
How Disability Support Services can lead on Advice for Students with Disabilities amid a Technological Revolution

A Growing Trend towards “Blue” Light Emitting Diodes (LEDs)

The growing presence of Light Emitting Diodes (LEDs) in 21st century technology has many benefits; their everyday application in our wider environment has penetrated the field of the personal computer, as well as smartphones and all display technologies.

Obviously, the reduced cost of LEDs, in terms of both their production and energy consumption, have boosted their roll-out. This movement is evidenced in the widespread replacement of traditional public lighting with LED lighting, a trend which cites greater pedestrian safety among its long list of benefits. In Ireland alone, there are half a million public lights, some of which are 40 years old, which account for some €56m in energy expenditure every year; these are all due to be replaced and, in many areas, this work has already begun (McMorrow 2018). However, the growing use of ‘white light’ (which emits blue light in most LED products) is similarly accompanied by an increased incidence of a range of problems, something which is slowly being acknowledged. This article looks at issues regarding the application and use of such LEDs or devices integrating LEDs in educational settings.

My interest in this area stems from conversations and one to one meetings with students who have reported the difficulties they were experiencing when driving due to the introduction of energy efficient street lighting. Also, students with whom I have regular morning meetings over the course of the academic year would be seen to visibly struggle with tiredness due to a late night not attributable to socialising but more commonly caused by screen based solitary activity via computers and mobile devices. My role as student support worker, in which many observations of this kind were made, led me to investigate further the behaviours contributing to insomnia, resultant lack of sleep and associated concentration difficulties among my students, particularly those on the autism spectrum.

The Medical Case for Blue Light Avoidance/Accommodation

A controversial 2016 article from the American Medical Association (AMA) entitled ‘AMA Adopts Guidance to Reduce Harm from High Intensity Street Lights’ points to blue-light rich LED streetlights, operating at a wavelength that adversely suppresses melatonin at night time, as having a five-fold greater impact on circadian sleep rhythms than conventional street lamps. While scientific argument is ongoing in terms of the relationship between hormone production and melatonin levels within ASD, there is little argument over the symptoms that are produced (Geoffroy et al. 2017; Glickman 2009). Blue light emitting LEDs in personal technology such as laptops and PCs can have a knock-on effect on both the rise of normally produced melatonin and, more importantly, its timing; in turn, this can have consequences for the parallel rise in sleep propensity. Indeed, it has been argued that there is a temporary increase in alertness when using blue light emitting LEDs, something which can be useful for working late at night, but not so for falling asleep (Cajochen et al. 2011, p. 1437). Melatonin supplements are often a means by which those on the Autism Spectrum (AS) can efficiently manage both their moods and sleep difficulties or insomnia

(National Autistic Society 2017; Autism Canada 2018; Drugs.com 2018). Circadian rhythms are of great concern to those with AS as the effects of disturbed sleep can have many associated negative impacts in terms of concentration, irritability and mood difficulties (Tosini et al. 2016; Comerford et al. 2018).

Awareness of the trend towards LEDs is slow moving but gaining momentum. Ultimately, to a limited degree, this can, and hopefully will, lead to technology being retrofitted and accommodated via blue light filters. Evidence of such retrofitting and accommodation can be observed in products produced by companies such as Microsoft and Samsung, amongst many other technology giants, where an additional feature, such as a night light or blue light filter, has found its way onto some android phones (i.e. Samsung A5) in order to minimise headaches and neutralise the disagreeable side effects of their continued use (Samsung 2017). Similarly, Microsoft, have added a further feature to its newest iteration of Windows 10 in its Creators Update build 14997 - an option to turn off or reduce blue light levels to lower the risk of disrupting sleep and as a means of reducing eye strain via its night light mode (Windows Update 2017) (Microsoft 2017). With the blue light reduction option enabled, Windows shows warmer colours to make it easier for the user to sleep at night once use of the technology has ceased. Certainly, these developments would indicate growing recognition of this issue, as does the return of screen-use oriented spectacles to the workplace. They are fast becoming a necessity to cope with the level of screen time required in today's working and online obsessed world. In fact, a whole industry has grown to return the IT generation to specialised spectacles designed for use with screens by opticians which, of itself, would be the best evidence for the challenges around blue light and screen glare.

