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Facilitating maximum benefit for students with attention deficit hyperactivity disorder in distance education

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Abstract

Traditional distance education environments are not conducive to learners with Attention Deficit Hyperactivity Disorder. The purpose of this literature review is to address how learners with Attention Deficit Hyperactivity Disorder (ADHD) can better succeed in distance education learning environments. The review defines distance education, and Attention Deficit Hyperactivity Disorder, and briefly explains some of the details of each. It then reviews strategies for helping students with Attention Deficit Hyperactivity Disorder. Considerations for Attention Deficit Hyperactivity Disorder in distance education are addressed. It discusses media, interaction, engagement of learners, feedback, motivation, and support systems as possible ways to help learners with ADHD succeed. Sources reviewed were books and articles by subject experts in distance education and Attention Deficit Hyperactivity Disorder. This review supports the idea that distance education can not only be an acceptable medium for education with students with ADHD, but that it may even be more beneficial than the traditional classroom when implemented properly to meet the learner's needs.

FACILITATING MAXIMUM BENEFIT FOR STUDENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER IN DISTANCE EDUCATION

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ABSTRACT

Traditional distance education environments are not conducive to learners with Attention Deficit Hyperactivity Disorder. The purpose of this literature review is to address how learners with Attention Deficit Hyperactivity Disorder (ADHD) can better succeed in distance education learning environments. The review defines distance education, and Attention Deficit Hyperactivity Disorder, and briefly explains some of the details of each. It then reviews strategies for helping students with Attention Deficit Hyperactivity Disorder. Considerations for Attention Deficit Hyperactivity Disorder in distance education are addressed. It discusses media, interaction, engagement of learners, feedback, motivation, and support systems as possible ways to help learners with ADHD succeed. Sources reviewed were books and articles by subject experts in distance education and Attention Deficit Hyperactivity Disorder. This review supports the idea that distance education can not only be an acceptable medium for education with students with ADHD, but that it may even be more beneficial than the traditional classroom when implemented properly to meet the learner's needs.

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INTRODUCTION

Distance education is becoming a popular form of education with universities and companies offering courses, online degrees, and even high school courses. Distance education has become an accepted option for teachers and students who do not have room in their schedules for traditional classes or for those who do not have access to traditional learning environments. Historically, distance learners have needed to use distance learning systems because they did not have geographic access to conventional learning environments. Due to the flexibility offered when the class is not tied to a time or place, online delivery is quickly growing in popularity with full time on-campus students. As barriers to Internet access continue to ease, and the potential of the Internet increases, distance education continues to expand (Dooley, Lindner, & Dooley, 2005).

Learners with disabilities face new challenges in distance learning environments. It is estimated that 5-10 percent of the population has Attention Deficit Hyperactivity Disorder. Learners with Attention Deficit Hyperactivity Disorder (ADHD) have a difficult time staying on-task and paying attention (Murphy, 1995). There is little research showing how students with Attention Deficit Hyperactivity Disorder perform in a distance education environment, but looking at strategies that help learners with this disability instructors can find ways to make it the ideal learning environment.

The purpose of this literature review is to document how learners with Attention Deficit Hyperactivity Disorder (ADHD) can be helped in the classroom, how people who are diagnosed with from Attention Deficit Hyperactivity Disorder are affected by distance education, and to explore how distance education can be adapted to help these students. Individuals dealing with these disabilities often have difficulties with attention

relative to their peers (Barkley, 1998). At first it appears that since there is no instructor present to keep the student on track, it may be more difficult for individuals with learning disorders; however there are benefits from distance education which may help people dealing with ADHD to keep up with the class.

In it's beginning, distance education was primarily correspondence study, where students read independently or did research and wrote back to the instructor. Such tasks, which do not offer regular, timely feedback are especially difficult for individuals with learning disorders to maintain focus. This review will explore how different media and approaches can improve the attention span of individuals with learning disorders. This review will present information about how learners with ADHD can remain motivated in the classroom, and show how this information can be used in designing and implementing distance education courses.

The results of this review will be important for distance education instructors and course designers, especially those who have students who are diagnosed Attention Deficit Hyperactivity Disorder, to meet the needs of their students and give learners with disabilities the same opportunities as others. This review will also briefly explore how technology has been used to help students with learning disorders. This is becoming increasingly important as the number of students with learning disabilities in college and graduate school increases.

The research questions this review will address are:

1. What is distance education?
2. What is Attention Deficit Hyperactivity Disorder?
3. How can ADHD students be affected by distance education

4. How can a distance education course be designed to benefit learners with Attention Deficit Hyperactivity Disorder?

METHODOLOGY

Most of the resources and references were found through the University of Northern Iowa's Rod Library website, www.library.uni.edu. Through this website, Academic OneFile, Lexis-Nexis, ERIC, and InfoTrac were searched for information and articles. Keywords relating to the topic were listed and then used to search these databases.

In order to identify keywords, a set of research questions was created. The research questions were then broken down to important words, which became keywords. Some of the keywords, or descriptors used were: *learning disorder, strategies, technology, medias, multimedia attention span, distance education, classroom, learning styles, ADD, ADHD, attention deficit, attention*, and combinations of these terms. Some of these keywords produced an abundance of articles so they were narrowed down using the combinations of keywords to find the articles that pertained to the topic; others retrieved few if any results. If there was limited useful information in a source, it was compared to other sources. If the new source did not have new or unique information, it was eliminated, narrowing the sources further. The most beneficial searches were the ones which used keyword combinations that narrowed the results down to a few sources because the results usually pertained to the topic.

