a 1:1 ratio when it comes to personal devices, whether laptops, notebooks, or smart phones. MITAC recommends exploring options for

leveraging existing resources, allowing students to bring their own devices into schools for instructional purposes. Districts must determine how to utilize all devices with appropriate levels of safety and security, resulting in greater access and cost savings for schools. Pilots of the use of student devices in schools are currently underway. Districts should expand upon them and share potential solutions.

To close the technology gap, the State and local school districts should investigate what security will be needed, the number of students currently in possession of handheld technology, and how to provide equitable access to devices in school.

The State and districts should undertake research to support development of policies and procedures that promote responsible educational use of personal devices, using guidelines such as those developed by the National Security Agency and Department of Homeland Security and the forthcoming National Initiative for Cybersecurity Education (NICE) Initiative.



Going Digital: The State and local school systems should provide students and educators with high quality, accessible digital resources rather than relying heavily on textbooks.

In alignment with the current technology plan for the State of Maryland, the future of educational resources is moving toward the replacement of some print materials in classrooms and school libraries with an investment in digital resources beyond just electronic versions of textbooks. Cost savings by moving away from print textbooks should be reinvested in technology infrastructure, access to technologies, and acquisition and development of more digital content.

Digital content can provide current, just-in-time resources, at school and home, for students and educators in today's rapidly changing information society. The transition to digital content supports the Maryland Common Core State Curriculum, including the use of assistive technology in the classroom and implementation of a curriculum based on the principles of Universal Design for Learning, as recommended by the Task Force to Explore the Incorporation of the Principles of Universal Design for Learning into the Education Systems in Maryland (2011).

Digital resources can provide rich, current multimedia content, text-to-speech capabilities, and interactive elements that paper texts cannot provide, allowing students to learn and demonstrate their knowledge in multiple ways. The State and local school systems should create and support collaborative partnerships to increase access to digital resources and to realize cost-savings. The implementation of Common Core

Curriculum and assessments across states allows for sharing to occur beyond the Maryland borders for an even larger collection of digital resources available to students and educators.

The State should provide access to a common Learning Management System (LMS) or e-learning classroom for all students and staff across districts. In addition to resultant cost savings, a statewide LMS facilitates sharing of digital content and online and hybrid courses across district and possibly state lines. As districts currently develop digital content, they should promote development in a format that is shareable across learning management systems, as well as compatible with the State system.

There are many digital resources that are currently unavailable to students and teachers because of existing policies, which need to be reassessed and revised to allow for greater access to digital content. Currently, students and staff may be barred from using personal devices because of restrictive policies regarding management issues and security. Filtering practices need to be re-examined, as they often result in useful educational sites being blocked. School staff should have the ability to unblock sites to meet educational needs. In collaboration, the State and local school systems should develop new and improved guidelines for acceptable use policies. A revision of policies that currently limit access to rich educational content could yield greater access to quality information for increased student learning.



Maryland Exemplars

Student Learning

Student to Computing Device Ratio Initiative: Over the past 5 years in Talbot County, a Laptop Initiative has resulted in the creation of a 1:1 ratio of students to computing devices for all high school students. Johns Hopkins University has documented this process with annual evaluations and has concluded that there has been significant impact in the areas of student achievement, effective use of technology for instruction, student engagement, and improved educational access for and participation by high-risk students. Statistically, the laptop initiative has shown significant increase in student achievement for students who used laptops in the classroom on a regular basis compared to students whose teachers used more conventional classroom instruction. Furthermore, students using the laptops showed gains on the High School Assessment (HSA) with regard to *pass rate and mean scores*. Student grades in both math and social studies showed favorable trends for students who used laptops. Over the past 5 years, teacher perceptions have consistently affirmed the impact of these laptops on student learning and have suggested that students benefited most in areas of instruction that included collaborative learning, acquisition of complex topics, application of content knowledge, and self-directed learning. Teachers also believe that these laptops assisted them in the improvement of instructional strategies and the use of technology to deliver digital content. Student-centered and discovery-based learning increased student engagement in and enthusiasm for the learning process. Students were similarly aligned in their opinions, with 73% indicating that the initiative increased their overall interest in learning. Parents felt the same way. Most significantly, at-risk students were targeted and impacted the most, according to instructors. The ability to differentiate instruction and to customize assignments to accommodate individual learning styles was irreplaceable, according to those in the classrooms (Otto, Hannon, Mainzer and Bautz, 2010).

Virtual Learning Environment: Baltimore County's Chesapeake High School boasts a full-fledged Virtual Learning Environment (VLE) called Seahawk. Seahawk is a high-fidelity simulation based on geospatial terrain data obtained from NASA. The current version of Seahawk embeds STEM learning activities in geometry and environmental science within a Mt. St. Helens volcano setting. Student teams work together to conduct scientific experiments such as virtually testing air and water quality, investigating what types of plants and animals have returned to the region of a volcanic eruption, and calculating the effects humans have had on the land surrounding the volcano. VLE is a flexible tool that can be adapted to various locales and content areas. A key to this is a Curriculum Customization Interface that allows non-programmers to create new content aligned with standards. The VLE is currently being used in Chesapeake High's Arena room and in a virtual computer lab (V-Lab) in which all workstations have 3 monitors, though it can also be used on more common single-screen configurations.



Maryland Exemplars

Student Learning

Cell Phone Pilot: Queen Anne's County Public Schools is piloting a program with Verizon and the company GoKnow to integrate Smart Phone technology into classroom instruction. Students are provided with a regular smart phone without calling capability or texting features enabled. The handheld technology is being used in class to support curriculum and learning. Currently the pilot is in only two classrooms, but anecdotal results are promising.

