

Office of the Superintendent of Schools
MONTGOMERY COUNTY PUBLIC SCHOOLS
Rockville, Maryland

March 8, 2011

MEMORANDUM

To: Members of the Board of Education

From: Jerry D. Weast, Superintendent of Schools

Subject: Innovations in Technology

Executive Summary

This update highlights examples of the innovative uses of technology throughout the district and also outlines some of the challenges ahead in ensuring that all students and staff can benefit from technology innovations. Dramatic changes in the variety and flexibility of digital content are facilitating important shifts in the ways teachers are teaching and students are learning. Similarly, these changes also are facilitating increased effectiveness of our business services and efficiency of key processes. The innovative use of technology remains a significant strategy in our ongoing improvement initiatives to provide staff with supports to save time, enhance teaching and learning, and deliver professional development. Montgomery County Public Schools (MCPS) is transforming learning environments and administrative functions through the integration of technology across all aspects of the school system by providing a robust and agile computing infrastructure that enables timely delivery and access to content through a variety of interactive and mobile technologies. However, a significant commitment will be needed to sustain appropriate budgetary support to integrate these technologies for all students and staff and adequately prepare our workforce to use digital resources effectively.

Background

A transformation in content has resulted in fundamental changes in the nature of instructional materials and how these materials are accessed and used, illustrated by the ongoing shift from printed textbooks to interactive and electronic text and digital instructional content that integrates customizable multimedia. These digital instructional materials and resources are accessed through a variety of computers (desktops, laptops, tablets, and netbooks), handheld and mobile devices, and interactive whiteboards. Integrating digital materials into the teaching and learning process presents both challenges to traditional instructional methods and opportunities to provide students with information in a variety of modalities.

The portability and flexibility of digital curricula and learning resources enable the connectivity of teachers and students across schools and school systems. As the cornerstone of our digital learning platform, the *myMCPS* portal is being enhanced to support students, staff, parents, and partners' collaboration and learning during and beyond the school day. The portal will increasingly support staff members as they form virtual communities where they come together to share and collaborate on innovative practices and participate in meaningful professional development that is customized to their needs.

This increased opportunity for collaboration and communication opens our classrooms to a world of resources. The power of technology can be leveraged to use an array of simulations and content visualizations that adapt and customize learning and workplace materials for students and staff. However, the use of technology in and of itself does not guarantee fundamental changes in the teaching and learning process or in operational improvements.

Merely putting technology in the hands of students does not spontaneously yield improvement in student learning outcomes. Instead, opportunities must be provided to model how to meaningfully integrate the right technologies with the appropriate instructional activities and content that are matched to the learners' needs and established learning goals. MCPS continues to transform the ways in which technology assists teachers in improving instruction and enhancing student learning that also helps to remove barriers to academic success for all students. Using technology to facilitate knowledge sharing and build relationships is characteristic of the context within which our staff and students increasingly socialize, communicate, and learn. The strategic use of technology supports the goals and academic priorities of the MCPS strategic plan, *Our Call to Action: Pursuit of Excellence*.

Building from a Robust and Agile Infrastructure

In the current fiscal climate, maintaining the appropriate level of technology infrastructure investment is critical. Technology plays a central role in virtually every aspect of our daily lives. We are making progress in designing and implementing innovative solutions to support our ongoing improvement efforts. These solutions center on supporting the creation of engaging learning experiences for all learners and providing access to resources and expertise that improve instructional and workplace practices.

The Board of Education, through the approval of its operating and capital budgets, dedicates resources that support our school system's instructional programs and business services. In these challenging economic times, innovative technology provides staff members with solutions to meet and exceed the high standards established for our students and employees. The Technology Modernization Program (Tech Mod) is an essential mechanism to provide schools with the information technology that is necessary to support digital content and to facilitate teaching and learning. This program is based on the strategic technology plan that was initially adopted by the Board of Education in September 2001.

Funded through the Capital Improvement Program, Tech Mod provides the funding for the school system's hardware, software, and network infrastructure. The mission of Tech Mod is to make technology a reliable tool to support access to a rigorous digital curriculum and provide access to data for decision-making. Updated technology enhances student learning opportunities; ensures accessibility for all students; provides access to different types of mobile, desktop, and handheld computing technologies; and facilitates communication about student progress.