After searching for the keywords and narrowing down the results hy adding keywords and trying different combinations, the articles found through the search were read to see if they would be useful resources. After reviewing online versions of journals, articles, and references to printed journal articles, the UNISTAR directory was then searched. This directory allows students, faculty, and staff of the University of Northern

Iowa to search the physical resources available in the Rod Library. The search engine allows for searches similar to the online databases, so the same descriptors and combinations of descriptors could be used. The results of the search of UNISTAR were more limited, but at times it did need to be narrowed down. After narrowing down the results, the Rod Library librarians assisted in locating the references. The results were then assessed to narrow down to articles with useful information, which would yield results for the topic at hand and eliminate repetition of information.

Current sources were important in the review, so most sources are from within the last 10-15 years, however some older sources, which laid the framework for current information were used. Validity of the resources was also considered. Usable resources were from refereed journals, books by subject experts, and known reliable sources.

ANALYSIS AND DISCUSSION

This analysis and discussion will explore distance education, Attention Deficit Hyperactivity Disorder, and strategies to help individuals with Attention Deficit Hyperactivity Disorder succeed in the distance learning environment. This will be beneficial in helping to meet needs of students with Attention Deficit Hyperactivity Disorder in distance learning classes.

Distance Education

This section will define distance education, discuss how distance education differs from traditional education, and briefly discuss hybrid learning environments. This will define many of the terms associated with distance education, and set up the framework for the rest of the review.

What is Distance Education?

Distance education is defined as "Any formal approach to instruction in which the majority of the instruction occurs while educator and learner are not in each other's physical presence" (Mehrotra, Hollister, & McGahey, 2001, p. 1). Distance education is by no means a new concept, however it has greatly increased in prevalence over the last 10 years. New technologies are opening new doors for innovative education delivery methods and for distance interaction (Mehrotra, Hollister, & McGahey, 2001). Often the term *distance learning* is misused in place of distance education. Distance learning is defined in Dabbagh and Bannan-Ritland as "The deliberate organization and coordination of distributed forms of interaction and learning activities to achieve a shared goal" (2005, p. 327). Distance learning refers only to the learning, not both teaching and learning (Moore & Kearsley, 2005).

How is Distance Education Different?

Distance education is different from conventional education in that it allows the student and the instructor to be in different locations, however it also can open the opportunity to choose the time in which the learning occurs (Shank & Sitze, 2004). This is one way in which different distance learning methods are categorized. In synchronous education the instructor delivers the material and the students receive it at the same time. A conventional learning environment is synchronous. Interactive television, chat rooms, or radio are also synchronous. In asynchronous education, the students are able to receive the material at different times, according to their own schedules. A recorded lecture, printed materials, or most web-based classes would be considered asynchronous (Mehrotra, Hollister, & McGahey, 2001).

Dabbagh and Bannan-Ritland (2005) also divide distance education delivery methods into two basic categories, *traditional distance learning* environments and *web-based learning environments*. Traditional distance learning environments are similar to conventional learning environments, but without face-to-face interaction. Web-based learning environments are learning situations where the web is used as a delivery medium.

Online learning also opens the door to the use of a variety of media including simulations, games, video, graphics, text, and audio (Dooley, Lindner, & Dooley, 2005; Smaldino, Lowther, & Russel, 2008). Using e-mail and bulletin board functions enable students to communicate at different times, at their convenience. This also enables students to review the previous communications when necessary (Smaldino, et al. 2008). Cutshall (2002) writes that the main appeal to distance education is the convenience that

it creates in scheduling and location. Distance education helps to increase access to learning, improve cost effectiveness, and make it possible to balance work, family, and education (Moore & Kearsley, 2005).

Hybrid Learning Environments

Hybrid learning environments are combinations of two or more types of learning environments. This can be a combination of a traditional learning environment and an online environment, or can be a combination of synchronous and asynchronous distance education learning environments (Herring & Smaldino, 2005). Using combinations can help to meet the needs of students with different learning styles.

> Bringing synchronous and asynchronous technologies together in the delivery of instruction captures multiple modalities for learning among the students. Students who have difficulty in televised or audio format class discussions can find success in the online environment. The same is true for those students for whom the lack of "presence" of others in an online class because they cannot hear or see their peers becomes a problem. (Herring & Smaldino, 2005, p. 85)

This means that if you use multiple learning environments and teaching styles, you can reach learners with different learning styles and needs within the same class.

Attention Deficit Hyperactivity Disorder

This section will define Attention Deficit Hyperactivity Disorder, discuss the symptoms, and will discuss the use of strategies, and media to assist learners with Attention Deficit Hyperactivity Disorder. This will provide a better understanding of the disorder and what can be done to assist students diagnosed with the disorder.

What is ADHD?

One way to understand ADHD is to consider it from the point of view of someone dealing with this diagnosis:

> Imagine living in a fast moving kaleidoscope, where sounds, images, and thoughts are constantly shifting. Feeling easily bored, yet hopeless to keep your mind on tasks you need to complete. Distracted by unimportant sights and sounds, your mind drives you from one thought or activity to the next. Perhaps you are so wrapped up in a collage of thoughts and images that you don't notice when someone speaks to you. For many people, this is what it's like to have Attention Deficit Hyperactivity Disorder, or ADHD. They may be unable to sit still, plan ahead, finish tasks, or be fully aware of what's going on around them. (National Institute of Mental Health, 1994)

Living in this kaleidoscope can lead to problems in the classroom.

