

**MAC 238-18**  
**Learning with Screens in**  
**Schools Work Group**  
**Report to the**  
**2019 Annual Meeting of the**  
**Provincial Assembly**

## **Report of the MAC 238-18 Learning with Screens in Schools Work Group**

### **MANDATE**

At AMPA 2018, the following motion was referred to the Provincial Executive for study and report to AMPA 2019:

**BIRT** AMPA direct the Provincial Executive to establish a work group that will examine the issue of learning with screens in schools. The scope of the work group shall include (but not be limited to):

1. effects on learning
2. effects on health (for the learner and teacher)
3. the cost to school boards/public education system to invest in screens and/or supporting technology
4. the waste generated due to obsolescence and/or lack of proper support/failed implementation.

#### **Tasks of the Work Group could include:**

1. a summary of the evidence of the benefits and/or harms of screens on learning.
2. a summary of the evidence of the benefits and/or harms of screens on health.
3. a cost analysis, including waste costs to be released to the public.
4. recommendations for teachers/educational workers for use of screens in education.
5. recommendations to the Ministry of Education and/or school boards for use of screens in education and allocation of funds for education technology.

### **Work Group Members:**

The Work Group is comprised of the following members:

- Rob Gascho, Vice President
- Rosemary Judd-Archer, Executive Assistant
- Norm Westbury, Executive Assistant
- Chris Samuels, Policy Analyst

### **Learning with Screens in Schools**

Personal mobile devices, tablets, computers, interactive whiteboards and a myriad of other screens currently fill the vast majority of educational settings in Ontario. The rate of expansion of the use of screens in education has far exceeded the research regarding the efficacy of their usage. Gradually, though, the results of studies are being published and providing educators with grounds to make decisions that maximize learning benefits and minimize health consequences.

As the majority of discussions on this topic involve pro/con research, we have provided a review that summarizes the most prevalent themes in a similar format. Recommendations to educators as well as government are included at the end and are followed by an extensive bibliography.



### **Effects on Learning: a summary of the evidence of the benefits and/or harms of screens on learning**

While it is accepted that learning with screens is now part of education in Ontario, it is relevant to note that these devices “are not designed specifically for education” and that their “integration into the curriculum should be guided by strategy and goals” (Kumi et al, p.182).

Improving student achievement is often stated as an outcome for increasing access to technology, but studies prove that there are too many variables to state that correlation. In fact, many studies point to losses in learning.

#### **A. Losses vs. Improvements**

The introduction of technology into education has provided many options for educators to differentiate instruction to the needs of individual learners. In many cases, being able to “provide multiple means and methods for learners to grasp traditionally difficult concepts” has helped learners achieve far better understanding than was previously possible (Darling-Hammond et al, p.7).

The increased ability for teacher/student and peer feedback (Keppler et al), along with limitless trial/error learning experiments with screens naturally improves writing, for example. However, those learners who are provided opportunities to work alongside their teachers and in collaboration with their peers, as well as with screens, are the ones who demonstrate, and self-report, the most significant improvements in their learning and writing. It is of interest to note that some students report that they feel they have to control the balance of using screens and the more traditional “pen and paper practices through which their final public assessments will be conducted” (Blikstad-Balas, p.323). Variety in curriculum delivery to learners and choice in knowledge demonstration by learners are both important.

Learners who take longer to process information and formulate responses often learn from, and participate more in, online, rather than in-class, discussions (Casey & Evans, p.139). Comments are saved and can be used later for reflection and extension and this can add an element of seriousness and professionalism that brings the learning up a level. There are security, privacy and monitoring issues that must be dealt with, but learners who can contribute anonymously, with the time and space they need to process, will contribute and retain more.

The largest losses in learning seem to come when personal laptops are the focal point of learning (Derounian, p.3). Not everything is better on a screen. There are a number of significant learning outcomes that cannot be achieved with a screen. When reviewing the use of computer-based additions to integrated STEM education, these additions were seen as “*not very effective at improving students’ learning performance*” (Belland, p.416). Ultimately, integrating screen technology into a classroom does not necessarily improve learning and, further, if the integration is done so ineffectively, the screen technology is detrimental to learning.

It is often assumed that, because students have grown up using screen technology, they understand how to use it for learning. This is not the case. Students are often more skilled with screen technology for games and social media, but less skilled with using the same technology as a learning tool (Clayton). Learning with screens in schools requires explicit instruction about the use of the technology as well as the subject material that is the focus of the learning. The educator must assess the investment into learning the technology against the added value to the content/subject material learning.



