Students may suffer from information overload, colloquially referred to as ‘info-besity’. This places significant demands on the cognitive load and attention spans of students.

Managing our attention requires impulse control which occurs in the pre-frontal cortex of the brain. However, this part of the brain is the last to develop completely (typically around early 20s for females and late 20s for males).

Many students believe that they are capable of ‘multi-tasking’. However, they are engaging in continuous partial attention (CPA), also referred to as ‘task-switching’. CPA can cause cognitive overload and hamper student learning.

Attention management will be one of the most important skills for learners to master in the 21st century. Educators and parents can teach today’s students how to manage and direct their attention to support them to become successful learners.

Teachers can help students manage their attention by explicitly teaching meta-cognition and study skills. Strategies such as mono-tasking rather than multi-tasking, and utilizing mindfulness techniques can help students to control their thoughts and reduce stress.

Teachers can minimise digital distractions in the classroom by establishing ‘tech-free’ zones, encouraging learners to work ‘off-line’ and switch off alerts and notifications, as well as set limits on their screen-time pursuits. Restriction tools on tablets and computers can be of assistance.

Captivate and sustain students’ attention by using time monitoring and management techniques. Periodic resting can enhance task focus and short work-cycles can decrease internal resistance, providing a quick reward cycle to sustain motivation. Student-centred pedagogical approaches are also recommended.

Consider how to optimise learning opportunities. Have set break times from academic work for technology use. Balance screen-time with ‘nature-breaks’, and allow ample ‘green-time’ for mind wandering. Implement engaging learning experiences to sustain attention.
Introduction

There is broad consensus among educators, parents and researchers that students’ digital lives are significantly afecting their learning and development. Many students live in a perpetual state of distraction which can adversely impact on their attention and learning. Research suggests a trend in reduced attention and concentration spans, especially among adolescents and adults who are heavy media users (Rosen, 2012). It is likely, given increased access to technology, that children will also be affected. While we do not yet have a comprehensive picture, studies confirm that the attention spans of teenagers and adults are deteriorating and, anecdotally, teachers report changes in younger students’ attention spans. Attention management is therefore a critical skill for learners to develop. Teachers are in a good position to support this.

Background

Students are using digital technologies for increasing amounts of time. The average 8–18 year-old uses 7.5 hours of media per day, and when ‘media multi-tasking’ this increases to nearly 10 hours per day (Rideout, Foehr, & Roberts, 2010). Students are also using an increasingly diverse range of mobile technologies such as tablets and smartphones, which offer a variety of digital distractions. A recent study found that, in 2010, pre-teens sent 1178 text messages per month and teenagers sent 3705 per month (Nielsen, 2011).

The Purcell and colleagues’ (2012) Internet study involving 2,500 teachers found that 87 percent of teachers believe new technologies are creating an “easily distracted generation with short attention spans”, and 64 percent agreed that digital technologies “do more to distract students than to help them academically” (p.2). While this does not prove that technology is the root cause of changes in attention, it provides evidence that educators are noticing a deterioration in students’ attention spans. Research suggests that digital learners are distracted by technology in two ways (Rosen, 2010):

- **Externally**: sounds, flashes and notifications can distract students from what they are doing and redirect their attention to another task.
- **Internally**: many students are thinking about technology, even when not using it. Out of sight is not necessarily out of mind for students.

When considering the nature of internal distractions, banning the use of technology is not to be an effective solution. Dumontheil, Gilbert, Burgess and Otten (2010) found no neurological differences between external task switching (responding to social media alerts) and internal switches (thinking about a social media alert). This suggests that if students are continually internally task-switching they are not working optimally. This can compromise their learning due to the impacts of distraction on short and long-term memory retention.

Demands on student attention

Cognitive overload

There is an information surplus in the digital age, but our brains have a finite cognitive load. Levitin (2014) notes that in 2011 we were consuming five times more information on a daily basis than we were in 1986—and this figure is growing exponentially as technology develops. Students are bombarded with new information, which can place them in ‘cognitive overload’ causing cognitive fatigue (Juster, McEwen & Lupien, 2010). When students are fatigued, they cannot manage and direct attention and learning is impacted.

Attention spans

An examination of the attention spans of secondary and tertiary students that documented their technology habits at home revealed that they averaged less than six minutes on a task before succumbing to other digital distractions (Rosen, Carrier & Cheever, 2013). They enjoyed task-switching.

Research on student attention spans is still in its infancy, with many studies (see reference list) focusing on young adult and adult users. It is reasonable to extrapolate these results to digitally embedded young people.

Multi-tasking

Many students believe that they are adept at multi-tasking, however this can have cognitive costs. Multi-tasking impairs performance, especially for ‘heavy multi-taskers’ (Ophir, Nass & Wagner, 2009). There is evidence that task interruptions, particularly digital interruptions, have cognitive costs: they disrupt attention, result in increased error rates, and decrease academic performance (Junco & Cotten, 2012; Levitin, 2014).