Attention Deficit Hyperactivity Disorder is defined as "A disorder characterized by a difficulty in retaining focus, especially on tasks, for a long period of time" (New Dictionary of Cultural Literacy, 2002, p. 1). According to Weyandt, "It is estimated that ADHD symptoms affect 2%-4% of the college student population" (Weyandt, 2007, p. 21). The number of students who have learning disabilities attending college and graduate school is steadily increasing (Shapiro, & Rich, 1999).

Primary Symptoms of ADHD

The primary symptoms of Attention Deficit Hyperactivity Disorder are inattentiveness, hyperactivity, and impulsivity. Each individual experiences these symptoms in different ways (Murphy, 1995).

Inattentiveness. Inattentiveness is defined as "The inability to focus one's attention on a particular task or activity over a sustained period of time" (Murphy, 1995, p. 285). Inattentiveness is also referred to as distractibility. Individuals with learning disorders, such as Attention Deficit Hyperactivity Disorder (ADHD), often have a difficult time with keeping their attention on tasks or in instructional settings such as classrooms (Learning about ADHD in Children, 2001). "It is not that the adult with ADD cannot focus on a given topic or task, it is that he or she is unable to do so consistently over a sustained period of time" (Murphy, 1995, p. 12). ADD, or Attention Deficit Disorder is an obsolete term for what is now a subtype of ADHD (Arnold, 2008). This inability to focus over time often causes "frequent shifts from one uncompleted activity to another" (Weyant, 2007, p. 24).

Hyperactivity. Hyperactivity is defined as "Excessive motor activity in children and/or feelings of excessive restlessness and agitation commonly associated with Attention Deficit Disorder in adults" (Murphy, 1995, p. 285). Symptoms of hyperactivity include fidgeting, pacing, taping a pencil, and excessive talking. Hyperactivity makes it difficult for people to remain sitting for long periods of time (Murphy, 1995). This often creates "feelings of restlessness," and "difficulty engaging in quiet sedentary activities" (Weyant, 2007, p. 24).

Impulsivity. Impulsivity is defined as "Acting or speaking too quickly before considering the consequences of one's behavior" (Murphy, 1995, p. 285). "Many people with ADD respond to stimuli witb astonishing speed and with little thought about the consequences that might result from their actions" (Murphy, 1995, p. 14). This can lead to students "frequently interrupting or intruding on others" (Weyant, 2007, p. 24).

Secondary Symptoms of ADHD

Some secondary symptoms of ADHD in adults are poor time management, disorganization, poor planning, impatience, forgetfulness, and lack of follow through (Barkley, 1998; Murphy, 1995; O'Regan, 2007).

"Though ADHD is found at every IQ level, most individuals may be of average or above intelligence. In fact, ADHD may mask intelligence in gifted children who show only average or below average performance" (O'Regan, 2007, p. 13). Historically, ADHD was thought to be something that would be outgrown, or that it was limited to children, however recently studies have shown otherwise. "ADHD does not disappear when an individual reaches 18. The way that specific symptoms present themselves bowever is often different than for the same individual as a child" (O'Regan, 2007, p. 25). Witita & Parish, 2008, wrote "Recent studies have shown that ADHD has a 50% to 60% persistence rate into adulthood, and may affect as many as seven million adults in the United States today" (p. 1).

Strategies for Helping ADHD Students

There are many things that can be done to help students with Attention Deficit Hyperactivity Disorder manage their disorder and excel in the classroom. Unfortunately, there is not a sure fix, because Attention Deficit Hyperactivity affects each individual differently. "Individuals with ADHD have different needs and different learning styles. What may work for one student may not work for another" (Cimera, 2002, p. 31). Instructors will need to observe the student or get input from the student to get an idea where to begin (Cimera, 2002). Instructors should "make accommodations only when needed. There is no need to make changes when they are not needed. Moreover, teachers

should start with making minor changes—making major changes only when the student needs dictate that more accommodations are required" (Dowdy, Patton, Smith, & Polloway, 1998, p. 99). The strategies and methods are not based on scientific studies, hut on common sense, because "...few scientific studies bave been conducted with college students with ADHD, and there is a need for basic research in this area" (Weyandt, 2007, p. 21-23).

Possible Modifications

Remove distractions. One thing that can help a learner keep focus is to modify the physical learning environment. The idea is to create a *distraction free room* (Weyandt, 2007).

> Students with ADHD often react to the physical aspects of the classroom, including the classroom dimensions and the way the classroom is arranged...Unless the classroom is too small to accommodate the number of students assigned, teachers can arrange desks to provide students with personal "space." This should greatly limit opportunities for unwanted physical and verbal interactions that might be inappropriate and disruptive. (Dowdy, Patton, Smith, & Polloway, 1998, p. 80)

Students with ADHD should be seated in areas that help avoid distracting stimuli, preferably in the front, or on an edge of the classroom. Placing the student in front keeps other students out of view, hut make sure that they are still part of the class (O'Regan, 2007). If the student is distractible, seat them away from air conditioners, doors, windows, bookcases, fish tanks, computers, and remove non-essential materials from the work area. Try to surround the student with good role models (O'Regan, 2007; Shulz,

1992). "Teachers can provide a quiet study area free from distractions, which is available to all students" (Shulz, 1992, p. 24). When creating the distraction free environment, it is also important to make sure that the student still feels like part of the class (O'Regan, 2007).

Time of day. For many individuals who have Attention Deficit Hyperactivity Disorder, the time of day can affect their attention span, for example, early afternoon may be a bad time for some students to pay attention. Weyandt suggests offering "more complex assignments in the morning hours" (Weyandt, 2007, p. 74).

