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The Teachers' Voice: Using Technology in Maryland Public Schools

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About the Maryland Equity Project

The Maryland Equity Project seeks to improve education through research that supports an informed public policy debate on the quality and distribution of educational opportunities. It conducts, synthesizes, and distributes research on key educational issues in Maryland and facilitates collaboration between researchers and policymakers. The Maryland Equity Project is a program in the Department of Teaching and Learning, Policy and Leadership in the College of Education at The University of Maryland.

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Executive Summary

In spring 2015, researchers at the Maryland Equity Project designed and administered a survey entitled, *The Teachers' Voice: Using Technology* to K-12 teachers in Maryland. The design of the survey was based on the idea that teachers' integration of technology into their classroom practice is built on both individual-level factors like attitude and competency, and school-level factors like access and training. This brief describes the results of that survey. It provides valuable information for understanding how teachers use technology and their perceptions of what they need to better integrate technology into their classroom practice. The following themes emerged from our analyses:

- Most teachers regularly integrate some digital tools, namely traditional tools like word processing or Internet searches, into their classroom practice.
- Teachers may be increasingly using digital tools to support teaching and learning, but they have yet to fully embrace newer digital mediums like blended learning software or social media.
- Teachers are shifting away from teacher-centered uses of educational technologies to a mix of teacher-led and student-led uses.
- Most teachers are not satisfied with the quality or usefulness of the technology-related professional development they have received or the adequacy of the technology tools they have access to at their school.
- Most students have limited school-based access to a mobile learning device (laptop or tablet), and if they do, that access is through school provided devices rather than through programs that provide each student one-to-one access.
- Access to digital tools, hardware, and Internet connectivity is not uniform throughout the state – particularly during state test administration.

Based on these findings we recommend the following:

- Maryland focus its technology investments on ensuring that the technology tools *that schools already have* are adequate for meeting the varied demands of the state's teachers and students and that access to technology is uniform across the state.
- If teachers are to gain competency and confidence in using technology, particularly in using new technologies, they need better professional development opportunities that specifically focus on integrating these new tools into their practice.

Often the rationale for investing in technology is simply that more is better. Yet as the results from this survey confirm, teachers' experience, knowledge, and integration of technology into their practice are major factors related to the successful use of educational technology in the classroom.

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Increasingly, K-12 institutions are investing in technology as a means of improving education and student learning (Burch & Good, 2014). A common motivation, cited in U.S. policies and by technology advocates, is that digital technologies are integral to achieving equity, ensuring a highly skilled workforce, and preparing students to make meaningful contributions to our global society (Ahn & Quarles, forthcoming). Digital learning platforms may provide students access to a wider breadth of content and learning opportunities not otherwise available in their classroom or local school district. Technological innovations may be employed to more precisely diagnose students' cognitive skills and deficits and to more accurately make data-driven decisions to improve differentiated and individualized instruction. However, technological change in schools is largely dependent on teacher buy-in, professional support, and teacher preparation (Mishra & Koehler, 2006).

Although early studies of computing in education highlighted the lack of teacher adoption of technology (Cuban, Kirkpatrick, & Peck, 2001), the situation has evolved with more Internet access and renewed interest in using computers in schools. Given this evolving climate, there is a great need to understand teachers' current perceptions and needs. To that end, we explore teachers' perceptions of technology in Maryland. The following data brief reports on a statewide survey of K-12 teachers with specific attention to the following research question: what are teachers' perceptions of and experiences with digital technologies in their schools and classrooms? Our findings provide valuable insight as to how teachers use technology that can inform technology policy and planning.

In Maryland, much of the educational technology policy focus has been on expanding access to high-speed broadband Internet, digital hardware, software and instructional content (Maryland Instructional Technology Advisory Council, 2011; Maryland State Department of Education, 2007, 2011; Maryland STEM Task Force 2009). In addition to expanding access, Maryland has identified educator proficiency as critical to technology integration. The idea is that if students and teachers have access to technology and teachers work to become technologically proficient, then teachers will integrate technology into their practice and student learning will improve. However, the state has provided relatively few financial incentives and little clarity on how best to support teachers' professional development and their technology adoption.