## **Distraction vs. Enhancement**

Direct links have been made between the access to personal screen technology and learner distraction. Generally, learners are distracted by communicating or through searching for information and entertainment. Anecdotally, educators know that the learners overestimate their ability to effectively multi-task using screens. In fact, learners who are distracted by screens “take poorer notes, retain less information and do worse in tests based on the material” (Derounian, p.3).

Numerous studies demonstrate that multi-tasking is not actually what takes place in the brain when we attempt to do more than one thing at a time. Switch tasking is a more accurate description as we “switch” from one activity to another. Each time we switch, there is delay and there will be time, and potentially, opportunities to learn, lost. A learner, then, who is randomly looking at several screens at a time (laptop, tablet, whiteboard) will not be as efficient as one who is purposefully choosing the best screen for each task.

This is not new information and, in the early 2000s, those working with children and youth in all domains were encouraged to “devise strategies to assuage the negative effects of...dependency” on screen technology so as to increase learning potential and decrease stress (Cheever, p.290).

It is encouraging to note that learners in secondary schools “appear to be more on-task when using mobile devices than their higher education peers” (Benzimra, p.986). This would indicate that, recognizing that the distraction can negate the enhancement; educators have taken heed of the need to socialize learners as to how best to learn with screens in schools.

## **B. Individual vs. Collaborative Use**

The belief that every learner requires personal access to a device with a screen is prevalent. In order to combat the never-ending soft and hardware sales pitches to have more and more devices, it is essential to note that 1-1 is not proven to be pedagogically sound. Specifically, “two-to-one may lead to higher learning gains than one-to-one” (HaBler et al, p.152). Further, when assessing “collaboration learning mode and individual learning mode”, increases in outcomes are higher with collaboration (Xie et al, p. 34).

In studying learning, behavioural psychologists and anthropologists have long-stated that humans are social beings who learn best through relationship; relationship with what they are learning (content), with those helping them learn (educators) and relationship with other learners. From Jean Piaget and Erik Erikson’s stages of development to Ivan Pavlov’s conditioning experiments to Margaret Mead’s insistence that learning is dependent upon the society within which the learner finds themselves, social scientists insist that effective learning – learning that changes the brain and is retained for further use – must be done in relationship (Carlson). It is, then, essential that students be provided opportunities for collaboration so that they a) learn how to collaborate with others through practice and b) maximize their learning potential.



## **Always vs. Better**

Initial uses of screens in school were focused on the technology itself. That is understandable as, for many learners, school was the only and first place that they were able to access and learn the technology. This is no longer always the reality and studies demonstrate clearly that a default of *always* teaching and learning with a screen is detrimental. In order to enhance learning through the use of screens, their use should be, first and foremost, pedagogically sound.

Learners can become more engaged in the learning process (Keppler, p.285) and educators and schools can identify and define their learning goals in a more meaningful way when they understand how technology can help them attain those goals (Kumi, p.182). Learners and/or educators using the tablets from the mobile cart simply because they have access to them is no longer good enough. Ignoring the 'features' of the screen technology and/or not examining, determining, preparing, planning and linking them to the content will result in honeymoon learning of the technology but not lead to transformational learning.

The focus needs to be on *better* use of screens in teaching and learning. Educators must be provided with "resources to help them create enriching, informative and interactive classes" (Sana et al, p.30) whether involving screen technology or not. Learner variability, learning objectives and effective pedagogy all must be considered by "both teachers and technology developers to consider the actual pedagogical orientation the technology itself has within the learning process" (Xie, p.35).

Corporate hardware and software developers cannot control this domain. For maximum improvement in the use of screens in schools, skilled educational workers must contribute to these conversations as early as pre-service (Burden, p.88). Learners, also, have much to contribute as we know that when students self-select their learning, both their motivation and achievement increase (Belland et al, p.421). It is in the nature of all learners to test limits and push boundaries in order to develop deeper understanding. Through this questioning, both learners and educators and developers will be able to adapt to meet changing needs.

Any use of a screen in school should be questioned and justified. Many educators are creating their own checklists for use of technology decision-making and some boards have them as well. They include questions such as: "What potential does this medium have for learning? Is there a better way? What will the learning look like? What scaffolding is needed for the learning to occur?" (Casey, p.132).