Involve the students. Allow "active involvement of student[s] in the lesson; using demonstration/guided practice/independent practice paradigm" (Dowdy, Patton, Smith, & Polloway, 1998, p. 27). Getting the students involved more in their learning has been found to benefit the student. "Direct teaching, cooperative learning, peer tutoring, the use of aides, and participation in small groups have all been found effective...Research suggests that short, structured learning activities interspersed with longer period of high interest learning may benefit most students" (Shulz, 1992, p. 25). As a student's interaction and involvement increase, so does his/her satisfaction (Dooley, Lindner, & Dooley, 2005).

Segmenting and sequencing. According to Swanson and Hoskin (2000), segmentation and sequencing of tasks makes it much easier for an individual with Attention Deficit to keep his/her mind on task, and form some type of organization. Segmentation means breaking down a task into several smaller tasks. This makes it easier for individuals with learning disorders such as ADHD because they are able to work on small tasks, so they do not have to keep their attention on one task for an extended period

of time. "This does not mean that you should expect students with ADHD to do less work. Simply break up the time that they require to complete a task" (Cimera, 2002, p. 34). The Chesapeake Institute recommends instructors "Break up long presentations by chunking content. At the end of each chunk, have the student respond in some way" (1994, p. 1). They also recommend that assignments be broken down into "'mini assignments' and build reinforcement as the child finishes each part. So as not to overwhelm the student, consider passing out longer assignments in segments" (Chesapeake institute, 1994, p. 1).

Give regular feedback. Giving regular feedback will help keep students motivated. This regular feedback helps the students know how they are doing (Dowdy, Patton, Smith, Polloway, 1998; Techniques, 2006). Barkley wrote that it helps to have reinforcers, rewards, and or consequences for completion of tasks, or when the learner is doing a good job managing his/her ADHD (Barkley, 1998). This applies to young students as well as adults. "You will probably find that many students with attention Deficit Disorder benefit from a structured reinforcement system. Let the student know what behaviors will be rewarded. Select reinforcers that are of interest to the student" (Chesapeake Institute, 1994, p. 20). Adults need to set these reinforcers for themselves. Adults can get the positive feeling of completing a task as a reinforcer when segmenting tasks, which will help them to keep their minds on the tasks. Once the smaller tasks are completed, they will then compose the whole of the original task (Swanson & Hoskin, 2000, p. 119). After tasks are broken down into smaller tasks, it helps to sequence them, and to sequence steps in the individual tasks (Swanson & Hoskin, 2000, p. 119). The National Institute of Mental Health says that it is beneficial to "Set a deadline for each

task and reward yourself as you complete each one" (National Institute of Mental Health, 1994, p. 1). When reading, it helps to break the assignment into smaller parts and space them over several sessions. When writing, it is beneficial to evaluate drafts and offer feedback. This helps make the final larger task easier by breaking it in to smaller goals (Quin, 1994).

Structure and organization. Structure and organization can also help students with Attention Deficit Hyperactivity Disorder. "It is important to provide students a lot of consistent structure. Providing a daily routine where students know what to expect will help" (Cimera, 2004, p. 96). O'Regan notes that ADHD students "do not handle change well, so avoid transitions, changes in schedule, physical relocation, disruptions" (O'Regan, 2007, p. 55). Cimera suggests the use of advanced organizers.

> Map out or outline what is going to be covered in class so that the students have a better idea what information will be important and what information is just *setting the stage*. A good way of doing this is to list all of the objectives for the lesson on the board. Before you begin the lesson, review the objectives, thus letting the students know what your expectations are. (2004, p. 36)

Cimera also recommends using study guides and making lists of assignments for the students (Cimera, 2004). Dowdy, Patton, Smith, and Polloway recommend instructors "provide students with a daily schedule," and "establish expectations for students in advance and do not introduce unexpected requirements after beginning an activity" (Dowdy, Patton, Smith, & Polloway, 1998, p. 76).

Address students' ability levels. Because learners with Attention Deficit Hyperactivity Disorder have a difficult time paying attention if they are not challenged,

or if they feel overwhelmed, it is beneficial if the instructor can narrow down possibilities if necessary, or give more of a challenge if the learner does not feel challenged (Weaver, 1994). For example, if a student is working on math homework and it is excessively difficult, the student will likely be easily distracted. The same goes if the homework is way too easy or too repetitive. If a student does not feel challenged, he/she will also have a shorter attention span when dealing with instructional material (Weaver, 1994).

Other areas. Some other suggestions from the Chesapeake Institute for maintaining student involvement include:

a. Keep lesson objectives clear
b. Deliver the lesson at a brisk pace
c. Encourage collaboration among students
d. Use meaningful materials and manipulatives
e. Prompt for student answers after allowing at least 5 seconds of wait time.
f. Have the students recite in unison
g. Vary your tone of voice and model enthusiasm. (Chesapeake Institute, 1994, p. 17)

Media and Attention Span

Some media for teaching and testing do not hold the attention span of individuals with learning disorders as well as others. Weaver (1994) stated that the worst possible way to evaluate a student with a learning disorder is through standardized testing. ADHD students have problems sitting still for long periods of time filling in circles (Weaver, 1994). There are several reasons that this is not recommended for learners with ADHD. One reason is that media that do not offer quick feedback cause the students to lose

interest sooner. If a student can get instant or quick feedback as reinforcement, he or she may be able to keep his/her attention on the task for longer periods of time (Xu, Reid, & Steckelberg, 2002). These tests seem to be one long task through which the students must remain seated and attentive. People with ADHD find that if something is broken down into smaller tasks, it is easier to maintain attention on the larger task. It is important that you "make sure you are testing knowledge and not attention span" (O'Regan, 2007, p. 55). When necessary, give additional time to complete tests or tasks (O'Regan, 2007).