Tech Mod is important to maintain a relevant and competitive instructional program. The County Council's final decisions on the Fiscal Year (FY) 2010 Capital Budget decreased funding, suspending Tech Mod for one year. This action effectively extended the Tech Mod replacement cycle from four to five years through FY 2012. This loss of funding required significant maintenance efforts to ensure that educational programs continued without interruption. While the refreshment program was reinstated for FY 2011 (at a reduced level), the added cost of \$5 million—to purchase parts, upgrade memory, refurbish out-of-warranty computers, and acquire service warranty for some specialized parts—in order to maintain five- and six-year-old computers uses valuable resources that would be better directed at providing newer technologies for more students and staff.

Essential Instructional Elements

The investments MCPS makes through Tech Mod lay the foundation for a flexible network infrastructure that enables staff members and students access to digital content. Although additional investments are required and more work remains to realize the vision for how these technologies are used, we are beginning to see how teachers' instructional practices are being strengthened through the meaningful integration of technology and curriculum content. Classrooms in MCPS are beginning to provide access to learning through interactive content and resources that incorporate multiple entry points into learning.

Students are being provided more options to understand the content and demonstrate and express their knowledge. Teachers are increasing their ability to analyze data about what students know and are able to do. They are able to integrate these data with other information to provide a profile that informs instructional decision-making. In today's teaching and learning environments, teachers and students collaborate and communicate with colleagues and peers across the district, throughout the country, and around the world to access learning and share information. Increasingly, this means that teachers and students are accessing and using the same types of technology in classrooms in which students are immersed outside of school. Students are engaging in interactive learning experiences that now are more easily accessible and integrated into instruction. For example, they are using virtual manipulatives for mathematics, online simulations and demonstrations for science and social studies, and podcasts and other digital media to support the reading and language arts program.

A Glimpse from the Classroom

At Springbrook High School, Computer Science teacher Pat Yongpradit offers a glimpse into how one creates these learning environments in his classroom. With an understanding of the world in which his students live, he involves his students in technical projects that address social issues. Mr. Yongpradit embraces the philosophy that students engage in using technology not only to gain access to knowledge but also to create knowledge and digital content that others can access. Mr. Yongpradit searches for ways to make computer science and technology vibrant and interesting for his students, especially underrepresented populations in the Science, Technology, Engineering, and Mathematics (STEM) fields.

Mr. Yongpradit partners with professionals in the technology community to strengthen his program. One such interaction facilitated an opportunity for two of his female students to develop a computer game over their summer break. This resulted in a grant from the Maryland Society for Educational Technology (MSET) to purchase additional software and to start the Springbrook Women in Technology Club, sponsored by Mr. Yongpradit. This club caught the interest of Microsoft's Partners in Learning Network, and Microsoft's representative encouraged Mr. Yongpradit and his students to enter Microsoft's Innovative Education Forum competition. Mr. Yongpradit and his team received third place, which qualified Mr. Yongpradit to participate in the worldwide competition held in Cape Town, South Africa in October 2010. Nearly 200 teams competed, and Mr. Yongpradit won the Innovative Teacher Award, capturing first place worldwide in "Best Practice—Innovation in Content."

However, this is only one facet of Mr. Yongpradit's program. He also sponsors a robotics club which is entered in the Mini Urban Challenge sponsored by the United States Army. He currently has six teams of students participating in Microsoft's USA National Imagine Cup Finals. The Imagine Cup is a worldwide technology competition for ages 16 through 25. In 2010, one of Mr. Yongpradit's teams made it to the United States finals and was the only high school team in the USA to do so; all other competitors were college students. The successes of Mr. Yongpradit's students confirm that through the integration of content, technology, and pedagogy, students are engaged in learning and excel at high levels.

Assessing Student Learning

Technology enables the real-time monitoring of student progress on academic measures that align to district and state accountability systems. More important are the opportunities to use technology-enhanced assessments and the improved ways in which teachers collaborate and use assessment data. ActiVote student response systems and handheld and computer adaptive assessments are strengthening teachers' ability to engage students in assessing their understanding in ways that are motivating and stimulating for learning rather than just simply measuring achievement.

