Using Distance Learning Electronic Tools within the Class to Engage ADHD Students: a Key to Inclusion?

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Abstract - **Research increasingly emphasizes the possible development and benefits of technological use in distance learning. Electronic distance learning tools however may have a very different educational use than the one they were originally conceived to meet. With attention deficit disorder being increasingly diagnosed in secondary students and inclusion policy dictating a differentiated teaching approach with the mainstream classroom, these distance learning tools may enable mainstream classroom teachers to address attention issues while they maintain regular curriculum delivery with other students. This article will review existing literature on distance learning tools and differentiated teaching suitable to ADHD students and assess whether an eco-systemic "match" between the classroom needs of these students and the potential of these electronic tools may be possible and may have escaped pedagogical theory to date.**

Index Terms – ADHD, adolescents, distance learning tools, inclusion.

INTRODUCTION

ADHD adolescent learners represent a major challenge for most education systems. Attention and impulsivity manifestations have a significant prevalence within the classroom, which most researchers estimate to be between 3 and 7 per cent [1]-[2]. This amounts to a sizeable student population which presents idiosyncrasies which make it difficult for them to be taught in a standard and traditional classroom format. While there is increasing pressure on teachers to seek, beyond the use of stimulant medication, other differentiated teaching tools that can be conducive to better learning outcomes, there is equally these days a unanimous philosophy in most Western education systems which dictates adhesion to principles of inclusion and the placing of Attention Deficit Hyperactivity Disorder (ADHD) adolescent learners within regular classrooms. It is time, in the face of the contradiction most teachers face in their everyday professional experience when devising approaches suitable for ADHD teens, to operate an eco-systemic evaluation of how in classroom teaching must be adapted to engage ADHD students successfully; technological devices, particularly distance learning tools may offer resources which have not to date been applied to this area by practitioners.

HYPOTHESIS

The working hypothesis in this research is that as ADHD students seem to perform best when they are multi-tasking. As they are also often criticized for their potential to disturb the classroom environment, they are best perhaps engaged by the classroom teacher, within the traditional environment, via electronic tools more typically used for distance learning.

REVIEW OF EXISTING LITERATURE

I Development of distance learning tools

Technology has developed a vast array of tools which can efficiently be used in learning, notably the World Wide Web, electronic messaging, listservs, as well as synchronous conversation tools such as MSN [3] and weblogs or blogs [4]. In 1997, more than 4 million students used the Internet from school and 5.7 million accessed it from their home [5]. From 1997 to 1999, connectivity within the classroom increased by 12 % [6]. As students are offered greater access to computers and to the Internet, the opportunities of learning outside the class and from one another has increased dramatically, a phenomenon that has sometimes be called "social presence" [7]. Research has in fact shown that distance learning is as effective as traditional in classroom learning [8]. While much of the research has focused on different types of software and their respective effectiveness in relation to learner characteristics [9], it is perhaps time to reconsider the actual use we make of technology and particularly distance learning technology.

II Particularities and needs of ADHD students

ADHD children and adolescents have the difficult characteristics neurologically of being both behaviorally hyperactive and mentally under-stimulated. This makes them doubly difficult to teach or to supervise in a traditional format classroom [10]. This cerebral under-stimulation which prohibits control over attention trigger mechanisms is commonly explained as being the manifestation of a deficit in cortical arousal [11]. This is often addressed with stimulant medication [12]; however adapted and differentiated methods of teaching may be able to address these idiosyncrasies and it is thought distance learning tools may be of assistance.

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What appeals firstly to ADHD teens in the use of distance learning tools in class is the fact that the media they are using is as versatile and fast moving as their own attention span is. Students who successfully integrate Information and Communications Technology (ICT) use, internalize its operations and achieve an intuitive understanding of its complex and fast capacities. As Cuthell explains: "(Hardware and software) are a tool, a vehicle for combining motor skills, language, images and symbolic manipulation through practical activities" [13]. Wertsch talks about a cultural tool which enables the mediation of thought. In practical terms, ADHD teenagers finally have with ICT a thought vehicle that moves as fast and as intuitively as their fast but easily distracted minds. Fast multi-tasking suddenly becomes a productive thought completion as opposed to an erratic and incomplete process and they finally have a media which follows their cerebral process [14].