Non-individualized learning, such as lectures or class discussions may be difficult for learners with learning disorders because they might not be able to keep up or might get bored. Xu, et al. said that if a student with ADHD finds a task to be too easy, or too difficult, the attention span drops quickly (Xu, et al., 2002). If the tasks can he individualized, or given to the student to do at their own pace, this is improved.

Cimera recommends the use of manipulatives. These are hands on activities, or "Representations of abstract concepts that the student can physically alter" (Cimera, 2002, p. 35). This means letting them get hands on with what they are learning. Instead of telling them what something looks like, let them see it, handle it, or work with a model of it.

Weaver also recommended encouraging learners to use checklists and checking off steps as they go (Weaver, 1994). This becomes an incentive or reinforcement because at the end of each step, they get a feeling of accomplishment and get to check off each step on the list. If the instructor can model or demonstrate how something is done and when possible provide a checklist for the steps rather than just giving instructions, ADHD students have a much easier time paying attention. Seeing it in addition to hearing or

reading it helps to make a connection and to keep their attention (Swanson & Hoskin, 2000). It is also important that the instructor makes instructions clear, and if possible, elaborate step-by-step chunks so that the learner can understand them. Instructors can use many different methods for letting the students demonstrate what they know. Rather than having them write a paper or fill out circles on a test, students can give oral presentations, do art projects, and participate in drama, reenactments etcetera. This allows them to take an active interest in the learning, rather than sitting still trying to keep their minds on something like reading or writing (Weaver, 1994). As Xu, et al. (2002) recommended, media which offer instant feedback or reinforcement are very helpful.

Using Technology

Technology has brought new media and options to the classroom, and the student's desk. Software can be used to tutor, test, and help organize students.

> Technology offers promise because a number of inherent features are closely associated with characteristics of effective instruction. For example, computers may be used to introduce new material with graphics, words, and sound within game formats, animation, or color. It also can simulate real world situations with images and sounds. The computer allows repeated trials, offers privacy, and organizes content into smaller chunks of information. Software can provide step-by step instruction, wait for responses, offer immediate feedback and reinforcement, and allow students to work at their own pace. These attributes allow the teacher to plan learning activities for students with short attention spans, enable students to be actively involved in learning, and may even increase the student's motivation and confidence. (Xu, Steckelberg, & Reid, 2002, p. 1)

Computers can be used as a tool to help break down information into smaller steps, and help present the information in a way that the learners are actively participating in their learning. Computer-based programs make it possible to provide immediate feedback to each student. In a traditional classroom, while working on a task, students could not expect immediate feedback because the instructor roams from student to student. A program on a computer can offer this immediate feedback (Swanson & Hoskin, 2000, p. 120). "Computers have colorful images that move, and are interactive. Using technology not only keeps students' attention but also teaches them valuable academic skills" (Cimera, 2002, p. 35). Also, technology allows for the use of media in presentation and feedback (Swanson & Hoskin, 2000, p. 120).

> For children with ADHD, computer assisted instruction (CAI) offers great potential. CAI can provide an instructional environment that is highly stimulation where students receive frequent and immediate performance feedback, instant reinforcement and continuous opportunities to respond to academic stimuli. All of these attributes have been shown to improve the performance of children with ADHD. (Xu, Reid, & Steckelberg, 2002, p. 1)

A study of ADHD students using an Internet-based reading program where students participate in over 180 active learner interactions per lesson "produced both higher mean levels of oral reading fluency and greater rates of growth as compared to the baseline rates…the computer tells the child, 'yeah' or 'you did it'" (School Psychology Review, 2005, p.1). "Learning can—and should be—fun" (Cimera, 2002, p. 36).

Games and simulations are other useful tools that technology can bring to the class. "Instructional games provide an appealing environment in which learners follow

prescribed rules as they strive to attain a challenging goal. It is a highly motivating approach, especially for repetitive content such as math facts or vocabulary words" (Newby, Stepich, Lehman, & Russell, 2006, p. 105). Using simulation, learners confront realistic approximations of real-life situations. Simulation allows realistic practice without the expense or risk involved in real situations such as driving and flight simulators" (Newby, Stepich, Lehman, & Russell, 2006, p. 106).

Audio can be a great tool for students with Attention Deficit Hyperactivity Disorder. Recording devices can help them go back to lectures if they lose focus. Books on tape can be used as an alternate to, or along with textbooks (Weyandt, 2007).

In addition to being able to offer new methods of presenting information and getting feedback, these distance education technologies can allow students to work at their own pace in a different place and different time. This means that they might not be as rushed as in other settings, and they are able to work at their own pace. Allowing students to learn at their own pace is very helpful in building the confidence and comfort level of students with learning disorders (Xu, Reid, & Steckelberg, 2002). In a 1981 study by Kleinman, Humphrey, and Lindsay, where arithmetic problems were given to students both on a paper and pencil format, and a computerized format with graphical motivational features, learners with ADHD "spent more time working on problems on the computer, without any significant loss of accuracy or speed" (Xu, Reid, & Steckelberg, 2002, p. 1). This indicates that technology can help keep students interested and motivated to work on the task at hand.