Oftentimes, the rationale for investing in technology is simply that more is better. Yet research continually confirms that while the latest hardware and software is necessary, it is not sufficient by itself to transform teaching and learning (Buabeng-Andoh, 2012; Norris, Sullivan, Poirot & Soloway, 2003). Teachers' experience, knowledge, and integration of technology into practice are major factors related to the successful use of educational technology in the classroom (Mishra & Koehler, 2006; Sandholtz & Reilly, 2004; Sandholtz, Ringstaff, & Dwyer, 1997). Despite positive trends that teachers are increasingly supportive of digital technologies in the classroom, concerns persist about the existence and implementation of adequate practices to support teachers' adoption and use of new technologies (Capo & Orellana, 2011; Lemke, Coughlin, & Reifsneider, 2009). Thus, it is important to periodically assess the factors that may be affecting teachers' technology integration.

Survey Methodology

In spring 2015, researchers at the Maryland Equity Project designed and administered a survey entitled, *The Teachers' Voice: Using Technology* to K-12 teachers in Maryland. The design of the survey was based on the idea that teachers' integration of technology into their classroom practice is based on both individual-level factors like attitude and competency, and school-level factors like access and training. We asked teachers to assess the availability of a full-range of technologies in their schools, from computers and computer-related equipment to the associated networking and software applications that are available for classroom use. In addition, we asked about teachers' technology access as it relates to Maryland's implementation of computer-based state testing.

Technology surveys often catalogue the presence of technology infrastructure without considering what teachers may need or actually use in the classroom (Capo & Orellana, 2011). To overcome this shortcoming, we also asked teachers about their experience, knowledge, and integration of technology into their practice. Since teachers are more likely to integrate instructional technologies into their practice if they receive quality professional development (Chen, 2008; Christensen & Knezek, 2006; Sandholtz & Reilly, 2004), we asked about the technology-related professional development opportunities and training they received. Finally, we surveyed teachers on the technology skills they deem most important for their students to get a sense of what outcomes educators valued from integrating technology into the classroom. Teachers' perceptions of student's digital literacy are a chief factor in the digital engagement and computer mastery of today's youth (Horrigan, 2008; Warschauer & Matuchniak, 2010).

Data Collection

We administered the survey in May and June 2015 using Qualtrics, a web-based survey software, to teachers and paraprofessionals who are members of the Baltimore Teachers Union (BTU) and the Maryland State Education Association (MSEA). We partnered with the unions to distribute the survey, which allowed us to reach teachers and paraprofessional in every public school district in Maryland. The final sample consists of 715 respondents, the majority of whom were teachers, evenly distributed among elementary, middle, and high schools throughout the state (Table 1). Respondents were predominantly female (80%) and over 50% had 15 years or more of teaching experience. The sample included teachers and/or paraprofessionals from every county in Maryland.

Analysis

The remainder of this paper unfolds in two parts. First we report the findings from *The Teachers' Voice: Using Technology* survey. This descriptive analysis includes: (1) how teachers use instructional technologies in the classroom and their perceptions of the adequacy of their schools' technology tools; (2) teachers' perceptions of student access to and use of mobile learning devices (laptops and tablets); (3) the adequacy of teacher access to digital technologies and instructional resources during testing periods; (4) teachers' perceptions of their technology skills and the adequacy of the technology-related professional development they receive; and (5) teachers' perceptions of the most important technology skills they believe students should have. We conclude by situating these findings within a boarder policy discussion of how to better support teachers' integration of digital tools and resources into their teaching practice.

Table 1. Demographic Characteristics of Sample Population

	Frequency	Percent		*Frequency*	Percent
Gender			*Years of Teaching Experience*		
Female	573	80	2 Years or less	16	2
Male	142	20	3 Years to 5 Years	66	9
			6 Years to 10 Years	136	19
Position			11 Years to 14 Years	133	19
Certified Teacher	521	73	15 Years or more	364	51
Para-professional	23	3			
SPED Teacher	82	12	*School Type (N=636)*		
Technology Teacher	8	1	Elementary School	226	36
Media Specialist	24	3	Middle School	194	30
Title I Teacher	17	2	High School	216	34
ESL/ELL	10	1			