Secondly, it is often wrongly assumed that ADHD learners should be maintained in an environment where stimulations are reduced to a minimum in order to enable them to listen, think and focus. In fact, as the cerebral cortex is under-stimulated, it is far more productive, it would seem, to place these learners in situations of over-stimulation: increased light, use of colour, background noise and music is thought by some research to increase cortex stimulation and actually trigger attention [15]. Multi-tasking on ICT is one of the most efficient methods an ADHD learner can use to self-arouse the cerebral cortex. Abbott [16] and Cuthell [17] describe how students will often multi-task on computers while the teachers are interacting. In the case of ADHD students, this online multi-tasking may be the key to remaining engaged in class and to succeeding academically in an inclusion context, as it constantly stimulates the cortex into attention.

III Online teaching as a mode of classroom inclusion

Research has established fairly conclusively that children with learning disabilities are best taught within the regular mainstream classroom, while other students do not suffer from such mixed ability teaching [18] - [19] - [20]. With mounting pressure worldwide to now provide for all students within mainstream schools [21] - [22], inclusion has become a key concept and research has had to focus on methods to rapidly and effectively include learners with disabilities within the mainstream classroom with as few changes to its format as possible. Much of the research on the use of technology in the classroom has originally focused on introducing new tools within old pedagogical routines, often simply for the benefit of time management [23]. Teachers are now beginning to understand that it is the way electronic tools are used rather than those tools themselves that may revolutionize teaching [24] -[25]. As a new constructivist conception of education emerges, one that moves away from traditional notion of didactic teaching, it becomes clear that ICT, the internet and distance learning tools are answering a genuine need [26] - [27]. One of the ways in which technological developments can be incorporated integrally into a teaching style is to conceptually rethink their use eco-systemically to address the needs of the learners they are aimed to serve. It is this philosophy that led to this teaching initiative and to the use in class with ADHD adolescents, not just of ICT but of distance learning tools in a new light.

IV Safety

As the students' screen is not monitored over the duration of the class through the use of electronic distance learning tools, but the subjects are merely engaged and contacted through synchronous electronic means of communications by the teacher, there is an ethical need to safeguard access to inappropriate sites through Internet filtering software. It is also suggested that an "Acceptable Use Policy" need be entered into between subject and teacher or school [28]. It is also recommended as viewing the screen of one of the subjects during class may be a distraction in itself that the subjects being engaged through these pedagogical tools be placed on the perimeter facing the rest of the student body, whatever class formation may have been adopted for the working environment.

V Reticence

Surprisingly, younger teachers with less than 5 years experience were found to be no more likely to use technology than teachers with over 20 years of classroom experience [29]. Becker reviewed what distinguishes "exemplary computer using teachers" and he distinguishes four requirements for effective electronic based teaching to take place: (i) teachers have to be surrounded by others teachers using IT; (ii) the school itself had to recognize use of IT for genuine, meaningful teaching purposes; (iii) financial support was essential at school level; (iv) a "resource rich environment" was required with fewer students per class in particular [30]. Seeing computers as an integral part of teaching is essential to the successful use of such technology, even if it means adapting and modifying the curriculum for that purpose [31].

VI Teacher training burden

Little progress can be made in this area till teachers receive adequate training in Information Technology (IT) before being able to integrate these skills effectively into their teaching [32]. While investment in IT can often be adequate in schools, teacher training in the art of integrating these skills into teaching is still underfinanced [33]. If adequate training is not received, the integration of IT into teaching remains locked within traditional teaching methods [34].

METHODOLOGY

The electronic distance learning tools used with the subjects included, over the period of observation, synchronous conversation tools, electronic messaging, blogs, web platforms for the viewing and downloading of pedagogical material such as interactive Powerpoint presentations, videos and PDF

documents and Webquests, defined as "an enquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the Internet" [35]. Teachers were asked to prepare and deliver tasks to the subjects, during the lesson time, through these electronic distance learning media; these tasks and the material disseminated through the distance learning tools reflected the skill acquisition they had planned though traditional classroom teaching methods for that period. They were to monitor the students' work and interact through the lessons via verbal exchange as well as through distance learning prompts (emails, messaging and synchronous prompts).