ADHD Considerations in Distance Education

The field of distance education raises a lot of questions about how learners with learning disorders will be affected. Schoenfelder says "differences exist between traditional and distance education classrooms. The most obvious difference is that often the teacher and students are in different locations" (Schoenfelder, 1994, p. 20). Herring and Smaldino wrote that "if it works in a regular classroom, it will probably work in electronically mediated instruction with some adjustment" (Herring & Smaldino, 2005, p. 40). This means that many of the strategies and approaches for assisting students with disabilities in the classroom can be adapted to the distance education environment. By looking at the similarities and differences between the traditional classroom and distance learning environments it becomes apparent that some media and approaches could benefit or hurt individuals with learning disorders.

Although it is not required that students identify themselves as disabled on application forms, it is important that they inform the instructor, as well as the institution, of their disability so that the instructor is able to assist learners (Quinn, 1994). This is the same whether in a classroom setting or in distance education. "Students are responsible for contacting the instructor when there is difficulty with an assignment or the technologies. The instructor can anticipate many of the probable issues that might arise, but cannot plan for all of them" (Simonson, Smaldino, Albright, & Zvacek, 2006, p.165). According to Simpson (2000), if instructors do not know their learners and know their learners' needs, they are unable to plan ways to accommodate their needs. Because learners with ADHD do have special needs, it is very important that the instructor is aware of the disability. Herring et al. as cited in Schoenfelder said that "One element of a

successful distance education course is an understanding of the characteristics of the distance education student…The teacher is then able to match the instructional content to the needs of the students" (Schoenfelder, 1994, p. 21).

The most important commonality between the traditional classroom and distance education for those who have ADHD, is that their disorder still needs to be addressed. The difference is in how it is addressed. In asynchronous distance learning environments, students can be allowed to work at their own pace, and at the time when their attention span is at its best. The offline learning opportunity provides the learner with more time to process the information, and craft a response. This levels the playing field for special needs students. If students are having a difficult time paying attention, they can take a break and come back to it later with many asynchronous approaches, where in a traditional setting, this would not be possible (Simonson, Smaldino, Albright, & Zvacek, 2006).

One disadvantage of distance education to the traditional classroom is that the instructor is not there to keep the student on track and offer in-person feedback and reinforcement. The student needs to manage his/her own time, and provide self motivation. This is difficult for learners with ADHD to do. Dooley, Lindner, and Dooley say that "distance learners need to have higher levels of self-directedness than do traditional learners in order to be successful" (Dooley, Lindner, & Dooley, 2005, p. 88). According to Cutshall, (2002) students in distance education need to be motivated, focused and self-motivated. Because the student and the instructor are not in the same location, it can be more difficult for the student to build a relationship with the instructor, so it might be more difficult for the instructor to help the student (Simonson et al., 2006).

Also, many of the things that an instructor can control in a traditional classroom now have to be controlled by the student. For example, minimizing distractions in the learning environment. The instructor can still minimize distractions in the online environment by "making classrooms efficient learning environments" (Schoenfelder, 1994, p. 12), however, the student needs to create their own distraction free zone and schedule the time to work on their own.

Many of the other differences between the traditional classroom and distance education appear to be beneficial for users with learning disorders. For example, in asynchronous learning environments, each student is allowed to learn at his or her individualized pace because they are able to work when it is most convenient for them, and can spend as much or as little time on a task as necessary. As Weaver (1994) discussed, if a student feels overwhelmed, or unchallenged, he/she has a difficult time. If the student is able to make his or her own decisions, the material becomes more individualized. As discussed earlier, often learners with ADHD find that at certain times of the day they have a better attention span. In a traditional setting, the student has to schedule according to when the class is offered, however in distance education, students are able to work at the times which are most convenient for them in most cases (Simonson et al., 2006). Also, since students are able to work at their own pace, they are able to break tasks into manageable steps, and do smaller steps per sitting, and take a break when necessary, rather than having to sit through an entire class (Simonson,et al., 2006). When they are allowed to manage their own time, this is eliminated, and learners with disabilities are given the same chances to learn as peers.

Media in Distance Education

Different media used in distance education can have direct effects on attention span. For example, if an instructor offers the information through a few different media, such as in a book, audio book, a video, and a game, students will be able to find a medium that works best for them.

> Because computers have the ability to deliver information in any medium (including print, video, and audio recordings of voice and music), the computer has become a boundless library. Students are able to communicate instantly with text, picture, voice, data, and two-way audio/video, and the resulting interactions are changing the roles of both students and teachers. Teachers can now be separated geographically from their students, and students can learn from other students in classrooms all over the world. (Smaldino, Lowther, & Russel, 2008, p. 183)

The instructor and student can choose a medium that the student can best follow and pay attention to.

> By varying the presentation of information or by enlisting multiple presentation formats, instruction might be designed to address multiple learning characteristics. Such techniques as using animation, text, visuals, audio, or video segments might be important to address individual differences within a group of students. (Herring & Smaldino, 2005, p. 24)

Simple media such as reading text and simple audio lecture do not hold the attention span of many individuals with ADHD. If educators can incorporate other media along with text, students will be able to build on and make connections on what they are learning

(Simonson et al., 2006; Xu, Reid, Steckelberg, 2002). According to Herring and Smaldino (2005), using a graphic instead of, or in addition to, text can enhance learning in many ways. Students can use graphics to gain a stronger understanding of what they are reading, or what is being said. Also, graphics are useful in assisting in the explanation of things which are difficult to grasp. "Research has demonstrated the use of visuals clearly influences the learning experience of students" (Herring & Smaldino, 2005, p. 52).