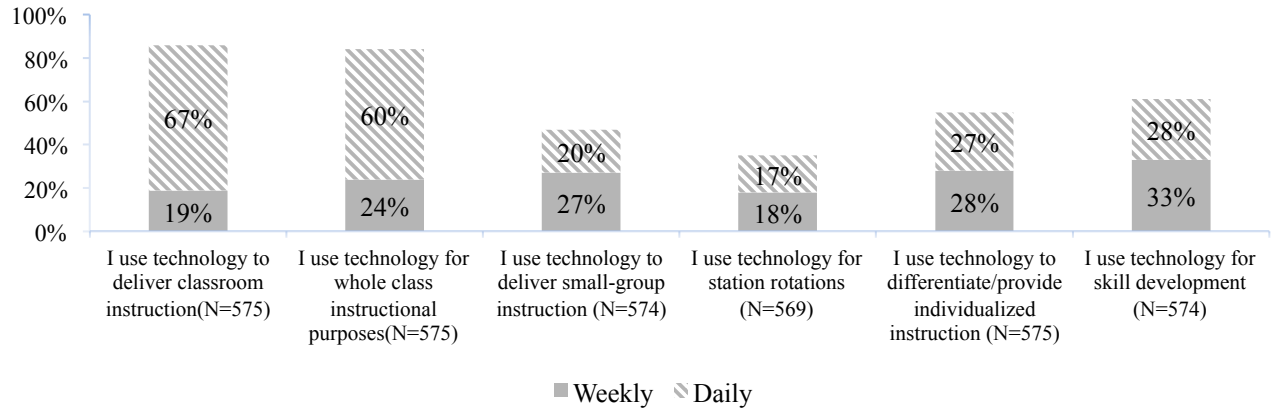
Note. N=715

Findings from the Teachers' Voice Technology Survey

Teacher Use of and Access to Technology

When teachers were asked how they used technology in the classroom, 86% of respondents reported that they use technology to deliver classroom instruction either weekly (19%) or daily (67%) (figure 1). When using technology to deliver classroom instruction, teachers showed a preference for whole-class instruction (84%) over small group instruction (47%). The majority of the survey sample reported daily or weekly usage of technology for skill development (61%) and differentiated instruction (53%). Less than thirty-percent of teacher respondents reported using instructional technologies for station rotations daily or weekly (29%).

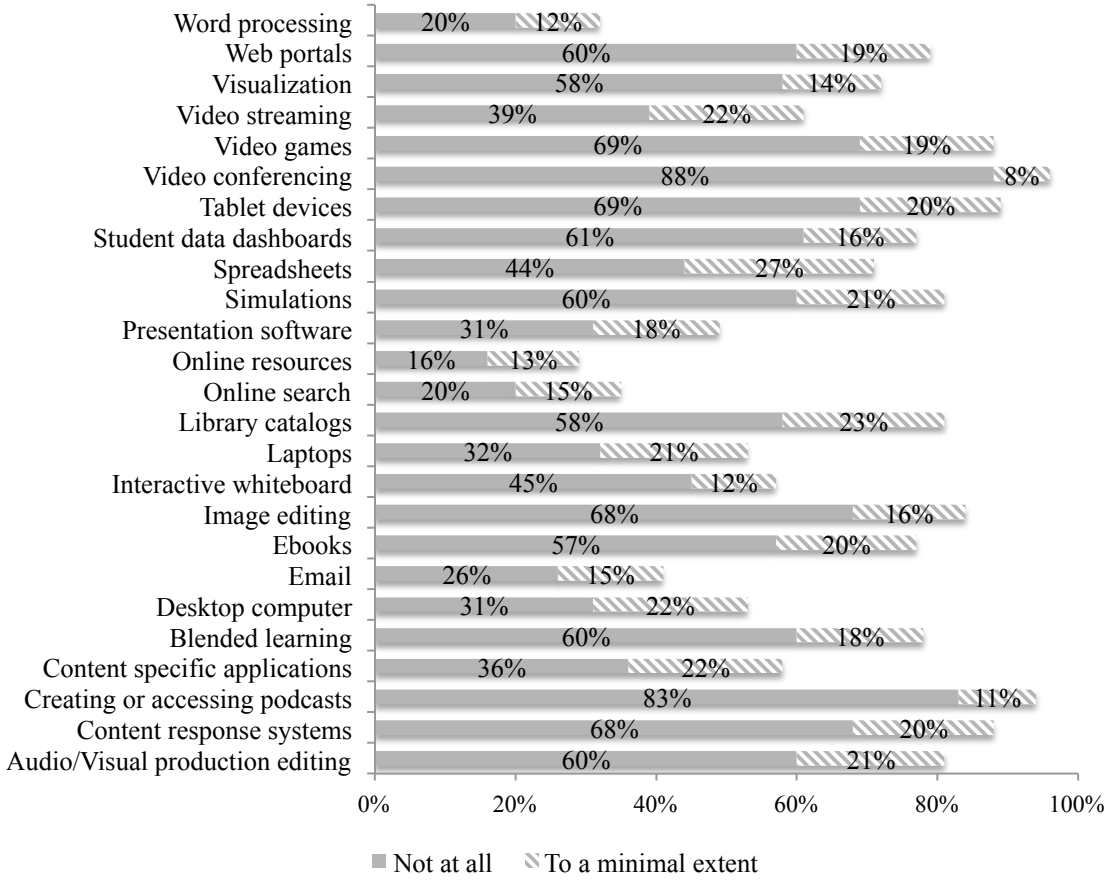
Figure 1. Weekly or daily use of instructional technologies: Percentage of reporting teachers.
To what extent do you use technology for each of the following:



Despite reporting that they regularly use technology, our findings suggest that teachers rely heavily upon a few technology tools to deliver instruction. When asked the extent to which they integrate various digital technologies into their classroom practice or preparation, a majority of respondents reported 'not at all' or 'to a minimal extent' for 18 of 25 items (figure 2). Respondents reported using online resources (71%), word processing (68%), online search (65%), Email (59%), and presentation software (51%) 'to a moderate extent' or 'to a great extent.' Desktop computers (47%) and laptop

computers (47%) were the next most frequently cited tools that teachers used. Perhaps relatedly, the majority of teachers reported dissatisfaction about their access to various technologies in school (figure 3), which may relate to decisions to focus on using a few tools that are available, reliable, or that the teachers are comfortable with employing in the classroom.

Figure 2. Integration of technology tools into classroom instruction or preparation. Percentage of reporting teachers.
To what extent do you integrate the following technology tools into your classroom instruction or preparation?



Notes. Response options were: not at all, to a minimal extent, to a moderate extent, and to a great extent. The first two options are displayed above. N-715.

Data in Table 2 also reveal that Maryland teachers may be shifting away from teacher-centered uses of educational technologies, as found in prior studies (Cuban et al., 2001), to a mix of teacher-led and student-led uses. Nearly one-third of teachers (29%) reported that their technology use was evenly split between teacher-led and student-led, although less than 5 percent of respondents reported that their technology use was overwhelmingly student-led. An intriguing question to explore further is whether shifts to student-centered teaching with technology increases or decreases over time.

Table 2. Nature of Technology Implementation

The nature of my technology instruction is:

	Frequency	Percent
Overwhelmingly teacher-led	72	13
Mostly teacher-led	260	46
Evenly split b/t teacher and student led	210	37
Mostly student-led	24	4
Overwhelmingly student led	6	1

Notes. N=572, 1=overwhelmingly teacher-led, mean (SD)=3.62 (.83)

To gauge the extent to which Maryland teachers may be using student data to support their instructional practices, we asked teachers about their use of results from electronically collected assessments, which are summarized in Table 3. Approximately half of respondents reported using student data to identify individual students who need remedial assistance (54%), to tailor instruction to individual students' needs (53%), to identify and correct gaps in the curriculum for all students (47%), and to identify areas of growth for teachers' content knowledge or teaching skills (48%). Less than forty percent of teachers reported using student data to recommend tutoring or other educational services to students or their parents (30%), or to assign or reassign students to classes or groups (39%). In other words, teachers are using assessment data to inform their practice rather than recommend outside services or to place students in classes or groups.

Table 3. Use of Student Data

To what extent have you used electronically collected student data for each of the following purposes?

