

Baltimore County School Health Council  
Workgroup Report  
Health Guidance for the Digital Classroom

July 2016

Workgroup Members: Cynthia Boyd, MD, MPH., Timothy Doran, MD, Kim Ferguson, MEd, Beth George, OTR/L, Fran Glick, MEd, Karen Greeley, DScPT, Linda Grossman, MD, Allison Jensen, MD, Scott Krugman, MD, Alan Lake, MD, James Lawson, PhD, Debbie Somerville, RN, MPH

*Introduction:* The age of digital learning is here. We are not yet aware of the full advantages of this model of learning nor the acute and chronic complications there-of.

We present here a consensus of the potential impact on the health and development of our children with an equal recognition of the critical need to closely monitor the impact on learning, social interaction, and life.

While our recommendations are directed at meeting curriculum needs of the teacher and schools, it is equally important to address the increasing digital role in the family and community.

*Process:* The workgroup identified and discussed potential health impacts in a classroom with individualized digital learning devices within an innovative, comprehensive digital learning culture. The workgroup reviewed available research as well as recommendations from the American Academy of Pediatrics and other nationally-recognized health advocacy groups about the potential health impacts of the digitally-transformed classroom. Using research and theoretical considerations, the workgroup developed recommendations that would address or mitigate these potential health impacts.

*Potential Health Impacts:* A detailed table of the findings of the deliberations of the workgroup is attached. It was agreed that a digitally transformed classroom could have impacts in a variety of health areas including the musculoskeletal system, vision, sleep, cognitive development, and social-emotional development.

*Workgroup Recommendations:* Two interesting patterns emerged in the discussions of the workgroup. First, there is a lack of strong research about best practices in some of these areas. Second, the recommendations for addressing different health concerns are often the same. For

## Baltimore County School Health Council

### Workgroup Report

#### Health Guidance for the Digital Classroom

example, limiting time at the computer and permitting frequent position changes will help to address musculoskeletal and vision concerns.

Because of the lack of strong research and the continued evolution of the digital classroom, the workgroup recommends that it continue to meet, at least annually, to review new research, review feedback on the effectiveness of the recommendations, and provide updated guidance. In addition, the workgroup was limited by the lack of specific information about the time and nature of student involvement with digital devices in BCPS; anecdotal reports often varied significantly. Information about these areas, ideally supplemented by information from parents about student digital use outside of school hours and information about the prevalence of physical concerns, would be of significant help.

The following list represents the initial guidance of the workgroup.

#### Time at the Computer

- Each classroom and student day should reflect a balance of learning modalities.
- In general, no more than half of the learning day for a high school student should be spent on the computer. Time spent on the computer should be minimal before students enter kindergarten. Between kindergarten and high school, computer time in the student day should increase gradually.

#### Physical Development

- Provide, in general, a break from computer tasks every 20 minutes to allow for movement and change of visual focus.
- Include a mix of sedentary and active tasks in each student and classroom day.
- Encourage students to use good posture, frequently change positions, and respond to discomfort by changing positions. Use of accessories (e.g., filters or apps to reduce glare, external keyboards, mouse, adjustable chair, foot stool) can improve posture and comfort for some students.
- Explore the option of having teachers complete a session on ergonomics of computer use to enable them to support an ergonomically healthy learning environment.
- Recess should be device-free, outdoors whenever possible, and should promote the development of gross motor skills when possible.

#### Social-Emotional Development

- Recess should be generally unstructured and should promote the development of social skills through activities like cooperative play.
- Computer interactions should never replace adult feedback nor the opportunities for social interactions.

## Baltimore County School Health Council

### Workgroup Report

#### Health Guidance for the Digital Classroom

- The use of extrinsic rewards, including those that are embedded in digital software or rewards given to incentivize time spent on the devices, should be balanced carefully with the need for students to develop intrinsic motivators such as pride in skill development, personal improvement or the love of reading and learning.
- Personalization of the relationship between the teacher and the student is of equal importance to personalization of learning.
- School plans for students with special needs should include strategies to promote healthy transitions between preferred and other activities.

#### Cognitive Development

- Paper versions of texts and homework should be available to all students.

#### Homework

- Homework assignments should reflect a balance of learning modalities and should mirror the guidance for the school computer time. This will require collaboration and communication between departments in secondary schools. Students should have a balance each day of computer-based and non-computer based homework so that they can adhere to the recommendation to avoid device use in the hour before bedtime.

#### Collaboration with Families

- Schools and families must work together to promote health in the digital age. This means that both must ensure that children are involved in a variety of activities, avoid replacing physical activity and social interaction with digital interaction, and encourage in person interactions for the development of social skills.
- Computers and other digital devices should not be used in the hour before bedtime.
- Parents are strongly encouraged to designate bedrooms as device/media-free zones.