Animations can also be a great visual aid to help students understand specific topics. They can help construct an easier to grasp model or simulation of objects and locations (Dooley, Lindner, & Dooley, 2005). A simulation is defined as "a representation of a real or imagined specific object, system, or phenomenon. It is an imitation" (Merrill, Hammons, Vincent, Reynolds, Christensen, & Tolman, 1996, p. 93). Simulations are "often considered a working model of reality." They "provide almost real examples of experiences that are impractical or impossible to reenact" (Dooley, Lindner, & Dooley, 2005, p. 197). Simulations involve less risk and are more cost effective than real life situations. Time can be compressed in simulations, allowing you to focus on specific aspects of the experience (Merrill, et al., 1996). "The experiences in a simulation are repeatable. Students can review an experience over and over again until their responses become natural and automatic" (Merrill, et al., 1996, p. 96) .

Tutor applications on computers have also offered a new media of learning, and practicing, and for self-testing knowledge.

In tutor applications, the computer acts as a tutor by performing a teaching role. In effect, the student is tutored by the computer. These types of applications are

often referred to by several different labels such as computer-based instruction (CBI, computer-assisted instruction (CAI) or computer-assisted learning (CAL). The general process is as follows:

1. The computer presents some information
2. The student is asked to respond to a question or problem related to the information
3. The computer evaluates the student's response according to specified criteria
4. The computer determines what to do next on the basis of evaluation of the response. (Merrill, Hammons, Vincent, Reynolds, Christensen, & Tolman, 1996, p. 11)

This type of tutoring application provides the instant feedback and reinforcement that learners with Attention Deficit Hyperactivity thrive on.

Interaction in Distance Education

As technology changes, there has been an increase in the potential for interaction in distance education. "The opportunity for interaction between students and teacher distinguishes modern distance education from broadcast media and text-based studies" (Herring & Smaldino, 2005, p. 1). By utilizing more interactive media and media where students receive instant feedback and reinforcement, students with learning disorders will be able to keep up and increase attention span. "The level of interaction may directly impact a student's learning" (Herring & Smaldino, 2005, p. 24). As discussed earlier, computers can increase a learner's attention span by providing instant feedback and reinforcement. They can also give a lesson more life by incorporating graphics, sound,

video, and text. "As in a regular classroom, various technology, media, and materials can be used in a distance education setting. Each of the various telecommunication systems used in distance education has strengths and limitations" (Smaldino, Lowther, & Russel, 2008, p. 159). Table 1.1 provides a guide for selecting media and methods in a distance education environment (Dooley, Lindner, & Doley, 2005, p. 178).

Table 1.1: Selecting media and methods in distance education

	Information	Procedures	Principles and Concepts	Attitudes and Values
Audio	Readings Audio Videotape Lecture Learner presentation Guest speaker	Demonstration Lecture Readings	Class discussion Peer teaching Case Studies Panel Discussions Group projects	Reaction panel Debates Panel discussions Class Discussions Case studies Role playing
Audio Graphics	Readings Audio Videotape Lecture Learner presentation Guest Speaker	Demonstration Lecture Readings	Class discussion Peer teaching Case studies Panel discussions Group Projects	Reaction panel Debates Panel discussions Class discussions Case studies Role playing
Two-Way Audio One-Way Video	Readings Audio Videotape Lecture Learner presentation Guest speaker	Demonstration Lecture Readings	Class discussion Peer teaching Case studies Panel discussions Group projects	Reaction panel Debates Panel discussions Class discussions Case studies Role playing
Two-Way Audio Two-Way Video	Readings Audio Videotape Lecture Learner presentation Guest speaker	Demonstration Lecture Readings	Class discussion Peer teaching Case studies Panel discussions Group projects	Reaction panel Debates Panel discussions Class discussions Case studies Role playing
Computer Conferencing	Reading Guest contributors	Readings Tutorials	Class discussions Panel discussions Group projects	Reaction paper Class discussions Debates Role playing

Engaging Online Learners

Because distance education is now primarily computer-mediated, many of the media can be used in unison to support learners with Attention Deficit Hyperactivity Disorder. Herring and Smaldino recommend instructors "consider a variety of techniques, but think interactively so students feel part of a learning community, sharing common goals and purpose" (Herring & Smaldino, 2005, p. 40). This enables instructors to engage distance learners. "Engaged learning is focused on the learner, whose role is integral to the generation of new knowledge. In an engaged learning environment, each learner's actions contribute not only to individual knowledge but to overall community knowledge development as well" (Conrad & Donaldson, 2004, p. 5). This enables the learners to actively participate in their learning, and gets them more involved, which can keep them motivated. Engagement makes learners feel like part of an online learning community. Conrad and Donaldson also state that active participants will invest more time and effort into the class (Conrad & Donaldson, 2004). Dooley, Lindner, and Dooley say that satisfaction increases as the learners' interaction increases. Learners in learner-centered instruction are actively involved, applying their knowledge, and building new knowledge and gets the learners to use creative problem solving skills, and critical thinking (Dooley, Lindner, & Dooley, 2005). Table 1.2 provides a representation of the paradigm shift (Dooley, Lindner, Doley, 2005, p.101).