The Third Level Environment

The provision of reasonable accommodation and an associated move towards universal design has a positive impact in that LED blue light avoidance is now documented as necessary. However, as most students' sensory experience is often conceived as being on campus, inside the classroom or lecture theatre, a need for additional consideration of students' personal environment and the bridge to technology is something that Disability Support Services and all IT related support areas would do well to acknowledge. For example:

- proactive group sessions designed to educate students on good sleep hygiene
- a commitment by Disability Support Services to enable students to self-action their well-being and general self-care strategies
- augmented by investigatory research to determine students' tech habits

could assist the student and their support staff to manage activities potentially damaging to establishing and maintain good sleep patterns. Equally, the increased promotion of student engagement with campus-based occupational therapists, where available, might well help to identify issues associated with or contributing to sleep deprivation, with technology among them.

Recent reports on the levels of sleep that children are losing due to the 'always on' nature of social media means that society should also be vigilant about the after effects of technology regarding the medium-term impact of blue light emitting technology. It can be difficult to monitor technology usage among students but perhaps educating students on the potential impact of blue light and the increasing availability of blue light filters within existing devices could at least reduce the level of concomitant side-effects that occur due to spending too many hours viewing LED screens.

Many personal computers in educational institutions are still running their technology on older versions of Windows operating systems such as Windows 7 and, even in cases where the institution is running with a Windows 10 infrastructure, there is no guarantee of an awareness or promotion of the use of the blue light filter provided by the new creator update. IT departments could lead the change by introducing as default pro- blue light filter friendly settings or changes that are centrally controlled among their own banks of communal PC in student computing centres and labs. Indeed, students with disabilities are likely to be among the heaviest users of technology and so, on an individual level, an enhanced focus should be placed both prior to and during the student loan of equipment (UCC 2017; TCD 2018) via an information sheet or training detailing the options to reduce blue light impact. Such health-oriented technology practices could also be promoted for use with respect to students' personal equipment and devices, for example, phones and gaming screens, not owned by a Disability Support Service.

Duty of Care/Holistic Care

The provision by Disability Services of technology such as student friendly laptops and tablets (RTE 2017) via short term loan schemes or long term lease may well infer a duty of care obligation to train students in receipt of such technology to reduce associated potential hazards such as blue light (DCU 2018). The reality of the modern college means that content is predominantly stored and consumed online via Blackboard or similar Virtual Learning Environments as the main depositories of lecture notes, study material and communications. The changing nature of the library also means that more and more resources must be provided online thus increasing user dependence on LED technology.

While students are not classified as employees in a legal sense, the interpretation and application of The Safety, Health and Welfare at Work, (General Application) Regulations 2007, Chapter 5 of Part 2 details quite stringent requirements that must be adhered to by employers in relation to Display Screen Equipment. Laptops are exempt under Regulation 71 (d) but solely on the basis of ergonomics. There is however provision within the regulations which require that the screen shall be free of reflective glare and reflections liable to cause discomfort to a user. It could be argued that blue light emission is equally as uncomfortable and therefore merits similar consideration. Therefore, despite the laptop exemption, it is advised that 'a laptop that does not have a separate keyboard... should not be used directly for long periods of time' (HSA 2018). A definition of this time frame is not provided within the legislation and, given rate of ongoing scientific analysis, I would expect a change to the legislation may come sooner rather than later.

Next Steps

In conclusion, the case for altering the environment within the college and also making suggestions to students on their use of blue light emitting technology is therefore of great importance to all, but particularly those with ASD. To date, students' home environment and sleep patterns have largely been something that staff have approached often accidentally on a conversational basis, largely when the problem has become so evident that something is not working for the student. In general academic and support departments can reduce the ongoing fatigue of a student in terms of workload or extra-curricular activities but additionally an awareness of the environmental decisions a student may be making may also be beneficial.

The duration and timing of exposure to LEDs that also emit blue light and the disclosure of knowledge around how to counteract some of their unwelcome effects is a conversation worth having with students and staff alike. Some

collaboration with student and staff IT help-desks around the configuration of PC and other device settings by use of filters both built into Windows existing architecture and in other recognisable brand names would be of benefit to all students. The resultant movement would of itself generate a greater level of knowledge and understanding around their potential effect. Such initiatives may positively impact student performance. Disability Support Services have a role in catering for the academic as well as the holistic needs of its students and thus could be ideally placed to positively influence the reduction of the harmful effects of blue light technology. Certainly, it would be expected that society is going to be increasingly affected by the growth in use of LEDs across all major technologies in the coming decades.

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