The Effects of a Portable Computer on

Written Output and Classroom Behaviour of Children with ADHD

Joey Turco

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Dr. Clifford Falk

<u>Introduction</u>

As an elementary school teacher for the past 4 years I have witnessed the growing use of technology as a teaching tool for the education of our youth. The computer has become as ubiquitous in schools as a pen and paper. At the same time, students of all ages have become more technologically savvy than previous generations prompting educators to take a serious look at the educational value of technological tools. In my own teaching practice, technology plays an important role in the delivery of my lessons. The computer has played a large role in helping my students to learn, dissect, investigate, and convey their ideas in an imaginative and enjoyable fashion. My own students have used the computer to research new concepts, write original music and produce their own movies. I have witnessed high levels of engagement and purpose when students are using computers for their learning. As a result, I believe that technology could also be an excellent tool in helping students with learning difficulties such as Attention Deficit Hyperactivity Disorder (ADHD).

Willingness to conduct this research stems from my experience in watching a loved one battle ADHD and from my passion for technology. Growing up I witnessed a sibling suffer tremendously in school as a result of ADHD. Although an exceptionally gifted person, my brother had severe written output difficulties, causing him severe embarrassment, stress, and problems completing assigned tasks. As he wavered on through elementary school, his schoolwork continued to suffer. By grade nine, my brother dropped out of school. The use of a computer in helping him with his learning

disability could have helped prevent this. Since many children who have been diagnosed with ADHD suffer from written output problems and struggle with and dislike writing tasks. The computer seems like a logical and perfect pedagogical tool in helping students overcome the challenges of ADHD (Xu et al., 2002). I have been using technology (computers, digital cameras, etc.) for over two decades. I feel that technology can serve as a great learning tool if used in the correct manner. My research could be instrumental in studying the effects of computers on students with ADHD.

The purpose of this study is to research the effects the use of a personal computer (Neo) has on participants' written output and classroom behaviour. The "Neo" is a smallish, lightweight, affordable laptop computer specifically designed for use in the classroom. Unlike a traditional laptop screen, the Neo's screen is very small and only capable of displaying text. The Neo is not a computer capable of surfing the internet or playing games. With its bland styling and limited functionality it is the perfect tool for word processing. Students can type in their work and, when finished, are able to connect to a printer for easy printing.

The researchers will focus on students' written output and on-task behaviour while using a computer. Students will both be observed before and during computer use to see if any noticeable differences in behaviour are present. Furthermore, students' written work will be observed before the use of a computer, and after, to determine if an improvement in written output can be detected. I believe that using action research

will enable me to learn more about my pedagogy and help me become a better teacher at helping students with ADHD.

The Review, Critique, & Synthesis of the Literature

Several studies have been conducted regarding the use of computers in helping students with learning difficulties and ADHD. What is clear in examining the literature is that Computer-Assisted Instruction (CAI) has been seen as a positive method in helping students with ADHD in achieving greater academic success and exhibiting positive, on-task behaviour. For example, Clarfield and Stoner investigated the use of a computer in improving reading and fluency with students with ADHD. Their main goal was to identify the effects of CAI on attention, oral fluency, and task engagement (Clarfield & Stoner, 2005). Three boys from kindergarten and grade one were observed during independent seatwork and later, using a computer. It was determined that all three students displayed a decrease in off-task behavior and an increase in oral reading fluency (Clarfield & Stoner, 2005). Mautone, DuPaul, and Jitendra also examined the use of CAI on children with ADHD to determine if mathematic fluency and on-task behaviour increased. Observing three students from first through fourth grade, their findings pointed to an increase in academic achievement and on-task behaviour with students with ADHD when students used a computer (Mautone, DuPaul, & Jitendra, 2005). Kotwal, Burns and Montgomery researched the effects a cognitive training computer program had on a 13-year-old student with ADHD (Kotwal, Burns, & Montgomery, 1996). Using Captain's Log software, which focuses on attention, memory,

concentration, and problem solving skills, the study concluded that the participant exhibited improvement in behaviour and academic success (Kotwal et al., 1996). Furthermore, a similar study by Slate, Meyer, Burns, and Montgomery also researched the effects of the Captain's log software in academic fluency and behaviour. The study tracked the progress of 4, severely emotionally disturbed students between the ages of 7 and 11 with ADHD (Slate, Meyer, Burns, & Montgomery, 1998). Although the study reported some improvement, the authors remained cautiously optimistic as only one student demonstrated a significant difference in behaviour (Slate et al., 1998). Finally, four boys between the ages of 10 and 13 with ADHD took part in Fenstermacher, Olympia, and Sheridan's 6-week CAI study. The study revealed positive results in student's behaviour and problem solving skills as a result of CAI (Fenstermacher, Olympia, & Sheridan, 2006).

While I believe that all of these studies have merit, they are not without their limitations. What strikes me to be most worrisome is that for each of the studies, all of the students were removed from their classroom to take part in CAI. In almost all of the cases, the participants' behaviour was observed doing seatwork in a classroom setting and then, later, observed in a different setting during CAI. The removal of students from the class to a different environment, such as a computer room could have drastically altered the findings, as students were no longer with their peers. My other concern with these studies is in regards to the students who took part in the study. For example, in Clarfield and Stoner's study, the students were extremely young. For Slate et al., the students who participated were also receiving other forms of medication and behavioral

modification techniques (Slate, Meyer, Burns, & Montgomery, 1998). Furthermore, these students had been victims of either, sexual, emotional, or physical abuse (Slate, et al., 1998). Kotwal, Burn, and Montgomery conducted a study whose participant discontinued the use of his medication 15 days prior to the study commencing (Kotwal, Burns, & Montgomery, 1996). In addition, some of the studies' participants were on different doses of medication, and some students within the same study were medicated and others were not.

