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Can the internet and digital technology help the education of children with Autism Spectrum Disorders?: Reasons to be dubious

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The evidence regarding the effect of the internet and digital devices on both education and the functioning of individuals is now unequivocal – this technology is generally unhelpful to educational objectives and damaging to individuals. This blunt conclusion may not have held even as recently as ten years ago, when e-education was still in its infancy, and the internet primarily was a repository of information. However, in the intervening decade, the internet and social media have got older, but not necessarily any wiser. Indeed, the situation is now so obviously bad that even well-respected and conservative international bodies, such as the Organisation for Economic Co-operation and Development (OECD)¹, are highlighting that increases in educational standards in countries that invest most heavily in ICT is falling behind that of those countries who do not make such a use of their public money¹. It cannot be argued that this is because countries like the UK are at ceiling in terms of educational achievement. The economic digital-divide between the richer and poorer countries of the world may actually be favouring the less well off, who are investing what little they have in teachers, families, and pupils. Given all of this, the questions are: how did this state of affairs come about, and why is e-education still perceived as the answer to a range of issues, when it is creating a range of problems?

To place this issue into a global context, use of digital technology, including the internet, is ubiquitous in the developed world – there are 7 billion mobile phones in the world for a population of 7.6 billion people². Internet/Wi-Fi penetration in UK households is over 90%³, and this figure is repeated across other European, North American, and some south-

east Asian countries – but not in developing countries, where penetration is as low as 25-40%⁴. The average schoolchild in the UK spends between three⁵ and nine⁶ hours a day engaged with digital technology, almost none of it (about 5%) connected to education or research⁵. This represents an increase in internet use of 300% over the last 10 years⁵, but there is not an increase of the use of this technology for educational purposes¹. These figures also suggest that between 20-50% of a young person's waking day revolves around their digital, unreal, world – to place that figure in context, they spend 3% of their waking time engaged in sport and exercise⁷, and about 35% of their time asleep. As the OECD¹ suggest, young people in the developed world simply do not have the time, given their digital commitments, to engage in schoolwork. The imperative political issues for education, here, are whether the adults who control the society in which the young people live wish to permit this state of affairs to continue, and if so, why?

The problem of digital technology and the internet is not just one of time commitments and priorities. The problem is much more pervasive and threatening to well-being – and not just of younger people. The digital world has been shown to have negative effects at almost every level of functioning for those who engage in it to excess – and that is likely to include most people, given the above figures. Although difficult to assess, it is estimated that between 6-18% of the younger population show severe levels of internet addiction or digital-dependency^{8,9}. This problem is manifest in terms of interference by the digital world with the rest of their lives: including, negative impacts on education and friendships, the development of tolerance (the need to use these devices more and more over time)¹⁰, and also in terms of withdrawal effects when disconnected from the internet^{11,12}. These withdrawal effects are seen at both psychological levels, involving increased anxiety and negative mood¹², and physiological levels, involving increased autonomic nervous system activity^{11,13}.

There is a plethora of clear negative effects of such heavy internet use driven by addiction and/or compulsion. Socially, as noted above, there are negative impacts on friendship and increased loneliness^{14,15}. Heavy internet use also interferes with quantity and quality of sleep^{16,17}, and also with healthy-eating and exercise¹⁸. Psychologically, there are negative effects on depression¹¹, anxiety^{13,19}, and motivation²⁰. Cognitively, there are impacts on attention span²¹, memory²², and impulse control^{22,23} – all related to executive function disorders, similar to those seen in many psychopathologies, such as schizophrenia and psychoticism^{24,25}. Neurologically, there are changes noted to the pre-frontal cortex^{26,27}, and a decrease in cortical matter has been seen over the course of a year for heavy internet users^{28,29}. These changes in brain structure may reflect the impact of stress hormones, such as cortisol, that may be released as a result of continued episodes of connection and disconnection from the internet – that is to say, as a result of withdrawal effects¹³. Cortisol is speculated to impact the amygdala, involved in emotional control, in a similar way to that which occurs in those with depression³⁰; it also reduces the function of the hippocampus³¹, known to be involved in memory³², and shrinks the prefrontal cortex, involved in higher functions, like impulse control, planning, and motivation²⁹. Finally, heavy internet use is also associated with increased levels of illness³³ and immune function problems³⁴.