CyberWatch K-12 Cybersecurity Curriculum: Having begun K-12 cybersecurity awareness and information assurance workforce training in 2005, CyberWatch, a Maryland-based National Science Foundation-supported Advanced Technology Education Center, continues to expand delivery of both informal before/after school and summer programs, and formal Cybersecurity content infused across whole school curricula. Elementary, middle, and high school content was developed in partnership with K-12 educators and with CyberWatch two- and four-year faculty, as well as national leaders in both government and private industry. Content has been back-mapped to federal Cybersecurity standards and competencies and is refreshed annually. Programs have been established in Anne Arundel, Baltimore, Howard, Harford, and Prince George's Counties with Maryland continuing to establish itself as the leader in this burgeoning career field. CyberWatch and MSDE have partnered to develop the nation's first High School Cybersecurity CTE track, with the first pilots begun in 2011 in Baltimore and Howard Counties. The comprehensive approach to educate teachers, students, and parents school-wide about cyber awareness and to promote careers in cybersecurity is seen as a national model and is being replicated by other states. The recent roll out of the High School Networking Security competition and the MD US Challenge Cybercamps promises to keep Maryland and CyberWatch in the forefront of K-12 curriculum, career development, and the cybersecurity industry. Maryland has served as a strong partner in the development of the National Initiative for Cybersecurity Education (NICE).

EDUCATOR PROFICIENCY

State of the State

Through Race to the Top, Maryland is currently investing in the enhancement of its instructional toolkit, serving as a repository of interactive digital content and effective practice for educators. The online instructional toolkit will support the integration of technology, information literacy, new standards, and digital assessments aligned to the Maryland Common Core State Curriculum. Educators will utilize the toolkit to improve classroom practice and increase student learning; time and training allow teachers to use the resource effectively.

With the establishment of the *Maryland Teacher Professional Development Standards* (2004) and many of the Race to

the Top initiatives, Maryland recognizes the need for expanded professional development (PD) through online or blended models for all educators. Funding and staffing restrictions at the district level and in the Maryland Virtual Learning Opportunities Program have limited the growth of online professional development. According to the 2010-11 Maryland Technology Inventory (MSDE), 37% of Maryland's schools offered online professional development (PD) using video-conferencing, streaming video, and learning or content management systems. Some schools offer online PD via more than one path (for example, the use of both online PD courses and web-conferencing).



Data was not collected on the number of schools whose teachers enrolled themselves in online PD courses through colleges, universities, or other programs.

During that same period, however, 280 educators enrolled in online PD courses offered through an *eLearning for Educators* grant led by the Maryland Virtual Learning Opportunities Program (MVLO) and Maryland Public Television. Of those 280 educators, 110 learned to facilitate online courses, compared with 44 in the previous year. An additional 9 educators learned to design courses during that same time. This strategically planned growth in capacity, both in access to courses and in the ability to provide online teachers, is essential in expanding online PD course offerings to teachers across the state. Year four of the state's Race to the Top Educator Effectiveness initiative will transition face-to-face annual summer academies for an estimated 6,000 educators to an online model in the summer of 2014.

Vision for Educator Proficiency

To meet the *Maryland Teacher Technology Standards* and the *Maryland Technology Standards for School Administrators*, teachers, library media specialists, and administrators need enhancements to their technology proficiency, as well as access to technology, to enable their ongoing learning. Improving proficiency includes the examination of current educator credentialing and the provision of meaningful professional development that not only enables educators to use the tools, but also helps them to integrate technology effectively every day in their classroom instruction and practice. For

administrators, technology instruction is focused on administrative uses of technology and, more importantly, on effective technology leadership. Meaningful use of technology by educators is an integral part of instruction rather than an "add on."

The ability of schools and districts to employ technology integration specialists who assist teachers and leaders with technology utilization is critical to the success of moving Maryland forward in meeting its goals and objectives. From teachers taking webinars at home or in their spare time, to administrators providing teachers with immediate feedback before and after an observation, vast possibilities exist for professional development utilizing technology. Sharing of strategies and digital resources within, across, and beyond schools and districts is essential; this can be accomplished through online communities of practice and partnerships. Districts, schools, and individual educators can leverage a variety of partnerships with institutions of higher education, businesses, and public libraries to assist in meeting their technology needs, including professional development and access to resources. MITAC would like to see these resources tapped and utilized to the fullest.

Goal II: Create a fully technology-proficient PreK-12 educator workforce.

Recommendations to Accomplish Goal II:

Educator Technology Access: Every educator should have 24/7 access to an Internet-enabled, high-performance computing device for instruction and administration of assessments. Appropriate technologies should be available for teaching and learning in every classroom.

Every educator needs access to a high-performance computing device with high-speed connectivity at work, and it should be individually assigned for use in school or at home. Educators also must have “anytime, anywhere” access to appropriate network files, software programs, and digital resources. With technology that functions well and with 24/7 access, educators will learn more quickly and become comfortable with using technology, enabling them to meet the needs of students in today’s schools.

Every district, with the help of the State, should define what constitutes a technology rich classroom for each subject area and grade level, and then work toward implementing that model to close the access gap. For example, a method of bringing technology into some classrooms for widespread use is by the introduction of computer projection systems, digital interactive boards, and student response systems. It is recommended that the technologies of choice within a district be available in every classroom and school library media center. Without this capacity, the advantage belongs to some educators and students, while restricting others in what they can achieve.

Educator Professional Development: Every educator should have access to high quality professional development related to technology, through a variety of methods, so that all educators will be technology proficient.

The State, districts, and schools need to support educators in gaining and increasing their knowledge and skills for effectively using technology in their positions on a daily basis. Differentiated professional development, with an emphasis on instructional practice for educators, should be provided and made *mandatory* for all. A pre-assessment based on the *Maryland Technology Literacy Standards for Students*, the *Maryland Teacher Technology Standards*, and the *Maryland Technology Standards for School Administrators* should be used as the basis for professional development, considering both prior knowledge and comfort level.