Although some gains in academic success and on-task behaviour were evident, caution should be taken in how we interpret the findings. While each of these authors extolled the virtues of CAI in combating ADHD, in some cases, the improvement were either minimal or not maintained over a long period of time. Furthermore, in each of these studies there were other behavioural modification treatments mixed in with CAI and in some cases, emotional problems, which would significantly alter the findings.

Research Questions

How does the use of a computer affect students with ADHD in their written output behaviour problems within the classroom?

Sub-Questions

1. How can teachers better incorporate the computer into the classroom?

2. How can teachers use the technology (computers) to improve student's behaviour and academic success?

3. How will educators know which types of software and hardware to use with students with ADHD?

4. Will students with ADHD maintain their gains achieved from using CAI?

Research Methodology

At the school where I have spent the majority of my teaching profession thus far, there is a large population of students with ADHD. These students have difficulty with written output and in-class behaviour. Experiencing the problems these students face on a day-to-day basis, I believe that the teachers at this school should research solutions into solving the problem. I feel that it is important for teachers to reflect upon their pedagogy and teaching practices in order to help these students who are having difficulty. At the same time, this school has invested in small portable computers known as NEOs, which could help students with learning disabilities such as ADHD. For this study I will use an action research plan to investigate the use of a portable computer on students with ADHD.

The teachers who are involved in this study, all have some experience in helping students with various learning and behavioural problems. Students in each of the classes who have been diagnosed with ADHD and have written output problems will be given a Neo (a rudimentary laptop) to complete language arts lessons such as journals

and story writing. The participants' pretest work will be collected and analyzed and compared with work done on the computers. I will be working with my grade 7 class and with two other classroom teachers. One of the teachers teaches a split 5/6 class, and the other teaches a grade 6 class. Each of us will be responsible for administering the study. All three teachers will administer a written assignment and students will conduct their work during class time working on the same class work as the rest of the class.

Participants and Setting

The participants for this study will be students ranging from grade 5 through grade 7 from three classrooms. The participants will be chosen based on an ADHD diagnosis and a history of written output problems and misbehaviour observed from their classroom teacher.

The study will be conducted within each student's respective classrooms. The participants will not be removed from their peers or classroom setting during any portion of the study.

Data Collection and Analysis

Data collection methods for this research study will be through teacher observations (journal), questionnaires, interviews with students and teachers, and student work samples before and after the use of computers. Data collected by all three teachers will be analyzed and compared to search for common themes. Discussions between the teachers involved with ensue.

Observations

Observational records will be kept throughout the entire study by each of the teachers participating. Each teacher will be given a special journal to keep records. Observations will be recorded during student seatwork before and during computer use.

Questionnaires

Questionnaires will be given to the teachers, students, and parents. The questionnaires will ask close-ended questions and will be different for each group involved. Questions for the students will be geared towards their impressions on using the Neo. Questions for parents will be to do with changes observed at home. Teachers will be asked questions regarding behavioural and academic changes as a result of using Neos.

Interviews

Interviews will be conducted before and after the students participate in the study. I will begin my research by conducting interviews with the teachers involved in the study. Interviews will take place during and after school hours in an informal setting. Interview questions will be geared towards how teachers previously helped students with ADHD in the past, problems they may have encountered, and how they believe CAI can help students in the classroom. As well, the teachers will divulge in any pitfalls they might see arise during the study. Students will also be interviewed after using the Neos.

Justification of Research Design

Unlike previous research discussed within the literature review, students will participate in this study within their classroom setting and surrounded by their peers. I believe that it is important that the students remain in their natural learning environment for the study as removing them into a different setting can influence the findings.

I believe that action based research is the best method for conducting my research based on several reasons. Firstly, the purpose of this research is to enhance the learning and behaviour of students with ADHD. Action research allows for teachers to be intimately involved in conducting the research and allows them to be active in making decisions based within their own classrooms. As well, it is an excellent way to solve problems within schools to improve the effectiveness of teachers and the learning of their students (Gay, Mills, & Airasian, 2009). Furthermore, it is a great way for teachers to continue in their professional development (Gay et al., 2009). Action research will be conducted by each of the three classroom teachers allowing them to gain a greater understanding of how to enhance their students' learning.

Ethical Considerations

Written consent will be obtained from parents of students who participate in this study. As well student confidentiality will be ensured throughout the study.

The Implications

There is a strong need for helping students with learning disabilities such as ADHD in the school system. It is estimated that there are over 1-2 million students who may have ADHD in the United States alone (Xu et al., 2002). For Canada, this means there could be 200 000 students who are affected by ADHD. Technology could significantly alleviate the problems associated with ADHD if implemented properly. This research could help teachers better understand and implement the use of technology as a pedagogical tool within the classroom. Furthermore, increasing the awareness of tools such as a Neo, gives teachers an option in helping their students' success.

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