The expanding use of technology-enhanced assessments is making the process of collecting information about student, teacher, school, and district performance more efficient. Technology-

enhanced assessments provide rich data that can be analyzed more discretely. They are creating opportunities for staff members to analyze assessment data by standard and indicator, and to translate assessment results into effective feedback that engages and motivates students. For example, in response to the changes in curriculum and assessment that implementation of the MCPS Elementary Integrated Curriculum and the Common Core State Standards are necessitating, the offices of Curriculum and Instructional Programs, Special Education and Student Services, Shared Accountability, School Performance, and the Chief Technology Officer currently are piloting the Measures of Academic Progress—Mathematics (MAP-M) computer adaptive mathematics assessment as part of the process of capturing a student's individual mathematical proficiency profile within the content. This profile will assist staff members to meet each learner's needs and lead to better descriptive feedback that will engage students to improve their understanding of the content.

Similarly, these central services offices, along with principals and other school-based staff, also have collaborated on using student performance data on formative, summative, and benchmark assessments to develop predictive statistical models to help students perform optimally on state assessments. Three Adequate Yearly Progress (AYP) Analyzers provide proficiency progress reports to all schools and make it possible to identify needs and provide instructional supports in a timely manner. These analyzers and other assessment data are published in the school system's *myMCPS* portal.

To streamline instructional decision-making, the *myMCPS* portal facilitates data analysis and school improvement planning by bringing together data that previously existed in a variety of electronic and paper-based systems. Using data related to AYP, the Seven Keys to College Readiness, and student performance prediction models, school leadership teams can analyze school and district-level data and assess the implications for teaching and learning in relationship to a school's improvement plan. Additionally, the *myMCPS* portal provides staff members with the information to assist them in determining the effective use of resources. Instructional specialists have been working with leadership teams and groups of teachers in providing professional development on how to access key performance data; analyze the data to better understand trends, root causes, and issues of equity; and use these analyses to inform programmatic and instructional decision-making.

Changes under way in the administration of the Montgomery County Public Schools Assessment Program—Primary Reading (MCPSAP-PR) underscore the integrated nature of the assessment program with our technology infrastructure. This formative assessment is administered to all kindergarten through Grade 2 students three times per year within a designated testing window. Teachers who administer the MCPSAP-PR using the handheld devices are able to capture real-time data and synchronize that data with other student performance information in *myMCPS* to inform their instructional choices and strategies. The handheld (PDA) devices by Palm currently used in schools were discontinued two years ago and will be replaced beginning this summer. It is important that the replacement device integrates seamlessly with our digital content platform and technology infrastructure, and mirrors the type of device our students also will use to access curricula materials, Web-based resources, and applications.

Expanding and Extending Collaboration and Participation

Through the integration of a variety of Web-conferencing and collaboration technologies, MCPS offices and schools have been adding to their repertoire of information-sharing and communication strategies within *myMCPS* and through the development of collaboration sites. These solutions—including online learning modules and webinar presentations—provide the ability to communicate with large audiences and increase collaboration with staff and the community while overcoming barriers of time and distance.

This year, a pilot has been conducted on the uses of Web-conferencing to support key initiatives. Many of these webinars have been focused on professional development for district initiatives including the Elementary Integrated Curriculum, Grading and Reporting, and the M-STAT sessions that concentrate on the use of data to make informed instructional decisions.

In addition, schools have quickly embraced the use of these technologies as a way of providing increased access to school programs and information for their parent community. Several schools have used Web-conferencing technology as a means for broadcasting Parent Teacher Association meetings, parent information sessions, and school concerts and events. For example, Lakelands Park and Rocky Hill middle schools have been leaders in the middle school community in hosting Web-based parent sessions on key issues including articulation, mathematics curriculum and programming, the Common Core State Standards, communicating with teenagers, and new findings in brain research and learning. Two high schools, Col. Zadok Magruder and Quince Orchard, have begun to use this technology to reach parents and students in their communities as they broadcasted key sessions on drinking and driving and school safety via the Internet.