An unkind interpretation of these findings is that the digital world creates a real world of sad, lonely, deluded, and unhealthy young people – albeit a generation that do play a good game of Minecraft©! Moving away from facetiousness, we must ask why, then, other than economic forces and addiction, has the digital world and e-education continued to develop apace? Are there any advantages to the impact of digital technology – especially for those with additional learning needs and Autism Spectrum Disorder (ASD)?

Computer-based assistive technology has been playing an increasingly large role in supporting individuals with ASD over the last few decades³⁵⁻³⁹. This is the case for

individuals with ASD who display both lower⁴⁰ and higher⁴¹ levels of functioning. For example, assistive technology has been employed to facilitate communication⁴², help individuals with ASD to understand social situations^{41,43}, and to help plan responses to complex or unexpected situations⁴⁴. Given these uses of ICT, there are two clear areas where claims regarding the importance of technologies for those with ASD should be examined in the context of the digital invasion: the role of the internet and social media in alleviating social difficulties; and the role of social media in facilitating life skills.

It is again worth stepping back to see why this might be important. The population prevalence of ASD in the UK is estimated to be between 0.9 to 1.5%⁴⁵. The condition results in significant deleterious health and quality-of-life impacts on the individuals with ASD⁴⁶⁻⁴⁸ and also on their families^{49,50}. Although it is difficult to get definitive figures concerning the associated economic costs of ASD, these have been estimated as high as £2.7 billion per year for children, and £25 billion a year for adults⁵¹. These economic costs result from the impacts of ASD on support and social services, and also from lost economic opportunities for the people with ASD who do not engage in employment opportunities to the extent as their typically developing peers^{48,51}. For those individuals with ASD whose functioning might be classed as higher-functioning – typically, those with average or better intellectual and language skills – these problems often revolve around social interactions and a need for routine. Thus, anything purporting a solution to these problems should be examined seriously.

Although the primary envisaged function of the internet was unrestricted information delivery to a mass public, this function largely has been superseded by the growth in social media platforms. Putatively, this growth is suggested to enhance the ease of communication between individuals. However, these positive ‘virtual possibilities’ have not necessarily been realised in the real world – as the depersonalised form of communication that social media

platforms support, has led to reports of increased levels of anxiety, isolation, and loneliness in younger people^{14,15}. These problems are thought to result from engagement in the digital activities displacing more positive and healthy social activities in the real world^{14,52}. Despite these disturbing findings, it has been argued that the internet is an important tool for individuals with ASD, as it might help them to participate in social interactions that they would not otherwise engage upon if they had to employ traditional social means^{42,53,54}.

It is well known that individuals with ASD have fewer friends, and smaller social networks, than those without the disorder⁵⁵. In part, this is because face-to-face social interactions often involve unpredictable turns of event, and reading of complex social-emotional cues, that can confuse those with ASD⁴⁸. The internet and social media putatively have structured rules of engagement with the platform (if not the antagonist), and the interaction does not rely on interpreting inter-personal cues (like facial expressions), so may be of benefit to those with ASD⁵³. Indeed, when those with ASD are asked, they often express a preference for online communication, and perceive great benefits of computer-mediated communication⁵³. However, on closer inspection, this expressed preference is not necessarily driven by the individuals with ASD using technology to maintaining social connections with friends and family. People with ASD employ computer-mediated communication more typically for indulging their special interests – or even blogging about their interests – to a greater extent than do those without ASD⁵⁶. These latter finding chime with data that suggest internet-use in those with ASD is more likely to be connected to compulsions, or restricted and repetitive interests, than it is to be used to compensate for poor face-to-face social skills⁵⁷. In fact, it is known that rates of social media use are relatively low in the ASD population as a whole⁵⁴, suggesting that any such social benefits have not achieved widespread recognition in what can be a vociferous online ASD community.

