Pokemon Phenomenon vs the Classroom: First Do No Harm

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Abstract

The 'Pokemon Phenomenon' occurred in 1997 when over 600 children were hospitalized after watching Pokemon Episode 38 (now banned). Medical research has since identified and measured a specific neurological response to particular visual light stimuli in up to 8% of the population aged 5 – 15 years old. This type of response is known as photosensitivity and may have a negative effect on a student's cognition and behaviour. Symptoms can range from nausea to headache to seizure activity.These symptoms are not restricted to students diagnosed with epilepsy.

International television restrictions have been implemented to reduce stimulus material being broadcast, although incidents still happen. The colour, pattern and frequency restrictions do not currently apply to video games, the Internet or movies shown at cinemas, even though health warnings have been included in some manuals, opening credits or box office windows. However, in recent years certain large screen televisions and smartboards have included warnings regarding the risk of stroke or seizures during use.

How can teachers protect their students and safely use the technology that has become central to so many learning experiences? Part of the difficulty for teachers is that the students most at risk are those who don't yet know they are photosensitive, so classroom practices need to include everyone. As photosensitive responses may be stimulated by environmental factors such as computers and other digital media, it would be advantageous if teachers were aware of this trait and the ways in which its effects can be minimised.

Many learning experiences have been enhanced by digital media, this paper invites us to question 'Are we doing no harm?' For example, are we decreasing the stimulus for students at risk due to photosensitivity? Some suggestions are given which are simple, practicable adjustments assembled from medical literature, suitable for all general classrooms, whilst additional adjustments are specifically tailored to support students who have been diagnosed with photosensitivity.

1. Introduction

From apps on iphones to textbooks on Kindles, pedagogy has been straining to keep up with current technological advancements. Although many excellent learning experiences and programs have been developed to widen students' experience within the classroom, photosensitive students may experience adverse effects while accessing these programs using digital technology.

The TPACK model [1] 'attempts to identify the nature of knowledge required by teachers for technological integration in their teaching' [2]. It begins with Technological, Pedagogical and Content Knowledge and structurally depicts their interplay creating Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK) and ultimately Technological Pedagogical Content Knowledge (TPACK). In TPACK explained [2] more detail is added to the description of Technological Knowledge, including "being able to recognize when information technology can assist or impede the attainment of a goal." This recognition of the advantages and disadvantages of using technology in the classroom is pivotal.

TPACK's Technological Knowledge and the accompanying Digital literacy include the ability to comprehend possible 'downsides' incorporated with the use of the technology. Fahser-Herro [3] suggests 'a need exists to further examine the potential value of incorporating digital media to *augment* curricula while acknowledging current research offers no clear-cut method to determine best practices.' They continue by recognizing the power of novelty has overwhelmed that of credible investigation.

December 16, 1997 is a date that many broadcasting stations in Japan would see as pivotal in their programming guidelines due to the 'Pokemon Phenomenon' [4]. After screening 'Pocket Monsters' at 7pm, 685 Japanese children were hospitalized for neurological problems that developed during or

after the broadcast [5]. The neurological problems included seizures, nausea, headaches and vomiting [4,6], although photosensitive seizures appeared to occur mostly in the older children [6].
Subsequent analyses of the program prompted generation of many stimulus theories regarding wavelength [7,8,9], frequency [10], luminance [7,8], percentage retinal area corresponding to amount of cortex stimulated [11] and concentration during program [6]. The most obvious outcome for the general population was the initiation of Recommendation ITU – R BT.1702 [12]. This recommendation prohibits any television station from broadcasting a program including any of the following (taken from Harding and Takahashi [13]): repetitive flashes > 3Hz are prohibited; high contrast patterns, either moving or stationary are restricted in screen size; flashes of saturated red at > 3Hz are prohibited.
Although Ofcom (UK broadcasting regulator) and its global relatives monitor television broadcasts, other media companies are not required by law to follow these restrictions. Hence, epileptogenic matter is free to air on the Web and videogames, and to be generated in free-form Media classes.
Even with these guidelines in place, contravention still occurs, as with the official launch of the London 2012 Olympic promotion (in 2007). The original version contravened Ofcom regulations with its use of saturated red colouration, together with a coalescing zig zag pattern which stimulates individuals with pattern sensitivity [14].
In 2011, outside the jurisdiction of Recommendation ITU – R BT.1702, movie goers were warned through box office notices or local news channels of the possibility of adverse effects from a newly released movie [15]. Hand held computer games have carried warnings for a few years [16], and certain 3D Interactive Whiteboard/Smartboard manufacturers [17] and 3D television [18] companies include warnings in their manuals regarding photosensitive seizures.