Data collection focused on two case studies which were followed in one case for 15 months of instruction, in the other for a period of 6 months. Both subjects were male and they were both aged 16 when modes of instruction began to be modified to accommodate the idiosyncrasies of their ADHD diagnosis and the effect this was having on classroom behaviour. Data was collected through observation of classroom behavior, the monitoring of teacher feedback and grades. Some self-reporting was also involved and both subjects have volunteered feedback on mode of instruction. In fact, their feelings and desires with regards to instruction format is what prompted the investigation of IT tools within the classroom in the first place.

There were in that sense few ethical issues as the research was carried out in the form of observation, which would have occurred in any event at the same frequency considering the students had entered the program seeking to gain greater control over behaviour and academic performance. All parties involved - school administrators, teachers, parents and the adolescent students themselves - were actively seeking innovative approaches to teaching and classroom format and the introduction of distance learning tools was but one of several initiatives that were introduced to encourage positive learning and behavioural outcomes. Impact on non-participating students in the classroom was thought to be minimal as any reduction of classroom disturbance was thought to potentially lead to a positive outcome and an increased performance in their case as well. Access granted by the two subjects to the specific technological tools or material was also made available to the mainstream students, but not during class time and there was therefore no discriminatory policy in the provision of services or pedagogical material.

It was also unlikely that the subject might in any way suffer academically from the access they were being granted to computers during class. Use of computer technology in fact is shown to have positive outcomes on numeracy [36], the willingness to compose [37] as well as the ability to re-read one's work and find mistakes [38].

There were few issues of a diagnostic nature. Both subjects had been diagnosed by an educational psychologist before admission to school; they had both been medicated in early childhood with stimulant medication in the past but had both been medication free for over three months before joining this program. Teacher and supporting staff's perception, over the course of the observation, concurred towards an ADHD diagnosis and previous early childhood symptoms of attention and impulsivity were confirmed by the parents in each case. Both subjects had been the subject of an exclusion from their previous school on the basis of unacceptable behavior.

Other parameters however cannot be discarded when analyzing the results. The two subjects were taught and cared for within a residential setting by a multidisciplinary team with a declared openness to alternate methods of instruction and behavior management. As part of this interaction, the two subjects had also been exposed to a variety of cognitive and eco-systemic interventions which may have also had an impact on the progress of the academic achievement which was recorded. There has in particular been exhaustive reliance on strong one-on-one staff-student relationships [39]-[40]-[41], as well as a daily use of sports and outdoors pursuit as a channeling process for surplus energy [42]-[43]-[44]. One of the subjects is dyslexic and was also receiving support for his dyslexia over the course of the study. Co-morbidity between ADHD and dyslexia and various other learning disabilities has been evidenced to some extent [45] and as research has definitely shown the positive effects of the use of technology with children with mild learning disabilities [46], it will always be difficult to some extent to clearly identify and quantify the impact the use distance learning electronic tools has either on attention or on other learning needs.

The electronic distance learning tools were also introduced in small classroom formats, with a number of participants always below ten. It is difficult to isolate here the effects of the introduction of an innovative IT teaching method. It is clear that the positive learning outcomes, which were observed, could possibly be solely due to the introduction of technological support, irrespective of the fact the tools themselves were distance learning tools and were being used discriminately with ADHD students alone. Research has shown that the introduction of any form of technological support within the classroom makes school more interesting and more fun and improves learners' attitudes and self-esteem [47]. This does not necessary rebut our hypothesis however; if one examines further indeed the reason why students using IT gain greater self-esteem, it becomes clear from research that the increased academic self-esteem is due to the fact that pupils become more autonomous in their learning and less dependent on the teacher [48]-[49]. This is not what this study had set as the main hypothesis for encouraging the use of distance learning tools with ADHD adolescent learners but if the positive learning outcome is due to this factor rather than to the original presumption, the result remains the basis for further research. Improvement in academic performance could also be the result simply of a small classroom format or effective classroom management.

FINDINGS

I Behavioural impact.

With the introduction of the distance learning electronic tools within the classroom as a mode of instruction, there were less instances of disturbing behaviour reported by teachers and peers and a tangible feeling of "increased control" was perceived by all, including the subjects under observation.