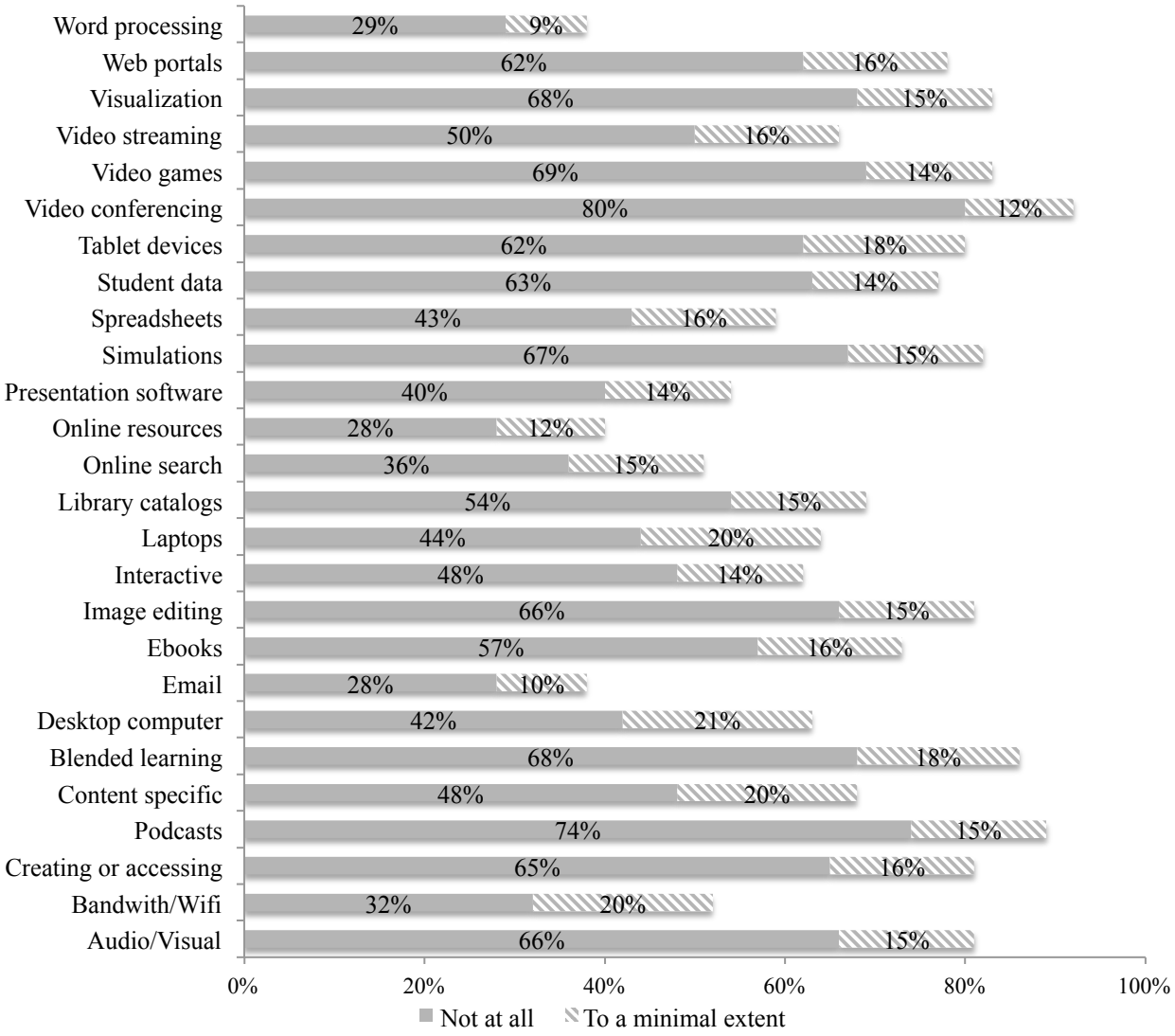
	***M*(*SD*)**	**Not at all**	**To a minimal extent**	**To a moderate extent**	**To a great extent**
To identify individual students who need remedial assistance	1.60(1.04)	102 (18%)	164 (28%)	170 (30%)	138 (24%)
To tailor instruction to individual students' needs	1.57(1.01)	99 (17%)	170 (30%)	184 (32%)	120 (22%)
To identify and correct gaps in the curriculum for all students	1.43(1.01)	119 (21%)	183 (32%)	168 (30%)	98 (17%)
To recommend tutoring or other educational services to students or their parents	1.04(1.01)	218 (38%)	179 (31%)	109 (18%)	65 (11%)
To identify areas where I need to strengthen my content knowledge or teaching skills	1.40(1.01)	135 (24%)	160 (28%)	187 (33%)	88 (15%)
To assign or reassign students to classes or groups	1.19(1.06)	197 (35%)	150 (26%)	144 (25%)	81 (14%)

Notes. N=568-574. 0=not at all, 1=to a minimal extent, etc.

Even though teachers reported using instructional technologies regularly, most teachers are not satisfied with the adequacy of their schools' technology tools (figure 3). When asked to specify their level of satisfaction with their access to 26 technology tools, a majority of respondents were satisfied 'to

a moderate extent' or 'to a great extent' for 2 items: Email (62%) and online resources (60%). Nearly half of respondents were satisfied with their Internet Bandwidth/Wi-Fi Connectivity (48%).

Figure 3. Adequacy of access to technology tools.
To what extent are you satisfied with the adequacy of your access to each of the following technology tools?



Notes. Response options were: not at all, to a minimal extent, to a moderate extent, and to a great extent. The first two options are displayed above. N-715.