Baltimore County School Health Council  
Workgroup Report  
Health Guidance for the Digital Classroom

**Selected References**

- Bali, J., Neeraj, N., Bali, R.T. (2014). Computer vision syndrome: A review. *Journal of Clinical Ophthalmology & Research*, 2, 61-68. doi:10.4103/2320-3897.122661.
- Christensen, C.A. (2004). Relationship between orthographic-motor integration and computer use for the production of creative and well-structured written text. *British Journal of Educational Psychology*, 74, 551-564.
- Course, L.J., Chen, D.W. (2010) A Tablet Computer for Young Children? Exploring Its Viability for Early Childhood Education. *Journal of Research on Technology in Education*, 43, 75-98.
- Gaul, D., Issartel, J. (2016). Fine motor skill proficiency in typically developing children: On or off the maturation track? *Human Movement Science* 26: 78-85. doi:org/10.1016/j.humov.2015.12.011.
- He, M., Xiang, F., Zeng, Y., Mai, J., Chen, Q., Zhang, J., Smith, W., Rose, K., Morgan, I.G. (2015). Effect of Time Spent Outdoors at School on the Development of Myopia Among Children in China: A Randomized Clinic Trial. *Journal of the American Medical Association*, 314, 1142-1148. doi:10.1001/jama.2015.10803.
- Jacobs, K., Kaldenberg, J., Markowitz, J., Wuest, E., Hellman, M...Barr, A. (2013) An ergonomics training program for student notebook computer users: Preliminary outcomes of a six-year cohort study. doi:Io.3233/WOR-121584.
- Kuhn, S., Romanowski, A., Schilling, C., Lorenz, R., Morsen, C., Seiferth, N., ...Gallinat, J. (2011). The neural basis of video gaming. *Translational Psychiatry*, 1. doi:10.1038/tp.2011.53
- Li, X., Atkins, M.S. (2004). Early Childhood Computer Experience and Cognitive and Motor Development. *Pediatrics*, 113(6), 1715-1722.
- Lillard, A. S., Peterson, J. (2011). The Immediate Impact of Different Types of Television on Young Children's Executive Function. *Pediatrics*, 128. doi:10.1542/peds/2010-1919.

Baltimore County School Health Council  
Workgroup Report  
Health Guidance for the Digital Classroom

- Radesky, J.S., Christakis, D.A. (2016). Keeping Children's Attention, The Problem with Bells and Whistles. *JAMA Pediatrics*, 170, 112-113.  
doi:10.1001/jamapediatrics.2015.3877
- Rose, K.A., Morgan, I.G., Ip, J., Kifley, A., Huynh, S., Smith, W., Mitchell, P. (2008). Outdoor Activity Reduces the Prevalence of Myopia in Children. *Journal of the American Academy of Ophthalmology*, 115, 1279-1285.  
doi:org/10.1016/j.opthta.2007/12/019.
- Rosenfield, M. (2011). Computer vision syndrome: a review of ocular causes and potential treatments. *Ophthalmic & Physiological Optics*, 31: 502-515.  
doi:10.1111/j.1475-1313.2011.00834.x.
- Straker, L., Maslen, B., Burgess-Limerick, R., Johnson, P., Dennerlein, J. (2010). Evidence-based guidelines for the wise use of computers by children: Physical development guidelines. *Ergonomics*, 53, 458-477. doi:10.1080/00140130903556344.
- Uhls, Y.T., Michikyan, M., Morris, J., Garcia, D., Small, G.W., Zgourou, E., Greenfield, P.M. (2014). Five days at outdoor education camp without screens improves preteen skills with nonverbal emotion cues. doi.org/10.1016/j.chb.2014.05.036
- Van der Lely, S., Frey, S., Garbazza, C., Wirz-Justice, A., Jenni, O.G...Schmidt, C. Blue Blocker Glasses as a Countermeasure for Alerting Effects of Evening Light-Emitting Diode Screen Exposure in Male Teenagers. *Journal of Adolescent Health* 56, 113-119.  
doi:org/10.1016/j.jadohealth.2014.08.002.
- Vasavada, A.N., Nevins, D.D., Monda, S.M., Hughes, E., Lin, D. (2015). Gravitational demand on the neck musculature during tablet computer use. *Ergonomics*, 58, 99-1004.  
doi:10.1080/00140139.2015.1005166.
- Zheng, B., Warschauer, M., Lin, C., Chang, C. (2016). Learning in One-to-One Laptop Environments: A Meta-Analysis and Research Synthesis. *Review of Educational Research*, 1-33. doi:10.3102/0034654316628645.
- Weiss, M.D., Baer, S., Allan, B.A., Kelly, S., Schibuk, H. (2011). The Screens Culture: Impact on ADHD. *Attention Deficit Hyperactivity Disorder*, 3: 327-335.  
doi:10.1007/212402-001-0065-z.

Baltimore County School Health Council  
Workgroup Report  
Health Guidance for the Digital Classroom