II Academic outcome

Academic development was the area where the most noticeable positive learning outcome was recorded. As predicted, attention was not maintained through the session; however while the subjects clearly wandered on to other areas, sites and material during the course of the lesson, they reacted positively to the regular teacher synchronous prompts and were motivated by the requirement to finish the tasks set and evidence this synchronously to the teacher within the class itself. The synchronous reporting to the teacher was taken seriously and became a motivating factor in itself.

III Emotional development

Self-esteem increased in the subjects over the duration of the period of observation, as can be expected with academic and behavioural progress. No isolation, whether spatial or emotional seemed to occur as might be feared and the subjects in fact did not become solitary workers; they developed skills and a desire to share knowledge and learning experiences and to work in cooperation with others, much as has been evidenced by previous research [50]. In fact they also became such expert users of the technology introduced, that they quickly became the resource person amongst peers in matters of computerized learning and information, this itself acting as a boost to their self-confidence and social recognition.

DISCUSSION

I Need for appropriate training

Training teachers to use technological tools effectively is a long and arduous process. Researchers have identified five separate stages in teacher IT development: "entry stage", "adoption", "adaptation stage", "appropriation" and "invention stage" [51]. This is a long and lengthy process. Technology only becomes a medium for exchange, collaboration and creative thinking in the last of these five phases [52] and it is assumed that teachers will not feel comfortable and empowered enough to freely devise approaches and teach ADHD adolescents through distance learning tools till they have themselves reached this last stage of technological integration. Further research is clearly needed to identify exactly what form this training should take and in what format it would best be delivered to mainstream teachers.

II Application to large classrooms

Disseminating material and monitoring skill acquisition through distance learning tools represents an added burden for the classroom teacher during the lesson. It is clear that the acquisition of this versatility and training in this skill would have to be formally taught and monitored. There is a cost issue (time and financial resources) which may be a hurdle in some schools and preclude the development of these pedagogical tools, beyond the mere investment required to provide the hardware and software necessary for its implementation. The preparation required outside the class to gain mastery over the distance learning tools, the preparation of material suitable to those tools and the research necessary to locate pre-existing electronic tools and appropriately formatted content which may be presented through these media, is also time consuming and requires a large personal investment on the part of the teachers involved. The teachers monitored during this observation had volunteered and were independently interested in the possible positive learning outcomes and invested in the success of such techniques. Research is needed in this field to be able to quantify, from a Human Resources perspective, the impact the implementation of such a pedagogical approach might have on staff contractual rights and entitlements, timetables, administrative support and training.

III Benefit to all students

The benefits of this initiative need not be restricted to ADHD adolescent learners. Students who, throughout secondary education, have benefited from unlimited access to computer technology are usually described at a later stage as "self-starting problem solvers" and "self-assured collaborators" [53]. There must a logical caveat that technological use of distance learning tools within the classroom cannot replace human contact and other holistic functions met by the presence of the teacher in an emotional interaction with the child [54]; it is difficult to conceive though that with careful scrutiny being placed on face to face interaction with the teacher "face time" [55], any learner might not benefit from the added channel of communication offered through the electronic media of the distance learning tool being used in class.

CONCLUSION

Blamires writes [56] that "enabling technology" is not merely about giving student access, it is about engaging students. We have seen by applying distance learning tools to the classroom itself in the case of ADHD adolescent learners, that we must be infinitely creative and observant if we are to achieve this "engagement" and create positive learning outcomes for students with learning disabilities, even if this means using tools out of context in the way this was done with distance learning tools in this study. This brings up the issue of "ICT capability". To be ICT capable is to be "competent in controlling situations in which these tools are applied" [57].

While the implications of this research are important and the potential positive learning outcomes numerous, it becomes quickly apparent that many of the factors that might hinder implementation on a large scale are matters of resources, in particular financial resources. It is disappointing to note that even when expenditure is made on the development of electronic equipment within the classroom, 66 per cent of technological expenditure is typically spent on hardware, 19 per cent on software and merely 15 per cent is set aside for teacher training on the equipment itself [58]. School and administrative support and leadership are crucial, in matters of expenditure, encouragement and release from timetable burdens, for such initiatives to succeed [59] and it is at that level that reform must occur.

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