## **C. Conclusions**

When the concentration is on the technology itself – as opposed to the technology as a tool to access, create and share content – both productivity and learning are decreased. A screen – whether smart phone, tablet, laptop, whiteboard – is a tool. In most domains, one chooses the tool for a task based on the best match between the resources available and the desired/expected outcome. Once introduced into education, screens quickly became the default tool used for all tasks. To some extent the availability of the tool has changed the tasks and it is being recognized that many of the outcomes (inability to inquire, focus, create, collaborate) are unexpected and undesired.

There is no evidence of the use of screens in schools "having transformed educational practices for the better, nor...having enabled innovative approaches to teaching and learning, nor...do



they appear to have been used in order to expand the scope and quality of students' understanding of the world" (Blikstad-Balas, Davies, p. 329).

This is not to state that screens should never be used; they can be an effective educational tool with features that can enhance understanding. But, all studies point to student focus on the features of technology being a detriment to learning. When the focus remains, not on the features but rather on learners examining, determining, preparing, planning and creating content in collaboration, then screens – mobile and fixed devices – enhance learning and productivity.

### **Effects on health: a summary of the evidence of the benefits and/or harms of screens on health**

The research we conducted on positive health benefits, while fairly exhaustive, only produced anecdotal evidence. The minor number of articles cited focused on emotional health and reported increases in serotonin levels (aka increased happiness). The articles also cited increased creativity, engagement in tasks and increased collaboration skills while using screens in schools. While these are all certainly positive, the research is mainly self-reported by participants and difficult to measure in any concrete or reliable way.

Australian schools report the highest daily usage of the internet in the classroom and a recent blog post at, [www.familyzone.com/schools/blog/screens-in-schools-the-good-news](http://www.familyzone.com/schools/blog/screens-in-schools-the-good-news), identifies some of the recent positive findings.

Most of the current research we reviewed within the last four (4) years has focused on the negative health effects of screens. A key item that appeared in many articles was the fact that the use of screens has a negative impact on melatonin production. The decrease in melatonin is directly related to issues with the ability to fall asleep, sleeping patterns and sleep disruption. Many articles reported that the unnatural light that is produced by screens causes sleepiness while using the devices but that the actual exposure is a sleep disrupter. However, the evidence regarding the association between increased screen time and decreased sleep quality is consistent (Rosen) A few key articles are highlighted here:

- Chinoy et al (2018) study findings demonstrate that evening use of LE-tablets can induce delays in self-selected bedtimes, suppress melatonin secretion, and impair next-morning alertness, which may impact the health, performance, and safety of users
- Hale & Guan (2015) found that screen time is adversely associated with sleep outcomes (primarily shortened duration and delayed timing) in 90% of studies. Some of the results varied by type of screen exposure, age of participant, gender, and day of the week
- Levenson et al (2017) compared those who rarely or very rarely check Social Media (SM) in the 30 minutes before bed with those who often or very often check SM at that time. Those who check more showed an increase in sleep disturbance. Additionally, there was significant linear trend in the odds ratios between the frequency of checking SM in the 30 minutes before bed and increased sleep disturbance.

### **Cost Analysis**

Using the Freedom of Information process, we were able to obtain significant amounts of Technology Board Survey data from the Ministry of Education. Ontario Boards of Education have been completing surveys regarding technology since 2009. The most recent survey sent to boards contained over 1500 questions on a variety of topics, such as:

- Internet Access ("What percentage of portables have wireless access to the internet?")
- Numbers of Devices ("Total Number of Mobile Laptop Computers for Use by Administrative Staff?")
- Instructional vs. Student Use ("Total Number of Instructional Desktops Computers for Student Use in Laboratories: 3 years or newer?")
- Policies & Plans ("Is Learning with Technology in the Board Leadership Development Strategy?")

While it seems like these surveys would provide exhaustive and accurate data that is not the case. Not one board fully completed the survey, many answers contradict answers given to similar questions in different (and in some cases the same) years, and, ultimately, the information is only as accurate as the information given to the person completing the survey.

The Office of the Auditor General of Ontario has also recognized the necessity for greater efficiencies in the tracking of technology costs. The recommendation to increase savings by encouraging partnerships that provide cheap, dated equipment is pedagogically problematic on two fronts: the partnership often involves collecting student information or at least usage patterns to be used for corporate gain and, with the current speed of technological advancement, students cannot be prepared in the present for future applications while using technology from the past. The "IT Systems and Technology in the Classroom" report further highlights that all of these costs have been incurred without sufficient investment in curriculum planning, software decision-making, reporting systems or cybersecurity measures (Lysk).