In particular, as communities become increasingly aware of the potential pitfalls of student technology use, it is critical that all educators are grounded in issues surrounding information literacy, media literacy, and digital citizenship (safety, security, and ethics). In addition, technology integration should be emphasized in the *Maryland Teacher Professional Development Standards*, and uses of instructional technology

should be addressed and modeled in all professional development offerings. To ensure that teachers, library media specialists, administrators, and other district personnel are equipped with the knowledge and skills to fully utilize current and emerging technologies, all Professional Development Plans should include a required technology component, and the meaningful use of technology should be made part of formal and informal observations of educators' practice, as well as part of their formal evaluation.

Online professional development is a powerful resource for educators, giving them flexibility related to when and how they will grow as professionals. Maryland needs to expand its statewide online professional development program for its teachers and leaders through the Maryland Virtual Learning Opportunities Program, with financial support from the State legislature as recommended in Goal I, Recommendation a. Providing choices for educators in content and format allows them to take charge of their own learning. Educators benefit by being able to participate in online modules, Continuing Professional Development (CPD) courses in specific content areas, or topical webinars, all available 24/7 for those who wish to learn more about their profession and improve their practice. Currently, for example, the Maryland Technology Proficiency Partnership, a Title II-D *Enhancing Education Through Technology* federally funded grant (described in more detail in Appendix C) is creating online modules aligned to the *Maryland Teacher Technology Standards*.

The State and districts should institutionalize support for online Professional Learning Communities (PLCs) for educators around topics of interest and need and provide recertification opportunities for teacher involvement. The establishment of PLCs is an opportunity to develop educator skills in the understanding and use of interactive web-based tools for communication and collaboration. Collaboration with others with similar needs encourages and develops the professional growth of our educators.

MSDE and local school systems should facilitate and implement forums and professional development for collaboration among educational communities around technology use and practice. These opportunities would facilitate the implementation of national, State, and local technology plans and foster the growth of professional learning communities via face-to-face sessions and/or distance learning and allow ideas to flow within and across schools, districts, the State, and beyond. When educators discuss with each other their successes and challenges in the use of technology, everyone benefits.

For the first time, the Maryland Society for Educational Technology (MSET) is collaborating with the Council of Educational Administrative & Supervisory Organizations of Maryland (CEASOM), the Maryland Association of School Librarians (MASL), other educational organizations, institutions of higher education, corporate partners, and community organizations in a Spring 2012 Conference to promote the effective uses of educational technologies and to better make the connection among technology, information literacy, content areas, and educational leadership.

Equally important to supporting educator professional development are Instructional Technology Infusion Specialists. These professionals are a critical part of school staffing who provide "just in time" professional development and ensure that technology is integrated appropriately. Through their efforts, they support educators who are not comfortable with technology or those who want to increase their knowledge and skills

to better prepare students for college and career readiness. In addition, Instructional Technology Infusion Specialists help administrators, other staff, students, and the community use technology to its fullest capacity, supporting a greater return on investment. The current Maryland target is one Specialist per 100 instructional and administrative staff members (MSDE, 2007a).

Educator Technology Qualifications: The State should develop policies regarding pre-service, in-service, and administrator effectiveness to determine accountability and to improve the technology proficiency of the educator workforce.

To ensure that all Maryland educators have the knowledge and expertise needed to use technology in support of teaching, learning, and for administrative purposes, the State should develop policies linking technology knowledge and skills with educator effectiveness. The Maryland Instructional Technology Advisory Council, representing a variety of educational stakeholders, is poised to make policy recommendations to the State Superintendent of Schools and State Board of Education on pre-service, in-service, and administrator effectiveness tied to increased educator accountability in meeting the Maryland technology standards.



Maryland Exemplars

Educator Proficiency

Leadership in Technology Integration by Building School Teams: Since 2007, the Baltimore County Public Schools' Office of Instructional Technology (OIT) and the Johns Hopkins University (JHU) Technology for Educators Program have been expanding the delivery of a Graduate Certificate in Leadership for Technology Integration program. This certificate program was built as a series of five courses to support educators as they learn to integrate technology into teaching and learning in the state of Maryland.

The OIT and JHU decided to tailor this series of courses to develop and support leadership development within a school and to build capacity for the successful use of technology through a cohort program. Participating schools form teams of teachers, including the school principal, that make a commitment to work together to develop a vision statement and an action plan that will be flexible and dynamic over the course of the cohort and into the future.

The content of the courses is infused with Baltimore County Public Schools (BCPS) policies, protocols and specific technologies used within the school system. Instructors from both JHU and BCPS originally met to create a seamless sequence of courses that began with the development of a school vision for technology integration and included the creation of action plans around the integration of technology into the school's instructional program. School teams work to expand data collection activities to make decisions about the effective use of technologies, expand their knowledge of Web 2.0 tools, Universal Design for Learning, and differentiation of instruction across the whole school curriculum. Elementary, middle, and high school teams have been developing and monitoring their actions plans, and collecting data of school processes that are successful, to support the school in moving forward with technology. Content has been back mapped to the *Maryland Teacher Technology Standards* as well as the *Maryland Instructional Leadership Framework* and is refreshed annually.

BCPS and JHU continue to establish themselves as leaders in this innovative and exciting endeavor and currently have 20 elementary, middle and high schools in this leadership cohort. To date, over 80 teachers and principals have graduated from this certificate program that continues to be evaluated by faculty from Towson University. Results from the ongoing evaluation are used to revise course content, teaching methods, and individual internship experiences in the program. Feedback from school administrators and teachers has been extremely positive as schools have seen new leadership patterns develop, a new emphasis on improved instruction through the effective use of technology, a movement to project-based learning, and community support for increased funding for technology initiatives within the schools.



Maryland Exemplars

Educator Proficiency

Technology Bundles: Wicomico County Public Schools has developed a way to reward teacher interest in instructional technology through their Technology Bundles program. The goal of this program is to provide technology tools for teachers to use in instruction. To ensure success, teachers need to be willing to attend professional development and to integrate student-centered, performance-based instruction, facilitated by technology.