Student Access and Usage

Student access to high quality digital devices is a necessary precondition to high quality digital learning (U.S. Department of Education, 2010). Quite simply, students cannot achieve competency or mastery of a technology to which they do not have access. Persistent disparities in digital access for students outside-of-school heighten the importance of equitable access and use of instructional technologies both in and between schools. (Horrigan, 2008; Warschauer & Matuchniak, 2010). Accordingly, we asked

teachers to gauge their students' access to mobile learning devices (tablets and laptop computers) and the source of that access (Table 4). Nearly one-half of respondents (43%) reported that their students had no access to tablet computers and about twenty percent (22%) indicated that their students had no access to laptop computers. School provided mobile carts or classroom devices were the most frequently reported forms of student access to tablets (30%) and laptops (60%).

Table 4. Students' Access to Tablets and Laptops

To what extent do students have access to the following mobile learning devices?

	Frequency	Percent
Tablet (*N*=584)		
School provided 1-to-1 access	37	6
Students may take home school provided devices	6	1
School provided mobile carts or classroom devices	178	30
Students' personal devices	110	19
No access	253	43
Laptop (*N*=579)		
School provided 1-to-1 access	48	8
Students may take home school provided devices	3	1
School provided mobile carts or classroom devices	346	60
Students' personal devices	52	9
No access	130	22

Nineteen percent of respondents reported that students were permitted to use their own tablets, and 9 percent reported that students were permitted to use their own laptops. Less than 10 percent of respondents reported that their students had access to one-to-one tablet (6%) or laptop (8%) programs where all students are provided with their own device. Less than 1 percent of respondents indicated that their students may take school provided tablets or laptops home. When asked about how frequently students used mobile learning devices, less than half of the surveyed sample indicated that their students use tablets (37%) or laptop computers (44%) daily or weekly (Table 5). These findings suggest that most students likely rely on desktop computer labs or desktop computers within their classrooms. The paucity of one-to-one and take-home mobile device programs is noteworthy in light of Maryland's policy language in support for such initiatives (Maryland Instructional Technology Advisory Council, 2011). For example, the state has articulated that every student should have access to his or her own Internet-enabled computer "to close the technology gap," (Maryland Instructional Technology Advisory Council 2011, p. 18).

Table 5. Students' Usage of Tablets and Laptops

To what extent do students use the following mobile learning devices

	M (*SD*)	Never	Infrequently	Weekly	Daily
Tablet (*N*=*454*)	1.19 (1.18)	183 (40%)	103 (23%)	69 (15%)	99 (22%)
Laptop (*N*=484)	1.40 (1.04)	112 (23%)	161 (33%)	118 (24%)	93 (19%)

Note. 1=Infrequently

Impact of New Testing Requirements

During the 2014-2015 school year, Maryland began full implementation of computer-based—Partnership for Assessment of Readiness for College and Careers (PARCC)—state assessments (Maryland State Department of Education, 2014). Readiness for these assessments required significant

infrastructural and human capital investments for most schools and districts. Because the implementation of the PARCC represented a significant shift in how schools administered state assessments, we asked teachers to assess their technology experiences during testing periods. Specifically, teachers were asked to rate the adequacy of their access to various digital technologies and instructional resources during PARCC testing. While the mean response suggests minimal satisfaction with technology access during testing, there was considerable variability within the population for nearly all items, as seen in Table 6. Only 50% of teachers reported that they were satisfied with their Internet connectivity during periods of PARCC testing to a moderate or great extent. Respondents perceived their access to other technology tools during testing far more negatively. Most teachers reported no access or minimal access to desktop computers (50%), laptops (50%), or tablets (49%) during testing.

Table 6. **Adequacy of Access to Technologies during Testing**

During periods of PARCC testing, do you feel that you have adequate access to the following resources for instructional purposes?

	M (*SD*)	N/A	Not at all	To a minimal extent	To a moderate extent	To a great extent
Bandwidth/Wi-Fi Connection	1.80 (1.4)	181 (25%)	121 (17%)	147 (21%)	166 (23%)	100 (14%)
Desktop Computers	1.39 (1.2)	210 (30%)	216 (30%)	146 (20%)	88 (12%)	55 (8%)
Laptops	1.40 (1.3)	200 (28%)	240 (34%)	117 (16%)	78 (11%)	80 (11%)
Tablets	0.96 (1.1)	284 (40%)	282 (39%)	73 (10%)	44 (6%)	32 (5%)

Notes. N=715. 0=not at all, 1=to a minimal extent, etc.