Table 1.2: Paradigm Shift

Teacher-Centered Instruction	Learner-Centered Instruction
• Knowledge transmitted • Passive • Context independent • Assessment separated • Competitive	• Knowledge constructed • Active • Context dependent • Assessment integrated • Cooperative

Watkins wrote that "online courses can effectively use Internet technologies to facilitate e-learning that is exciting, interactive, purposeful, and beneficial for online learners" (Watkins, 2005, p. 2). One way to get learners involved in online courses is through e-tivities.

Salmon wrote that e-tivities are:

- Motivating, engaging and purposeful;
- Based on interaction between learners/students/participants, mainly through written message contributions;
- Designed and led by an e-moderator;
- Asynchronous (they take place over time);
- Cheap and easy to run-usually through online bulletin boards, forums or conferences. (Salmon, 2002, p. 1)

E-tivities can bring many perspectives and a diversity of ideas, can be asynchronous, and can be used to assist learners with disabilities using technology (Salmon, 2002). These types of activities are a good way to engage a learner with ADHD because they thrive on motivation, interaction, and because they are asynchronous, they can do it at their own pace.

Feedback and Motivation

Feedback and motivation are especially important in a distance education environment. Simonson, Smaldino, Albright, and Zvacek say that "a well-run online course should provide regular feedback for students" (2006, p. 174). Getting feedback contributes to learner motivation.

> Extrinsically motivated people respond to reward, praise, good grades, money and so forth. Intrinsic motivation is derived from learners' internal drive. Intrinsically motivated people want to learn for the sake of learning, just to know something new and out of curiosity. (Dooley, Lindner, & Dooley, 2005, p. 91)

Feedback helps motivate both types of learners, because it helps the intrinsically motivated people know that they are on the right track and learning, and it provides the reward and praise needed to motivate extrinsically motivated people. "Another effective device for motivating students is to explain why they are being given a certain request or assignment as well as how it could be useful to them" (Schoenfelder, 1994, p. 13).

Support Systems

In distance education, it is very important to have a good support system in place for the students. Instructors should provide advising, technical assistance, and library support (Dooley, Lindner, & Dooley, 2005). McLoughlin and Marshall (2000), as cited in Tait and Mills (2003), says

> Support systems are essential for learners to engage in the process of learning and need to be developed in response to needs. It is also imperative that a range of support systems be put in place to enable learners to become competent in learning on-line, and to learn to interact in a virtual environment. (p. 62)

The instructor can also "create supporting materials such as checklists, study guides, and/or rubrics" to assist students in staying on task and completing assignments. (Herring & Smaldino, 2005, p. 23). Pendleton, as cited in Cutshall (2002), advises instructors planning online courses to make it clear to students exactly what is expected of them, and to make the materials available in a way that are easy for the learners to access. Smaldino, Lowther, and Russel wrote that "The emphasis on student learning, whether in a teacher-led or student-centered environment, is as important in a distance education setting as it is in a traditional classroom" (2008, p. 158). In providing the support needed by the students, the goal of maximum student learning can be reached.

CONCLUSIONS AND RECOMMENDATIONS

This literature review supports the proposition that although learners in a distance education environment do not have an instructor present to keep the student on track, it appears that distance education can be a beneficial setting for learners with disabilities such as Attention Deficit Hyperactivity Disorder. In distance education it is as important, if not more important, than in a traditional classroom that instructors are aware of their learners. This will help instructors find ways to use methods, approaches, and media that will help maximize learning of all students. It is important that the learners with disabilities inform their instructors and the educational institution that they have a disability and their specific needs, so that they are able to accommodate the learner's needs.

Distance education offers options for the students to do some of the breaking down of tasks and time management on their own, because they are allowed to work at their own pace, and at the time that works best for the individual. It has been shown that if the material is presented in a way that can keep the learner's attention the learner will get more out of it. Media that offers instant feedback and reinforcement will help keep the learner motivated, which will help them keep on-task and have an easier time completing tasks in a reasonable time. Using real life situations and activities which get the learner actively involved in the learning will make them part of the learning process. Technology, and the media introduced through it, has provided new options for learning. Some students with disabilities find it easier to maintain attention with certain media or combinations of media. Because much of today's distance education is over computers, it is possible to utilize most media that are available in a traditional classroom, all at the

student's desk. One major benefit of distance education for individuals with learning disorders is time. Students are able to work on tasks at times when their attention span is better, and are able to take breaks when necessary. This enables the students to work at their own pace, because if a student feels overwhelmed, or unchallenged, the attention span plummets.

This review has shown that, if designed properly, not only is distance education not a negative for most learners with ADHD, but can be of great benefit. Students are able to work at their own pace and challenge themselves. This makes it more of an individualized-learning environment where the students take an active role in their learning. This is beneficial in keeping learners on track, hut the learners need the knowledge and support to make this a successful event.

Some further needed investigation would be research findings on success rates of individuals with learning disorders comparatively between distance education and the traditional classroom. It would be useful to determine the effectiveness in different distance education environments, and using different media. Another area where this reviewer would like to see further research involves measuring differences between levels of learning when reading materials in a book or hard copies, as compared to soft copies or copies on the computer. It would be beneficial to know if a student's attention span, comprehension, or retention rate changes between the two. This information would be useful in choosing course materials for distance education courses.

This author has Attention Deficit Hyperactivity Disorder, and has found this review to be beneficial. It has helped in selecting courses, managing work, and maintaining personal life by helping find ways to manage the disability. For this learner,

it was not only important to let the instructor understand my needs, but also to better understand my own disability so that I can better manage my life. This information will also be useful in designing future formal and informal distance education environments to meet the needs of students with Attention Deficit Hyperactivity Disorder, and to give all learners an equal opportunity to learn.

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