Teachers are given the opportunity to complete an application exploring their teaching style and desire to use technology to enhance their instructional program. Applications are scored and selected by a panel of their peers using a rubric. Selected teachers receive a technology bundle consisting of an LCD projector, document camera, laptop computer, eBeam interactive device, Interwrite School Pad, and TurningPoint System. The recipients then participate in 45 hours of ongoing professional development focusing not only on the use, but also on the pedagogical implications of teaching with technology.

This program has had a significant impact on teaching and learning in Wicomico County. The process has become very competitive and has evolved to include school-wide, interactive technology implementation. Teachers report that behavior problems are down and attendance is up in classes where the technology is being used effectively, and students are more engaged in their learning.

Interactive Classroom Project: Montgomery County Public Schools has invested in interactive whiteboard technologies and supporting learner response and assessment systems for their classrooms. Currently, 65% of all secondary classrooms have Promethean Boards, a brand of digital interactive whiteboard, and work continues to provide these technologies to all elementary schools in a similarly systematic manner. Professional development efforts seek to capitalize on the opportunities that these new and innovative technologies provide for changing teaching and learning. The focus of these efforts is to help teachers rethink their instructional approaches and model how to create multimodal, universally designed learning environments. Through the integration of content, pedagogy, assessment, and technology, these learning environments reflect the shift in instructional focus from teacher centered to learner-centered classrooms.

Video Conferencing: At Wiley H. Bates Middle School in Anne Arundel County (an Arts Integration Community), video conferencing not only allows students to experience the world, but gets their principal involved, too. Italian classes at Bates are able to videoconference during class time with Collegio San Carlo in Milan. The teachers from Italy and Bates facilitate a student-to-student interface for learning. Principals from both schools are also video conferencing with one another regarding summer professional development offered at the 21st Century Learning Institute sponsored by the Arts Education in Maryland Schools Alliance



Maryland Exemplars

Educator Proficiency

and based on the Partnership for 21st Century Skills framework for learning.

Elementary Integration, K-8 Technology Scope & Sequence: Harford County has embarked on a project to develop two tools: a K-8 Technology Scope and Sequence, and an aligned elementary Integration Tool. The Integration Tool offers grade level and subject area-specific technology as alternatives to traditional methods of teaching and student learning. Teachers receive professional development on how to use the tools in their classrooms, and tools are provided to supervisors for use in new curriculum development initiatives.

Both tools have been shared with core content supervisors and all elementary principals. In addition, 75% of elementary school teachers have attended faculty meetings in which these tools were introduced, and 15 after-school workshops have been offered to teachers. One school has also allocated a professional development day to learning how to use the tools, facilitated by two county Technology Teacher Specialists.

Online Professional Development for School Administrators: Through funding from the federal *Enhancing Education through Technology* program, the Maryland Society for Educational Technology (MSET), in partnership with the Maryland Technology Literacy Consortium and the Maryland State Department of Education (MSDE), has created an online tool to support school-based administrators as they acquire and maintain the skills and knowledge to be technology literate and meet *Maryland Technology Standards for School Administrators*. Using this tool, current Maryland school-based administrators as well as future administrators in leadership development programs will be able to determine their own ability to implement technology in all aspects of their job, including allocating resources, data driven decision making and, most importantly, teaching and learning, allowing them to plan their own professional growth to meet these standards. MSET's leadership fully supports the implementation of the administrator tool and, beginning with the 2011-2012 school year, will schedule a variety of professional development sessions, including webinars, face-to-face opportunities, and online modules that school-based administrators may access to use this resource in an "anytime, anywhere" fashion. MSET and its partners recognize that student achievement and the successful use of technology in learning depend upon the leadership of school-based administrators and the instructional practices of their staff members. We anticipate that thousands of Maryland administrators across the state will take advantage of this tool that has been developed for them by Maryland principals, higher education faculty, and other Maryland educators.

EQUITABLE ACCESS

State of the State

Maryland has made great strides over the past decade with Internet access and availability of computers and other related digital technologies for instruction. With the increase in computing devices and access to rich digital content, including multimedia and video streaming, there comes a greater demand for high-capacity bandwidth and investment in computing devices and other technologies such as digital whiteboards and video cameras. Moving toward more online assessments also requires the need for expanded infrastructure and capacity, and a greater number of computing devices. While making great strides in access to technology resources, including connectivity and bandwidth for accessing the Internet, Maryland remains inconsistent — within classrooms and across school districts, communities, and in the homes of students. All instructional and administrative uses of computers and other technologies require the necessary capacity to provide high-quality digital content to our students and educators.

Maryland is currently building out its longitudinal data system to align with higher education and workforce systems to track student success not only during the PreK-12 years, but also beyond graduation. Building the capacity for data-sharing across systems is a high priority in the State. While these efforts will certainly improve the quality of data available to educators, building statewide educator access to data through user-friendly dashboards is an essential part

of Maryland's Race to the Top initiative.

Improving access by students, parents, and other stakeholders to the Internet, within the school and in the community, is critical to eliminating the digital divide. According to the Maryland Technology Inventory, only 74% of students are able to access a computer or the Internet at home, leaving many students without the resources and support they need outside the school day (MSDE, 2010a). According to the Pew Foundation, nationally about two-thirds of Latino (65%) and African American (66%) adults went online in 2010, while more than three-fourths (77%) of white adults did so. In terms of broadband use at home, there is a large gap between Latinos (45%) and whites (65%), with the rate among African Americans (52%) falling in the middle. This holds for other technologies as well. Fully 85% of whites owned a cell phone in 2010, compared with 76% of Latinos and 79% of African Americans. If Maryland is to close the achievement gap for all its students, State and local government need to address these discrepancies with an increased investment in community resources (Livingston, 2011).