In written comments, respondents identified a number of additional challenges posed by the administration of PARCC (Table 7). Comments indicated that in some schools, computers and mobile devices were used exclusively for PARCC preparation for upwards of 6 weeks prior to testing. Respondents stated that access to certain websites and online content was restricted and that both Wi-Fi and bandwidth slowed significantly during testing. Other teachers reported that PARCC disrupted regular classroom activities, and in some instances teachers were displaced from their classrooms in order to accommodate testing. Summarizing many of these challenges, one teacher wrote, "I teach a class that is solely web-based—there are no textbooks, and almost all of our resources have been loaded [onto the Internet]—and PARCC administration took away the laptops that were almost solely dedicated for this class." Some schools reportedly opted out of the electronic administration of PARCC entirely because they lacked the necessary bandwidth or computer hardware. Other challenges included computers crashing during administration, and insufficient PARCC training and practice time for both teachers and students.

Teacher Skill Self-Assessment and Professional Development

Several recent studies report that teachers are more likely to integrate instructional technologies if they receive quality professional development (Chen, 2008; Christensen & Knezek, 2006; Sandholtz & Reilly, 2004). Thus, we asked teachers to evaluate their own technology skills and their professional development related to technology. When asked to assess their technology skills, more than three quarters of respondents described themselves as either average technology users (41%) or very

good/intuitive technology users (38%) (Table 8). Indicative of the ubiquity of digital technologies (Horrigan, 2008; Smith, 2010; Fox & Rainie, 2014), less than 6 percent of teachers did not consider themselves a technology user (0.7%) or a novice technology user (5%). However, only fifteen percent of teachers self identified as technology leaders.

Table 7. Summary of Written Comments about PARCC Administration Challenges

Are there any issues with access to technology, software, or other tools that you experience due to PARCC testing requirements?

	Frequency	Percent
Restricted access to websites or online content	134	30
Computer "glitches" during testing	97	22
Non-testing classrooms/students, limited or Insufficient Bandwidth or Wi-Fi in non-testing classrooms	51	11
No PARCC testing challenges	48	11
Non-testing classrooms/students, no access to technology devices, mobile device carts, or computer labs	38	9
Non-testing classrooms/students, restricted access to technology devices for non-testing classrooms/students	34	8
Insufficient student or teaching training on electronic testing platform (e.g., no practice test opportunities)	18	4
School Opted out of online testing because of insufficient technology capabilities	17	4
Teaches displaced from classrooms in order to accommodate testing	8	2
Insufficient testing accommodations for special student populations	2	<.1

Note. N=398 unique written comments.

Table 8. Self-assessment of technology skills

Please select the statement that best describes the level of your technology skills:

	Frequency	Percent
I do not consider myself a technology user	4	0.7
I consider myself a novice technology user	30	5
I consider myself an average technology user	241	41
I consider myself a very good/intuitive technology user	218	38
I consider myself a technology leader	89	15

Notes. N=582, M(SD)=3.62(.83)

While three quarters of respondents participated in technology-related professional development (Table 9), data revealed considerable variability with respect to the extent to which technology professional development helped improve their teaching practice. More than sixty percent of surveyed teachers reported that their technology-related professional development had minimally benefitted their teaching (44%) or had no benefit on their teaching practice (22%). In contrast, five percent of respondents indicated that the technology related-professional development they received fundamentally changed their teaching practice, and it substantially aided the teaching practice of approximately thirty percent (29%). Understanding the different types and conditions of teacher

professional development remains a pressing issue in both research and practice (Lawless & Pellegrino, 2007).

Table 9. Adequacy of Technology-Related Professional Development

To what extent do you feel that the technology-related professional development you received helped you improve your teaching practice in each of the following areas:

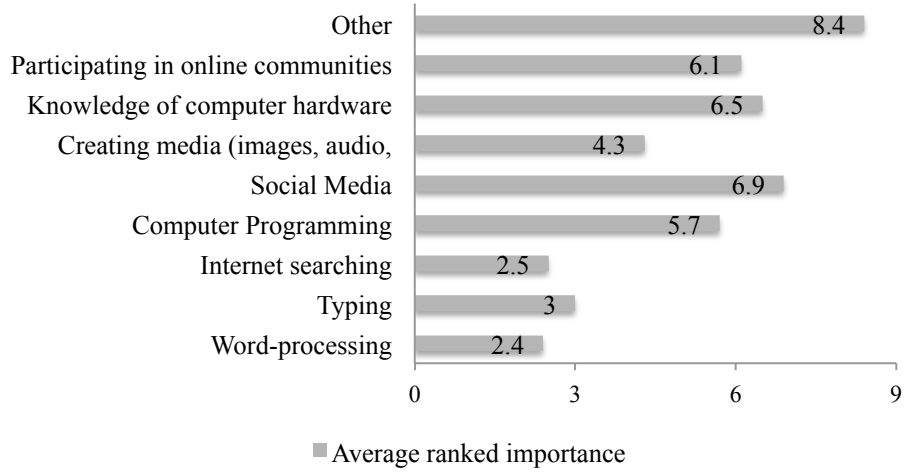
	Frequency	Percent
It had no benefit or I did not focus on technology-related professional development this year	125	22
It had minimal benefit on helping my teaching practices	247	44
It helped me improve my existing teaching practices substantially	160	29
It fundamentally changed my teaching practice	25	5

Notes. N=557, M(SD)=1.15(.82)

Teachers' Perceptions of Students' Technology Skills

To assess what student technology skills teachers perceive as more valuable, respondents were given a list of 8 technology-related skill sets and asked to rank them in order of importance for their students from 1 to 9, with 1 being the most important. Figure 4 shows the mean ranking score of each skill. It is important to note that in this instance, the skill with the lowest average rank was the most preferred. Across all grade levels, teachers ranked word processing, Internet searching, and typing as the most important skills students needed (mean rank, 2.4, 2.5, 3.0, respectively). This finding is perhaps unsurprising, given that respondents most often integrated word processing and Internet-related activities into their classroom practice. Moreover, many of the remaining skill sets that teachers were asked to rank involve relatively newer technologies (e.g., participating in social media, learning about computer programming), about which teachers may be less familiar or slower to adopt.

Figure 4. Average ranked importance of student technology skills.
From your perspective, which set of technology-related skills are most important for your students? Please rank from most to least important option.



Note. Lower values signify that teachers ranked the skill as higher priority/value.

Conclusion and Implications for Policy

Our survey of Maryland teachers suggest that although most teachers expressed comfort with instructional technologies, that comfort may not be uniform across all forms of technologies. In general, we observe that most teachers are regular users of computers, although only a small percentage considered themselves to be expert users. In their teaching practice, teachers reported more frequent use of mature and older tools such as word processing or Internet searching and prioritized those skills for their students. In contrast, teachers expressed marginal access to, use of, and support for newer digital mediums like blended learning software and social media. Teachers may also be relying upon older, more traditional, instructional technologies because of the limited effectiveness or usefulness of the technology-related professional development they reportedly received, and dissatisfaction with their level of adequate access to new technologies.

Our findings also illuminate other trends with technology. In the area of mobile devices, current research suggests that young people have widespread access to mobile technologies outside of school (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). However, there is still a long way to go in terms of schools implementing and supporting mobile devices for learning in Maryland. Our findings also point to the complexities and challenges that are introduced with new standardized testing requirements such as PARCC. Teachers reported that PARCC testing had the effect of limiting students' and teachers' access to digital tools and to digital content significantly. Finally, findings suggest that access to digital tools, hardware, and Internet connectivity are not uniform across the state. The finding that some schools were able to meet new testing requirements without incident, as others struggled is evidence of a digital divide. Moving forward, the state may do well to focus its attention on ensuring that the technology tools schools already have are up-to-date and able to meet the needs of Maryland teachers and students.

Technology will continue to be a ubiquitous, and ever more engrained, presence in K-12 schools. Our survey results suggest that shifts are occurring, albeit slowly and steadily with Maryland teachers, and there is much that could be done to better support teachers moving forward. Adequate technology infrastructure and technical support will always need to be improved in order to provide reliable access to tools. School leaders will need to consider how competing pressures – such as testing – will impact teachers' access to and support for technology. Finally, our teacher respondents pointed to the prominent need for better teacher professional development that can help educators to shift their perceptions of how technology can be used in the classroom, and to improve their technological skills and competencies as technology evolves. For example, there is great potential for more student-centric teaching with technology, but that shift requires careful teacher support to help educators better understand and employ those strategies effectively. As new technologies continually emerge and students require different skills, such as programming or digital literacy in online settings, there is a critical need to understand how to help and support educators to integrate these new competencies into practice as well.

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