2. What is Photosensitivity?

One of the most difficult aspects of identifying photosensitivity is that it is a ‘hidden’ trait. There are no outstanding physical features, it is neurologically generated [19], can appear at any age, tends to be more prevalent in adolescents [20,21], may exist subclinically without any clinical manifestations [22] and can undergo spontaneous remission [9]. It is episodic in nature but may be stimulated by certain environmental factors [23].
Physiologically, photosensitivity is an epileptic reaction to visual light stimuli [19]. Yet not everyone who registers as photosensitive has epilepsy [20,21,22]. Photosensitive responses in children have been recorded with televisions, computers and other digital media acting as the visual light stimulus [4,5,6,25,26,27].
For these students, episodes triggered by visual stimuli may be categorized into two subgroups; clinical and subclinical. Clinical episodes show specific electrical activity patterns on an EEG (electroencephalograph) as well as visible, observable symptoms. Subclinical episodes are restricted to EEG registration showing no external indication of excess brain activity.
As clinical symptoms stemming from a visual trigger in a person who is photosensitive can include, but are not limited to headache, vision disturbance, dizziness, vertigo, nausea, vomiting and seizures [4], understanding their stimulus and possible impact on school activities is important.

3. Cognitive Impairment?

There has been debate over the possibility of cognitive impairment during these periods of increased brain activity, either subclinical or clinical [28]. These are also the periods where short term memory may not retain verbal instruction, such as those often given in a classroom. This phenomenon may be termed Transitory Cognitive Impairment.
Transitory Cognitive Impairment (TCI) has been documented over many years [28,29,30,31]. For teaching purposes, the question of cognition in the classroom is closely linked to that of concentration, sequencing and long-term memory. The ability to follow an ordered group of verbal instructions is key to developing, for example, mathematical processes. Even classroom management reminders can depend on a three second verbal request. Missing or misconstruing part or all of these academic or social cues can disadvantage a student, even one who only experiences subclinical episodes.
Spontaneous remission is one of the most positive possibilities about the photosensitive trait - it may disappear without warning. This remission occurs in between 14 and 37% of photosensitive individuals in their early twenties [9].

For teachers, the impact of potential spontaneous remission is subtle yet significant. Pedagogy for a student who will always function under the restrictions of photosensitivity will differ from strategies used to prepare a life long learner with the potential to use all digital media without any negative repercussions.
As shown by the Pokemon phenomenon of 1997, it is possible to elicit undesirable neurological responses from digital media in particular environments. Our classrooms have undergone a technological revolution – has our Technological Pedagogical Knowledge [1] allowed us to safeguard against any repeat of this phenomenon?

4. What can we do?

As educators, our priorities lie with supporting and facilitating the development of our students. Developing our own Technological Pedagogical Knowledge enables us to remove a possible factor of inadvertent distress from our classroom environment. Although contemporary monitors provide less 'flicker' than the old 50Hz CRT televisions, they do not totally protect the students [13,32]

4.1 Recommendations for compulsory education environments

- Keep the curtains open when using the IAW or Laptops. Sunlight through a window provides no flicker [12,13].
- Turn the screens off when not in use. Even background, peripheral vision stimulus can precipitate reactions, so blank the screen rather than screen saver [4].
- Ensure students are not too close to their screens [4,6,12,32] especially for 3D viewing [17,18].

4.2 Safer digital media use specific for students with known photosensitivity

- Seat student at the back of the classroom, to decrease the image size from the interactive white board. As the image size decreases, so does the stimulation it provides [4,6,13].
- Seat student next to the window to increase the natural light over their screen use. This decreases the 'flicker' [5,12].
- Reduce computer screen luminance and contrast. Luminance is the brightness of the screen, very bright screens are more epileptogenic. High contrast patterns also trigger more hypersynchronised brain activity [8,12,13,26].

5. Conclusion

As educators we have the power to incorporate relevant medical research into our Technological Pedagogical Knowledge. If the classroom environment changes, then we too must change to ensure first, we do no harm.

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