Ultimately, we agree that "the convenience benefits of these technologies do not, as things stand, unambiguously constitute sufficient justification for the cost and disruption involved in their introduction into schools, but that opening the school curriculum to the serious study of the meanings and challenges of the digital world clearly might" (Blikstad-Balas, Davies, p330).

## Recommendations

- I. Based on our research, we make the following recommendations for teachers/educational workers for use of screens in education:
  - a. Learning:
    1. Ensure that the use of the screen is the best available option for the unique combination of content and learner(s).
    2. Consider limiting the number of 1-1 (student to screen) tasks during learning to increase student interactions, interpersonal skills and collaboration.
    3. Be specific with learners regarding the purpose of, timing for and manner in which the screen will be used. Restrictions and limitations are recommended and should be clearly stated.



b. Health:

1. Ensure ergonomic risk assessments are completed, as necessary, for workers who use computers/screens for a significant portion of their workday. The assessment should consider but, not necessarily be exclusive to: examining time spent on the screen, workstation design, work tasks, administrative controls, and lighting. (Risk assessments are still one of our best tools to address H & S hazards in our workplace).
2. Ensure all screens in use in educational workplaces are at a minimum, liquid crystal display (LCD) screens, or as a best practice, light emitting diode (LED) screens. (Current transparent conducting oxide (TCO) standards indicate that the new LCD/LED screens emit less than 1 milliGauss of non-ionizing radiation otherwise known as electromagnetic frequency (EMF)).
3. Limit, where possible, excessive exposure to lighting devices and electronic devices with backlight screens. (There is some quantitative research, though limited, which suggests that the risk of some health conditions increases due to melatonin suppression from the effects of light exposure).
4. Allow regular access to natural light for workers who work with screens for a significant portion of their day. (Similar to above, the access to natural light combats the possible health effects of the environmental light).
5. Consider employing blue filtering to reduce exposures to blue light. (There is some evidence that filtering can reduce the effects of the blue light on melatonin suppression and disrupted sleep experience).

II. Based on our research, we make the following recommendations to the Ministry of Education and school boards for use of screens in education:

1. Ensure that all stakeholders in education (including but not limited to: Ministry of Education, Boards of Education, Professional Colleges, Unions) collaborate to collect reliable information regarding the existence and use of screens in educational settings.
2. Ensure that pedagogical research to improve student learning is the driver for all decisions made regarding the existence and use of screens in educational settings.
3. Ensure that all staff are provided opportunities for employer-paid professional development in the use of screens in educational settings.



## **RECOMMENDATIONS:**

1. **BIRT AMPA** endorse the report of the LSS Work Group.
2. **BIRT Policy 5.7** be amended by the addition of a new subsection to read:
  - 5.7.x It is the policy of OSSTF that ergonomic risk assessments should be completed, as necessary, for workers who use computers/screens for a significant portion of their workday. The assessment should consider, but not necessarily be exclusive to, an examination of the following:
    - 5.7.x.1 the amount of time spent on the screen;
    - 5.7.x.2 the workstation design;
    - 5.7.x.3 worktasks;
    - 5.7.x.4 administrative controls; and
    - 5.7.x.5 lighting.
3. **BIRT Policy 5.15** be amended by the addition of a new subsection to read:
  - 5.7.x It is the policy of OSSTF that educational workers who work with screens for a significant portion of their day should have regular access to natural light.
4. **BIRT Policy 5.7** be amended by the addition of a new subsection to read:
  - 5.7.x It is the policy of OSSTF that all screens in educational workplaces should be light emitting diode (LED) screens.
    - 5.7.x.1 Notwithstanding, 5.7.x, if LED screens are not possible, screens should be liquid crystal display (LCD).
5. **BIRT Policy 7.8** be amended by the addition of a new subsection to read:
  - 7.8.x It is the policy of OSSTF that all staff, who so choose, should be provided opportunities for employer-paid professional development in the use of screens in educational settings.
6. **BIRT AMPA** direct the Provincial Executive to lobby the Provincial Government to ensure that all decisions regarding the existence and use of screens in educational settings be based on pedagogical research and focused on the improvement of student learning.
7. **BIRT AMPA** direct the Provincial Executive to direct the General Secretary to assign staff to collaborate with all stakeholders in education in Ontario to collect reliable information regarding the existence and use of screens in educational settings in Ontario.

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