Vision for Equitable Access



The State of Maryland needs to improve access to high-speed broadband to better serve all school districts and homes in every area of the State. Focusing on Maryland's poorest and most rural communities that are least likely to have adequate Internet access, State and county governments must broaden efforts to provide Wi-Fi in community centers, and support public libraries as valued centers for learning. Collaboration among schools and the larger community is essential in supporting students and their families with access to necessary tools and resources outside of school.

Through the Race to the Top initiative, Maryland is developing a longitudinal data-system system that will allow teachers and administrators to access and share student data, so that they can better meet the needs of each individual student. Teachers will be able to obtain results from formative assessments quickly and then modify their instruction to personalize learning. Access to appropriate and timely data for instructional decision-making can help transform the teaching and learning process.

Goal III: Provide equitable access to current and emerging technologies for *all* students and educators and expanded opportunities for parents, families and the community.

Recommendations to Accomplish Goal III:

Infrastructure: The State of Maryland needs to make a significant investment in designing and building a sustainable infrastructure to provide appropriate broadband connectivity to every corner of Maryland.

Access to the current infrastructure does not support the burgeoning technology needs of many schools. Universal access to high speed broadband in every instructional and administrative area will provide faster connectivity and access to robust, dynamic content allowing students and educators to accomplish their instructional goals. Use of ongoing assessments to differentiate student learning increases the urgency for this growth. Through Maryland's Race to the Top funding, its investment in a statewide system will provide: "anytime, anywhere" access to data through user-friendly dashboards for real-time instructional decision-making; appropriate resources aligned to the individual needs of students; and support for educators in differentiating the learning experience for every child. An investment in a quality infrastructure is critical to supporting every aspect of teaching and learning.

In addition, there needs to be a significant update to the Maryland school construction and telecommunications standards in response to our complex digital environment. This includes the preparation of existing infrastructures for one-to-one learning, the improvement of wireless coverage, Internet access, networking technology, and the human capital required to achieve these outcomes.

Community Access Points and Portals: In an effort to assist students and other stakeholders who are currently without access to the Internet and digital resources, the State of Maryland, county government, and local communities should invest in remote, out of school access.

Community centers and public libraries are valuable venues for providing access to resources, and partnerships should be developed to leverage these assets to their fullest. Investing in Internet access, particularly in some of the poorest neighborhoods, will provide students, parents, and community members with a gateway to key resources in the educational system, including databases and software, student information for parents, and school information for the larger community. Local school systems should develop their own or opt into a statewide portal for family and community access to educational information and resources. An investment in community access should be accompanied by policy changes and training to support successful implementation. Expanding community access through technology will improve communication and provide greater support for students and families.

Technical Assistance & Maintenance: The investment by the State and local school systems in technologies, infrastructure, and professional development must be combined with a commitment to adequate numbers of information technology staff.

The investment in information technology specialists and support staff is essential for purchasing and maintaining all technologies and securing the networks. As the State and local school systems increase the number of computing devices, expand digital resources, and improve systems and infrastructure, it is imperative that the human capital is available to protect this investment. The current Maryland Technology Plan suggests a target of one full-time technical support person based in the schools for every 300 workstations, a modest target compared to business standards. Support staff should increase proportionally with our investment in technology, including State Department of Education and local district personnel. Providing ongoing training for information technology staff is critical if they are to perform their jobs effectively.



Maryland Exemplars

Equitable Access

One Maryland Fiber Optic Initiative: Howard County is taking the lead in the One Maryland network, an initiative to interconnect ten jurisdictions in central Maryland. The One Maryland network will connect approximately 500 schools to digital educational resources over fiber optics, bringing the world into the classroom in an interactive, high-capacity way. One Maryland will also interconnect with Mid-Atlantic Crossroads (MAX), a consortium of 38 participants, including universities, federal agencies and non-profit institutions. Through MAX, the One Maryland network will enable connections between public schools in the proposed service area and the University System of Maryland Academic Telecommunications System, bringing those schools a range of innovative content from colleges and universities in Maryland and beyond.

While increased bandwidth and interconnection for over 800 community anchor institutions throughout 10 jurisdictions in the State represents the most significant benefit of the One Maryland plan, the One Maryland project will also reduce operating costs significantly by eliminating or reducing leased fiber and network connection costs, sharing Internet access costs, and converting standard phone services to Voice over Internet Protocol (VoIP).

Access Project: Allegany County Public Schools is in its second year of using an online Student Information System called *Aspen* at the secondary level. It offers families and students the ability to access attendance data, grades, calendar, assignments, and a direct communication tool. Families of secondary students select course schedules online and can communicate with guidance counselors through the system. Teachers regularly post announcements, and a link to teacher email is available to facilitate communication. Families can come into the schools to use computers during the school day or during an after school program by arrangement with the principal. Logistics are currently being developed so that wireless access will soon be provided within all schools in Allegany County. The access will be behind the school system's firewall, but not on their network. Once the liability release for the free wireless access is finalized, students will be able to bring their own devices to school, but it will be a teacher's prerogative whether or not certain devices will be allowed within each classroom. This policy is modeled on the standard used on most university campuses.

Allegany is also using an alert system called School Messenger. This system allows the family of each student to set communication preferences, such as phone, e-mail and text requests for alerts and school announcements. Emergency delays, closings, school related activities, newsletters, and reminders go out based on the family's communications settings. The number of people attending events has nearly doubled since this system was put in place. Both systems are managed at a district level, inclusive of alternative school and career centers.



Maryland Exemplars

Equitable Access

At strategic times throughout the year, families receive training at the school level. Training might consist of a family orientation to Aspen or a meeting on how to use the scheduling feature.