Web-conferencing has been used not just to strengthen communication and build community with parents, but also within the school day to support and enhance instructional programs in and across our schools. For example, Luxmanor Elementary School has been experimenting with using this capability for students to facilitate planning for, producing, and broadcasting student announcements. Further, through the integration of this technology, students are able to connect with experts in the STEM fields across the country, as modeled by teachers at Earle B. Wood Middle School. Media specialists across the district are able to invite authors into the classroom through this virtual connection to share their expertise and answer students' questions.

Mrs. Lisa B. Norris, media specialist at Great Seneca Creek Elementary School, has not only embraced the use of Web-conferencing to support increased access for parents, she also has modeled how to use this technology to support and enhance the school media and information literacy program. On any given day, Mrs. Norris can be found Web-conferencing with students across multiple classrooms, reading books aloud to students as they respond to reflection questions and help each other create meaning and understanding. Mrs. Norris works with students as they conduct book presentations and share research findings via the Internet with other students in the school and their parents at home or at work. Through the adoption of this

technology, Mrs. Norris and teachers across the county are finding new ways to communicate with parents, foster and strengthen communities within and across schools, and engage students in demonstrating and presenting what they have learned.

Building Capacity

There are many challenges for educators to integrate technology in meaningful ways. Technology may be used to sustain existing practices rather than to serve as a catalyst of change. Professional development opportunities might be focused on isolated activities unrelated to instructional concepts and practices. In such cases, technology has complemented conventional instructional curricula instead of transforming traditional teacher-directed lessons and sequential instructional materials.

MCPS is designing professional development efforts that seek to capitalize on the opportunities that new and innovative technologies provide for changing teaching and learning. The goal is to help teachers rethink their instructional approaches and model how to create multimodal, universally designed learning environments. Through the integration of content, pedagogy, and technology, these learning environments reflect the shift in instructional focus from teacher-centered to learner-centered classrooms. They use interactive technologies to support and extend students' understandings of concepts and processes. Traditional verbal activities are replaced with hands-on, inquiry-based learning experiences during which students explore problems, design solutions, and create products that illustrate their understandings of key concepts. In these learning environments, teachers and students are using technology to access content beyond the walls of the school. Teachers in these classrooms use multiple assessment strategies including portfolios, open-ended questions, self-reflection and analysis, and peer review.

Professional development efforts supported by staff in the Office of the Chief Technology Officer (OCTO) have centered on helping teachers integrate technology, pedagogy, and digital content throughout their planning and enactment of their lessons, assessing student learning, and monitoring student performance.

Transforming Operations and the Business of Education

The important transformations in digital content that have been spurred by the Internet also are facilitating ongoing improvements in the operational effectiveness in our business functions. These improvements are evident in the ways in which technology is supporting process improvements—especially in workflow and staff self-service processes, strengthening communication, and enhancing the satisfaction levels of the operational offices' and departments' customers. Implementation of the *myMCPS* Business Center provides the capability for administrators, administrative secretaries, and fiscal assistants to access information, documents, and resources related to business operations from a central location. The Business Center contains a searchable database of finance and business memoranda that are categorized and able to be sorted. The *myMCPS* Business Center also includes links to Web-based applications, information libraries, tools, and frequently accessed websites. School-based

administrators can also run account balance reports for their school without logging into the Financial Management System.

In collaboration among the Employee and Retiree Service Center and the offices of Human Resources and Development and the Chief Technology Officer, paper forms are being transformed into electronic forms. For example, during the 2010 Open Enrollment period, 80 percent of employees completed the Flexible Spending Account election form using the online option. The online option automates the employee election process, which reduces the need for staff intervention and frees staff time to provide additional services and supports. The online form reduces processing errors and eliminated the majority of manual data entry. Similarly, the new Federal Race and Ethnicity form also was provided to employees electronically, eliminating the need to produce and scan bubble sheets or tax the internal mail system with paper forms. Additional employee self-service forms planned for development include direct deposit election, beneficiary designation, emergency contact, and employee leave.