Research suggests that interruptions disrupt students’ ability to commit information to memory and to later recall that information.

Multi-tasking also appears to overload our working memory and divide attention—it can also be a predictor of depression and social anxiety (Becker, Alzahabi & Hopwood, 2012; Junco, 2012; Junco & Cotten, 2012). It can also cause fatigue and shallow, superficial processing of information. When multi-tasking, students skim the material preventing them from making intelligent and lasting associations with the content, resulting in a shallow understanding. Carr (2011) likens this shallow processing to being a jet-ski rider, as opposed to a deep-sea diver.

Studies have also shown that it is difficult for students to return to a task once their attention has been captivated and diverted (Altmann & Trafton, 2004; Parnin & Rugaber, 2009).
2011; Trafton, Altmann, Brock & Mintz, 2003). Studies with computer programmers have shown that it can take, on average, 25 minutes to return to original tasks after disruptions (Parnin & Rugaber, 2011). Programmers who were interrupted also reported higher levels of stress than those who spent more time focusing on a single task. It is likely that young learners are impacted in similar ways.

**Continuous partial attention (CPA)**

When children attempt to multi-task, they engage in rapid ‘task-switching’, which results in CPA (Rose, 2010). This involves paying attention to multiple streams of information, but at a superficial level. Students split their attention between multiple tasks, scanning for opportunities that pique their interest from the surrounding sensory seduction. In a digital world, the seductions are ongoing and multi-modal (i.e. images, sounds, animations). Students skim the surface, extrapolate the most important information and then move onto the next source once their attention has been aroused. These kinds of interruptions disrupt the encoding of content and cause difficulty when attempting to retrieve information (Oulasvirta & Saariluoma, 2006).

**Strategies for attention management**

An inability to pay attention taxes cognitive processes and hampers deeper learning. However, it is possible to educate students to become more attentive.

**Teach meta-cognitive strategies**

Teaching meta-cognitive and study strategies to students can help them deal with the mass of digital content they experience, so that it does not impede their learning. Wijekumar and Medinger (2005) showed that students with study strategies in high-tech learning environments were more adept at staying on-task than those students with lower meta-cognitive skill capabilities. This suggests it is important to teach students how to:

- be aware of their mental processes
- understand what tasks are easy or difficult
- recognise when it is appropriate to take a break
- understand the importance of avoiding task-switching when studying
- identify learning tasks that require uninterrupted attention.

Students can also benefit from learning about the adverse impact of CPA, and why it is better to ‘mono-task’ rather than ‘multi-task’. If multi-tasking appeals to students, educators can guide them to do this when the demands of the secondary task are low. For example, listening to soft, familiar background music while writing or reading. Mindfulness training is also proving to be effective in helping students manage their attention. It can improve cognitive performance and executive function skills including impulse control, student learning and general well-being (Davis, Hayes & Jeffrey, 2012; Diamond & Lee, 2011).

**Minimise distractions**

Teaching students how to maintain their focus by minimising the impact of external digital distractions is useful. Strategies include:

- using apps such as Guided Access (iOS) and Kids’ Corner (Android) to prevent multi-tasking and switching between apps on tablet devices
- using website restriction tools such as Self-Control and If This Then That, which block access to particular websites at certain times or when academic work is being performed
- turning off unnecessary alerts and notifications
- establishing tech-free zones at home and in class
- encouraging students to work ‘off-line’ without distractions. Alternatively, they can revert to pencil and paper.

**Captivate and sustain attention**

Techniques and strategies to help students maintain their attention include the following:

- Teach students to use the Pomodoro technique: a timer is set for 25 minutes and students complete one task only in that time and then take a break. Taking regular breaks keeps students’ attention sharp.
- Use student-directed pedagogies: these approaches result in more sustained periods of attention (Bunce, 2010).
- Implement engaging learning experiences: use stories and humour, add sensory details to lessons and use props and relevant examples to involve students in lessons. This helps to sustain attention throughout the lesson, so that they are not scanning for other stimuli to pique their interest. Change the delivery mode of the lesson every 15 minutes or so (for example, break up lessons with periods of active learning).

**Optimise learning times**

Optimising learning can be encouraged with the following strategies:

- Allow students to take regular ‘technology breaks’ throughout lessons. This is beneficial for older learners who use social media regularly—they can feel cut off if they are not permitted to use social media or technologies, which have become part of their everyday lives. Allow specific and limited amounts of time to ‘check-in’ with technology: 15 minute work periods, followed by a two-minute period.
technology break with a gradual increase in work periods as students adjust (Rosen, 2012).

- Provide ‘nature-breaks’—time in nature has been shown to help restore cognitive function and attention, and to re-calibrate and calm students after they have been digitally stimulated (Berman, Jonides & Kaplan, 2008).

- Screen-free ‘green-time’ also facilitates mind-wandering, which allows for more creative thinking (Levitin, 2014). When students are constantly tethered to technology, their sensory system is over-stimulated, making it difficult to sustain attention for long periods of time.

References


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