Maryland Learning Links: The Maryland State Department of Education and the Johns Hopkins University Center for Technology in Education are developing an exciting new special education supersite called Maryland Learning Links. Through a federally funded State Improvement Grant, Maryland Learning Links will be a comprehensive website for teachers, administrators, parents and community members. Five channels will organize it: Teaching all Students, Professional Practice, Family and Community, Policy and Process, and Leadership.

Maryland Learning Links offers special education professional development resources and online tracking of professional growth for teachers and leaders. In addition to digital resources for teachers and leaders, the site will also include information for families on developmental milestones, the Individualized Education Program (IEP) process, and issues of transition. It will feature parent interviews and social networking, blogs, and discussion groups to encourage the building of a community of families. Libraries of digital resources, quick professional development seminars for use in schools, and flash-based media will be included. Information on how to apply Universal Design for Learning principles in the classroom and how to find assistive technologies will combine with the above resources to make the site of great value to educators. The Maryland Learning Links site is scheduled for release in October 2011.

MDK-12 Digital Library: Initially funded through a federal *Enhancing Education through Technology* grant, this project has established a purchasing consortium of all 24 school systems and participating nonpublic schools in Maryland to provide a cost-effective way to deliver digital content that supports teaching and learning in an equitable and timely manner for all students. As a result, all students and educators in all participating districts and schools have access to subscription-based online databases. Additionally, professional development on how to incorporate these digital resources has been provided statewide. Overall, more than a million dollars in savings has been realized through this consortium since its inception in 2004. In the future, the MDK-12 Digital Library will work with higher education and public libraries to achieve even better buying power through formation of the Maryland Library Consortium. The MDK-12 Digital Library offers a promising model for statewide purchasing of other commercial solutions.



Maryland Exemplars

Equitable Access

PowerSchool Project: The Eastern Shore Consortium has teamed up to purchase PowerSchool, a web-based student information system that is shared across districts. PowerSchool provides information through parent and teacher portals and encourages collaboration and the use of data for instructional decision-making. Through the consortium, Eastern Shore counties are able to leverage resources and partner to purchase a powerful data system to support student achievement.

EVALUATION

Protecting our Investment

The State, in collaboration with local school systems and designated partners, must establish a continuous evaluation strategy and timeline to ensure that technology plans and investments are working, and to make adjustments to plans as needed. As technologies develop and change rapidly, key stakeholders need to understand what exists in the schools and how current policies and practices need to change.

It is critical to determine what tools will provide the best information. The existing Maryland Technology Inventory, School Library Media Annual Survey, and/or other identified tools should be reviewed and revised as necessary to provide in-depth data. This will inform the technology decisions of the State, local school districts, and individual schools, including identification of inequities and return on investment.

The State and districts need to determine how best to measure knowledge and skills of students, teachers, and administrators, based on Maryland and national technology standards. Using the standards to guide teaching and learning, Maryland will prepare its students for college and career readiness. As new technologies are introduced, districts need to have confidence that their teachers, library media specialists and administrators will use them effectively. Targeted professional development and resources that meet the needs of all educators will result in better teaching and learning, and ultimately greater student success. In addition to the technology skills needed to perform their specific jobs, educators need to have the knowledge and ability to be technology leaders, supporting a school environment that embraces technology, innovation, and creative thinking.



CONCLUSION

To realize the full potential of technology for improving student and educator performance, MITAC has put forth in this report a rationale, vision, goals, recommendations, and examples for the State of Maryland to accelerate the use of instructional technology. The goals and recommendations are clearly aligned with statewide reform initiatives, the Race to the Top grant, and the most recent State Technology Plan.

Maryland is recognized as a national leader for education – but it did not get to the top by standing still. In order to create world-class students, Maryland needs to foster innovation in the use of ever-changing technologies in partnership with parents and families, institutions of higher education, the State and local business community, non-profit organizations, and public libraries. These partnerships include increasing access to experts, rich digital content, greater bandwidth and capacity, and professional growth opportunities for educators. Dynamic partnerships have the potential to create greater equity for schools, classrooms, students, and families. As stated in the National Educational Technology Plan 2010:

Technology and the Internet have fostered an increasingly competitive and interdependent global economy and transform nearly every aspect of our daily lives – how we work; play; interact with family, friends, and communities; and learn new things. (U.S. Department of Education Office of Educational Technology, 2010)

Partnerships provide a vehicle through which the public can be made aware of why technology integration is important to prepare Maryland's students for career and college readiness to compete in a global world.

Technology is essential for the success of Maryland's reform efforts. The Maryland Instructional Technology Advisory Council recognizes the need for an ongoing financial investment in digital content, educator proficiency, technology leadership, and access to technologies. The recommendations in this report will advance Maryland's efforts to provide a world class education for all our students and thus realize its goals in the Third Wave of Reform.

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APPENDIX A

CROSSWALK: RECOMMENDED STRATEGIES AND THIRD WAVE OF REFORM INITIATIVES

		College/ Career	Infrastructure	Teachers & Leaders	Turn Around	STEM
Student Learning	Online Learning	+	+		+	+
	Student Access to Computing Devices	+	+		+	+
	Going Digital	+			+	+
Educator Proficiency	Educator Technology Access		+	+	+	+
	Educator Professional Development			+		
	Educator Technology Qualifications			+		
Equitable Access	Infrastructure		+			
	Community Access Points and Portals	+	+		+	+
	Technical Assistance and Maintenance		+	+		

APPENDIX B

BROAD REFORM INITIATIVE INFORMATION

National Perspective

Under the Obama administration, education has become an urgent priority driven by two clear goals:

1. To raise the proportion of college graduates from the current amount (41%) so that 60% of our population holds either a two or four year degree by the year 2020; and
2. Close the achievement gap so that *all* students graduate high school ready for college and career success.

With national initiatives for educational reform and the *National Education Technology Plan 2010*, clear goals have been set for the nation. These goals are aggressive and present a sizable challenge to states and school districts. Reduced national funding and resources for education pose considerable challenges for states. The time to take responsibility in each State, however, is at hand.