In collaboration with the Department of Facilities Management, staff in OCTO developed a Web-based solution for tracking the condition and status of MCPS facilities due to severe weather or wide-scale utility outages. The project team took an inefficient process, which used spreadsheets shared via e-mail, and enhanced the process by developing a Web-based system which can monitor the status of parking lot and sidewalk snow removal, sanding and salting, and power outages. The system easily can be configured to capture additional event scenarios as the need arises. Report results are displayed using an interactive map feature which can be filtered by event type and geographic region.

Technology is the linchpin that enables parents and schools to facilitate the articulation process without monopolizing all of their time. OCTO staff has worked to streamline the articulation process by integrating articulation data into the Online Administrative Student Information System (OASIS) to provide information for class sectioning and enabling school staff to group students based on their strengths and instructional needs. Development currently is under way to provide a Grades K–6 articulation application in *myMCPS* that will enable teachers to view and review comprehensive data about individual students, select recommended course placement for each student, and print electronic student articulation cards.

By leveraging our existing document management system, we are able to improve the availability of existing paper-based records created by staff in Psychological Services in the Department of Student Services and reduce the need for increased physical storage space. Psychological Services stores student evaluations, assessments and protocols, and related documents in a remote storage facility, which makes it a challenge to file and retrieve documents. The document management system will enable a secure and efficient way to retrieve documents utilizing many attributes, including but not limited to student name, identification number, and date of birth. Furthermore, documents can be shared securely without the need to access the physical file.

Following the initial implementation of *MCPS Careers*, ongoing work has focused on improving the ability of hiring managers to source, assess, hire, and onboard the best talent efficiently. Hiring managers are able to post vacancies faster using preconfigured job templates and can review applicants' qualifications from any location. Hiring managers also are able to rank candidates based on prescreening questions, making selection and screening more efficient as well. Integrating the capabilities of the document management system with internal applicant records further streamlines the transferring and hiring of employees. Providing hiring managers the ability to view online human resources records for candidates who are current employees eliminates the need for staff to travel to the Office of Human Resources and Development to view internal candidates' personnel files.

The safety and security of students and staff are MCPS priorities; the Visitor Management System (VMS) is intended to enhance MCPS security measures to ensure a safe and secure learning and working environment. This automated system replaces the paper/pencil sign-in and sign-out processes for visitors. VMS provides administrators convenient access to reports such as visitor accountability. Administrators also can track the number and purpose of visits to their schools, including the number of volunteers and volunteer hours, streamlining a time-consuming and inefficient task. VMS also cross-checks names against the Maryland State Sex Offender registry.

Conclusion

Digital content—text, pictures, video, and developed materials—used purposefully, has the power to change geo-political boundaries and economies, redefine businesses, and certainly improve teaching and learning. How we respond to and plan for the emerging opportunities to reconceptualize and transform teaching and learning are crucial to our long-term success in meeting the needs of a new generation of learners. These emerging opportunities are a result of the ways in which content is being recreated and published and MCPS has responded by laying important building blocks for the future, providing a robust and agile infrastructure that supports delivery and access to digital content through a variety of interactive and mobile technologies. Equally important has been the district's investments to ensure that our classrooms are staffed with high-quality teachers, who are supported with a rigorous curriculum, competent leadership, and professional support staff.

In the face of significant fiscal pressures, it is imperative that appropriate investments be continued to ensure the integration of technology for all students and staff; to prepare our workforce to use digital resources effectively; and to protect our computing environment in which students, staff, parents, and partners are using a variety of devices to access information, collaborate, and communicate anytime from any location. Technology is an essential tool to the future of teaching and learning in our school system and to the business of education. Much remains to be done to realize its full potential.

At the table for today's discussion are Mr. Sherwin A. Collette, chief technology officer, Office of the Chief Technology Officer; Mrs. Aimee R. Conway, mathematics teacher, Northwest High School; Mr. Gregory S. Edmundson, principal, Great Seneca Creek Elementary School; Mrs. Lisa B. Norris, media specialist, Great Seneca Creek Elementary School; and Mrs. Sarinya Rapeepun, kindergarten teacher, East Silver Spring Elementary School.