On the positive side, it might be noted that individuals with ASD who do use social media do report higher numbers of friendships⁵⁸. Social media use by those with ASD without an intellectual impairment also correlates with friendship quality, but it does not do so for individuals without ASD^{53,60}. However, this is true only for those individuals with ASD who lack high levels of anxiety⁶⁰. It may be that individuals with ASD and low anxiety levels could possess other psychological traits that produce over-estimates of friendship strengths. It should be remembered that what ‘friendship’ in this context means is unclear, especially in self-reports of individuals with ASD, as this population notoriously over-estimates the strength, depth, and numbers of friendships that they have⁵⁹. Nevertheless, this finding holds when parent’s ratings of their children’s friendships are considered⁶⁰, rather than just the children’s ratings alone. However, it is not clear what this parent judgment is assessing – and it may be that parents confuse time online with quality of friendship, which is not the same thing⁵⁷.

The positive argument for the social importance of digital technology for those with ASD might be taken to suggest that individuals with ASD may somehow be protected from developing digital-related problems, discussed above, as the precise function of the internet use may be important in determining whether digital problems develop^{61,62}. Unfortunately, this suggestion is not borne out by the data. There are significant associations between ASD and internet addiction^{57,63,64}. The picture is further complicated in that studies also note that the ASD association with digital-dependency is moderated by anxiety⁶³ – individuals with ASD show less internet addiction if they also display high levels of anxiety. Thus, while anxiety seems to reduce the likelihood of internet addiction, it also appears to reduce the chances of any beneficial outcome from the use of the internet⁶⁰.

In sum, the data on the helpfulness of the digital world for friendships for those with ASD is confused, and, frankly, less than compelling. Placing social media use by those with

ASD into a broader context, we have long known that the social media world is one in which bullying is rife⁶⁵, with 77% of young people reporting bullying online⁶⁶. Additionally, the chances of contact with inappropriate web-content is also a major concern⁵². If the individual does not have the psychological or cognitive resources to deal with these exposures, the outcome can be disastrous – certainly for the individuals with ASD⁶⁷. It may be that internet exposure to the with additional needs like ASD is simply exposing them to even greater risks of contact with the criminal justice system than they already experience⁶⁸.

Turning to the alleged helpfulness of the internet for educational functioning in general, it is certainly the case that digital technology supports platforms through which specific and customizable supports can be delivered to students with ASD^{69,70}. It has long been established that ICT can help teach specific things to specific pupils with specific goals⁷¹⁻⁷³. There is evidence that such specific and guided use can expand communication skills⁵⁶, school participation⁷⁴, and engagement in scheduled activities^{71,73}. This much is thought to be well-known, and is more than likely to be true – but this use of traditional ICT that presents scheduled tasks to pupils, and monitors their performance, is a far cry from the heralded freedom of the internet for the pupil to drive their learning experience for themselves and explore material in an independent manner⁷⁵. The evidence relating to how this ‘free’ use of the internet impacts learning in schools, especially for those with ASD, is far less compelling, and perhaps even a little troubling from a teacher’s perspective.

As noted above, pupils and teachers may have very different views of how the internet is, and should be, used. In one study, a large sample of adolescents with ASD, between 14 and 18 years old, were asked how they used this technology⁷⁵, and they reported that their use of technology occurred both in school and the home, and was very supportive in increasing their independence, reducing their anxiety, and increasing their social opportunities. On this basis, it is often suggested that pupils should be supplied with laptops

to aid their educational experience. Unfortunately, none of these positive functions of the internet proposed by the subjective reports of those with ASD, as we have seen above, are supported by the objective literature. In fact, there is a clear mismatch between the perception of teachers⁷⁶ and students⁷⁷ about uses and usefulness of technology in the classroom – especially in terms of the presence of laptops. This dispute has been settled convincingly by a study that measured the use of laptops by students (18-21 years) in lecture rooms⁷⁸. Primarily, the use was for non-academic activities (especially social media), and this use was inversely related to the class performance of the students. Importantly, this negative impact of the free use of laptops by students in the lecture theatre was not accounted for by the lectures (or the lecturers) being turgid, and producing low interest in the subject, which, in turn, provoked laptop use to escape the tedium!