State Alignment and Maryland's Third Wave of Reform

Maryland's plan for reform aligns with the goals and recommendations President Obama's administration has set for the nation. Maryland has received repeated accolades and continues its dedication to continuous improvement, elimination of

the achievement gap, and development of exceptional students. Although Maryland has earned recognition in these areas, the Third Wave of Reform Initiative is designed to increase rigor, reiterate the effort to eliminate the achievement gap, ensure its students are college and career ready, and most importantly, prepare world-class students.

For the past three decades, Maryland has built a strong foundation for its education system during the first two Waves of Reform. Starting in 1989, the First Wave of Reform focused on creating a comprehensive system of public assessment and accountability to hold schools, local school systems and the State responsible for student achievement. The Second Wave of Reform, spanning 2002-2009, brought increased funding, increased accountability, a statewide curriculum, alternate pathways for high school students, and stronger professional development programs for teachers and leaders. Presently, the Third Wave of Reform aims to reach one of the nation's highest goals: create a superlative system that prepares students for college and career success in the 21st century.

Maryland’s 5-pronged strategy for reform is highlighted below, with specific ways in which instructional technology accelerates the reform initiative:

Statewide Technology Infrastructure	
Description	<p><i>Build a statewide technology infrastructure that links all data elements with analytic and instructional tools to promote student achievement.</i> In the world of technology, infrastructure is essential. Linking the current Local Education Agency (LEA), Maryland State Department of Education (MSDE), higher education, and workforce data-systems will ensure that information is shared easily and effectively. Maryland will create an instructional improvement system to give teachers better data about their students, promoting effectiveness. Expanding online instructional toolkits will aid teachers with the resources needed to impact their students.</p>
Acceleration through Technology	<p>Technology-enhanced classroom decision-making will allow customized instruction that targets student needs. Longitudinal data-systems are currently not available at a macro-level for tracking student and teacher performance, teacher preparation program performance, or formative assessment data. Metatagging, or coding, of digital resources is critical to increase ease of access to teacher resources and for resource sharing. Bandwidth in schools, generally, is not adequate to meet instructional or administrative needs. Improving these areas will greatly improve infrastructure, in turn, affecting the other components of school reform.</p>

College and Career Readiness

Description	<i>Ensure that all students are fully prepared for college and career in the 21st Century.</i> This student learning effort focuses several goals to ensure that students are prepared for their futures when exiting high school. Revising the State's PreK-12 curricula, assessments, and accountability system based on the new Maryland Common Core State Curriculum will ensure that all graduates are college and career ready. Maryland seeks to further align its standards with college and university admission standards, assisted by higher education stakeholders. Within the high school system, efforts to redesign the graduation requirements will embrace four years of core courses in the field of mathematics, and the further endorsement of STEM courses.
Acceleration through Technology	Maryland recognizes that preparation to use technology tools is required for success in today's college classrooms and changing workforce. The application of technology literacy standards and the infusion of interactive, web-based tools, Universal Design for Learning (UDL), virtual learning, school library media standards (information and media literacy), and grounding in digital citizenship are important parts of Maryland's reform. To improve and streamline assessments, Maryland aims to digitize its assessments Statewide. Improvement to Maryland's technology access is required for educators to administer and deliver the assessments, use Universal Design for Learning to address student needs or learning styles, and quickly compile results and return them to teachers in a timely manner. Fostering innovation is important to Maryland; the ability to do so is contingent upon an increased investment in technology.

Great Teachers and Great Leaders

Description	<i>Develop and support Great Teachers and Great Leaders.</i> A strong education system starts with strong teachers and leaders. Maryland recognizes this and aims to continuously improve its system’s backbone. In redesigning and strengthening the model for the preparation, development, promotion, retention, and evaluation of teachers and principals, Maryland will better support its human capital. Providing Educator Instructional Improvement Academies for administrators and school-based coaches will also support school systems in this advance. Above all, new evaluation systems for teachers and administrators will increase accountability.
Acceleration through Technology	Technology-supported productivity tools, virtual professional development, and collaboration of educators will enhance human capital across Maryland’s public school system. Nationwide, the delivery of professional development to teachers and administration is shifting to the online environment. A similar shift in Maryland will keep the State timely and “on top;” it will also be more efficient with resources in this financial climate, will support the attainment of teacher and administrator technology standards, and will assist in providing consistent information and messaging to all educators. The national technology leader must be on the cutting edge; MSDE must be continuously learning, growing, nurturing online connections, and exploring how to use and promote use of technology in the classroom. Connecting with other educators is how individuals learn, grow, and foster best practice across time and space; this cannot be done on a wide scale basis without improved school technology.

Turn-Around Schools

Description	<i>Turn around low-achieving schools.</i> All schools are equally important to Maryland’s success and leaving any “school” behind is not an option. Maryland is dedicated to focusing on these low-achieving schools and helping them to be increasingly more successful. Expanding the implementation of Maryland’s Breakthrough center will do just that. A new Breakthrough Zone for the lowest-achieving schools will allow for more targeted assistance; a new intervention model, monetary and resource initiatives, and strategies for addressing cultural and climate issues will ensure that all students will be successful, safe and healthy into the future.
Acceleration through Technology	Assistive technology and Universal Design for Learning make high-quality instruction more accessible to all students. Access to technology is imperative for low-performing schools and their communities. Without access, the achievement gap grows ever wider. To narrow this gap, the lowest achieving schools require equity in accessing technologies. In some of Maryland’s high poverty communities, the sheer lack of access at home or in school, constant turnover of staff, and lack of technology know-how clearly contribute to a lack of success. These schools need to be linked into State and local student data-systems, have access to real-time data, and be able to continue job-embedded professional development related to use of technology in instruction, to increase levels of student engagement, and address climate and behavioral management issues. Access to student information through portals should also be made available for parents, as Maryland aims to achieve a broader sense of community engagement through technology. With the right technology in place, parent training may even be established using portals and other innovative technologies.

STEM

Description	<i>Promote the development of STEM.</i> In today's global economy, students compete both in the State or nation, and around the world. Science, Technology, Engineering and Mathematics skills are essential if American students are to stand out; Maryland must lead the way. By following the recommendations of the Governor's 2009 STEM Task Force report, developing curricula for STEM around rigorous, internationally benchmarked standards, increasing the numbers of secondary STEM teachers, and better preparing teachers at the early childhood and elementary levels, Maryland will be able to promote STEM in a comprehensive and systemic way.
Acceleration through Technology	Investment in technology plays a direct role in some STEM core classes, but it will also contribute to STEM integration for other subjects. Technology applications allow virtual modeling, simulations and games that increase student interest in and motivation to learn in the STEM content areas, fostering innovation curriculum-wide. The "T" in STEM refers to both educational technology and technology education.. The investment in courses and teachers who provide students with experiences in technical areas such as design and fabrication, CAD, and computer engineering will help prepare Maryland students for the future, making them college and career ready. Technology will be used to enhance instruction and facilitate hands-on and interdisciplinary learning. If educators do not foster STEM, Maryland will not be economically competitive. With proper implementation of STEM, today's students will be prepared to engage in the future of both business and the technology era; development and programming take a solid background of skills and interest.

APPENDIX C

STATE EDUCATIONAL TECHNOLOGY GRANTS

Maryland has received an influx of support for technology projects through federal educational technology funding. In addition to the MDK-12 Digital Library highlighted earlier in this report, six current projects involving multiple school districts are currently being funded.

Hybrid Course Model: Cecil County Public Schools of Maryland leads this project, developed to fill a need expressed by school systems for a model for hybrid course development. Hybrid course development is a mix of both face-to-face and online learning intended to reap the benefits of both formats. The initiative examines the best practices and researched-based strategies to develop and pilot a World History hybrid course. From this development, a process guide and an evaluation system are being developed for other schools to follow in their own course development. Partnering school districts include Baltimore City, Baltimore County, Calvert County, Carroll County, Kent County, Prince George's County, Washington County and Worcester County.

Career and College Readiness Support Project: This project, led by Howard County Public Schools, supports teachers as they integrate educational/instructional technology into their High School Assessment (HSA) mastery classes (e.g., Algebra II and English IV). The products developed through this grant-funded project will support instruction and assessment of student performance, with

additional focus on using student data to guide instruction. Partnering school districts are working closely to create reusable learning objects that can be part of online professional development courses, traditional face-to-face training, or flexible combinations of the two. These learning objects will be accessible to all Maryland teachers as they work to prepare students for the 21st century workplace. Districts participating in the development of these useful tools include Baltimore City, Calvert, Caroline, Carroll, Cecil, Dorchester, Howard, Prince George's, Somerset, and Worcester Counties.

Maryland Proficiency Partnership: This project includes the collaboration of Montgomery County, Washington County, and Maryland Public Television; it involves all 24 school districts. The purpose of the Maryland Proficiency Partnership is to improve technology proficiency for Maryland teachers and leaders. The project partners are developing course modules for teachers to use that are aligned to the *Maryland Teacher Technology Standards*. One online course module, Social and Ethical Issues, was developed and piloted during the summer of 2010, and was highly successful. Five other modules are currently being developed. Principals from around the state are working with the Maryland Society for Educational Technology (MSET) on developing the resources that will become part of the Maryland Technology Leadership Toolkit for School Administrators. Resources will

be available for all school systems to use in their educator professional development initiatives.

Open Source Learning Management

Systems: Calvert County, along with Allegany, Anne Arundel, Cecil, Dorchester, Frederick, Prince George's, Washington and Worcester Counties, is examining whether open source learning management systems (LMSs) are a cost-effective and viable solution to commercial LMSs. The partnership is investigating whether open source systems provide the same functionality as commercial products and is documenting the Total Cost of Ownership to determine the most appropriate implementation strategy for local school systems seeking to adopt a learning management system.

STEM Portfolio Project for Students and

Teachers in Grades 4-8: Anne Arundel County Public Schools is leading all 24 local education agencies in building statewide capacity to improve teaching and learning in STEM, so that Maryland students will be college and career ready. The project incorporates learning teams of school-based educators from grades 4-8, including teachers of science, mathematics and technology, library media specialists, teachers of English language learners, and special educators from all 24 school systems in Maryland. These teams work together to develop model units for project-based STEM instruction across curricula and classrooms. Units are district specific to align with existing STEM initiatives. Targeted educators are participating in high quality professional development, and instructional coaches are working with them in their classrooms. Units will include: (1) a strong interdisciplinary research project to address information literacy; (2) problem-based learning strategies, based on an issues investigation; (3) applications of interactive

web-based tools, including an ePortfolio for students and teachers; (4) incorporation of geospatial analysis, and (5) a model for a 21st century STEM classroom, equipped with the appropriate technologies. An underlying expectation of the project is that participating students and teachers in Maryland will become technologically and information literate, and there will be a greater understanding of the digital resources necessary to incorporate STEM instruction into schools and classrooms. The educator teams will participate in a minimum of 120 hours of high-quality professional development to include two years of activities based on two regional academies, follow up activities and ongoing classroom support throughout the year.

Open Educational Resources (OER) Project:

Baltimore City is leading a partnership with Anne Arundel, Baltimore, Calvert, Carroll, Howard, Prince George's, and Washington Counties to develop a repository of learning objects for sharing and reuse. The repository will be available for all local school systems to access learning objects for teachers' use in preparing instruction for their students. This will be accomplished through the establishment of a commercial or open source Learning Object Repository (LOR) solution along with professional development in using and contributing to the repository. The project is also providing professional development to teachers to facilitate online courses and will sponsor an Open Education Resources Summit.