This negative finding regarding the benefits of the unstructured use of digital technology in the classroom is mirrored by a range of other negative impacts of the impact of the internet and laptop technologies on performance to emerge from the educational literature. For example, one study noted that even when laptops were just used to take notes (cunningly engineered by turning off the lecture room Wi-Fi) their presence still impairs learning⁷⁹. Students with laptops did take more copious notes than those who wrote by hand, but the conceptual understanding of those relying on laptop notes was worse than those simply using pen and paper⁷⁹. It has long been known that taking verbatim accounts produces shallow understanding of material⁸⁰, and laptops dispose people to this strategy, as most people can type faster than write, allowing them to take down all that they hear – simply because they can⁸¹. This is a major issue for those with ASD, who are already disposed to the concrete, rather than the conceptual, and may well get lost in the details⁴⁸.

Finally, students with higher levels of digital dependency display lower intrinsic interest in the subjects that they study than those without this problem. In a recent study²⁰,

the extrinsic motivation of groups with and without an internet-addiction was similar to one another, suggesting both were equally goal-oriented. However, the group with an internet addiction displayed far less intrinsic motivation in learning the subject. This lack of intrinsic interest in the subject being studied was not accounted for by higher levels of depression or anxiety in the internet-addicted participants. Rather, the result simply that those with high levels of internet addiction had a difficulty in being motivated by longer-term goals, and were highly dependent on the immediate rewards of passing the course²⁰.

All of the above suggests that the digital invasion of society has produced a real set of problems that have not been solved, and there is not any great evidence of digital technology dealing with the problems that it putatively was meant to cure. There is no doubt that ICT can help when it is used in constrained and monitored ways. It could be argued that most internet-related activity engaged upon by most people is entirely harmless, and that concerns about the impact on a set of the population who are vulnerable with additional needs should not be used to berate the more general employment of the tool for the rest of the society. However, place this argument into context for a moment. It may be true that some people can drink alcohol or gamble without showing ill effects, a few people can smoke cigarette without apparent negative impacts on their health, and a tiny number of people remain unharmed from taking poisonous illegal substances. But, we would use these facts of escape from proven toxicity to allow unrestrained access to alcohol, gambling, nicotine, and drugs? Given what we know about the internet and digital technology, should we similarly allow it to remain un-investigated and unregulated, and welcome it into our educational institutions, where it apparently provides little evidence of its effectiveness.

This lack of enthusiasm about the possibilities of the internet helping those with ASD should not be construed as a ‘Luddite’ response – although to the extent that the Luddites were motivated to react against the “fraudulent and deceitful” use of technology⁸², there is

resonance with the current position. The issue, here, is how do we modernise and individualise education, and maximise chances for all – including those with ASD? Digital technology is not a forward-looking answer – it has not provided evidence of change, and appears to be holding back progress for our children¹, as well as giving them a whole range of new problems^{10,11}. All of the above suggests that digital technology is not a cost-effective use of public money, and a major rethink regarding any such drive is urgently needed in the face of the mounting evidence. As a parting challenge to those younger individuals who tend to favour usage of digital technology, and may see this argument as a manifestation of a reactionary view; if you also champion the need to address issues such as climate change, then consider that the internet takes between 8-16% of the power generated in the UK each day – almost half of the amount of energy production that needs to be reduced in order to meet the goals of the Paris agreement on combatting climate change. Given the above lack of clear evidence of its positive effects on education, can continued public investment in the digital world be supported?

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