

COMPARATIVE ANALYSIS OF LEARNING STYLE PREFERENCE OF STUDENTS WITH AND WITHOUT ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

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Abstract

In many cases what is being taught has a less impact on learners' achievement if their varied learning abilities and disabilities are not accommodated in the teaching process. The present study is a comparison of the learning styles of students with and without Attention Deficit Hyperactivity Disorder (ADHD). Survey research design was used to investigate the preferences in learning styles of students. In order to compare, a total of 158 (73 students with and 85 students without ADHD) participated in the study. Two instruments were used for data collection and they are Learning Styles inventory adapted from Fleming (2001) VARK Questionnaire and ADHD questionnaire adopted from Leslie & Wolraich (2007). Data collected were analyzed using percentage, frequencies and crosstabulation. Findings among others revealed that most students have visual learning style preference; majority of students with ADHD learn by hands-on-activity followed by those who prefer learning through watching and demonstration; most students without ADHD learn by watching followed by those who learn by listening and reading text materials. Based on the findings, it was recommended that the learning preferences of students should be verified prior to the start of their academic tasks by using VARK questionnaire among others.

Introduction

It is known that learning processes vary from person to person due to the presence of biological and psychological differences. These differences could be seen in the students' performance goals which can be maximized when students' learning styles are acknowledged and accommodated into teaching process. Learning style is defined by Hall (2008) as the way in which students begin to concentrate on, process, internalize, and remember new and difficult academic information. Learning styles indicate how students perceive, interact with, and respond to the learning processes in the classroom. The definition takes into consideration the existence of a range of individual differences in how students prefer to gather and absorb information.

Based on the above, learning style could therefore be defined as the composite of students' characteristic differences that serve as relatively stable indicators of how they perceive, interact and respond to learning in the class. The interaction of these elements occurs differently in every student. To reveal these natural tendencies and styles, it is important to use a comprehensive model of

learning style that identifies each individual's strengths and preferences across the full spectrum of physiological, sociological, psychological, emotional, and environmental elements. (International Learning Styles Network, 2008)

There are many models of learning style such as the Dunn and Dunn learning-styles model (1990), Kolb's (1984, 1985) Learning Styles Inventory, and Honey and Mumford's (1992) Learning Styles Questionnaire and Fleming (2001) individual's learning preference. Among the models, the present study will focus on Fleming (2001) individual's learning preference known as VARK—Visual, Aural, Read/Write, and Kinesthetic (hands-on). The VARK model is proposed by Fleming (2001). Fleming (2001) defines learning style as “an individual's characteristics and preferred ways of gathering, organizing, and thinking about information. VARK is in the category of instructional preference because it deals with perceptual modes” (p.1). The model helps to find how students learn and retain information most effectively by seeing, listening, reading/writing, or through movement/touch.

According to Fleming (2001) Visual learners prefer maps, charts, graphs, diagrams, highlighters, different colors, pictures, word pictures, and different spatial arrangements. Aural learners like to explain new ideas to others, discuss topics with other students and their teachers, use a tape recorder, attend lectures, and discussion groups use jokes. Read/Write learners prefer lists, essays, reports, textbooks, definitions, printed handouts, readings, web-pages and taking notes. Kinesthetic learners like field trips, trial and error, doing things to understand them, laboratories, recipes and solutions to problems, hands-on approaches, using their senses and collections and samples.

Studies by Chuah Chong-Cheng (1988) cited in Mohamad, Abbas, Helan and Kiranjit (2011) discusses the importance of learning styles as being not only necessary, but also important for individuals in academic settings. Most students favour to learn in particular ways with each style of learning contributing to the success in retaining what they have learnt. As such, studies carried out by Chuah Chong-Cheng conclude that students retain 10% of what they read, 26% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say, and 90% of what they say as they do something. Omrod (2008) maintain that students seem to learn better when information is presented through words (verbal learners), whereas others seem to learn better when it is presented through pictures (visual learners).

Additionally, the differences in learning styles have also been reported between academic achievers and the underachievers (Zwart & Kallemeyn, 2001); between the learning disabled and average learners. Some special needs students favour kinesthetic instruction, such as experiential, active and hands-on, while many others are more auditory and visually oriented (Dunn 1991 cited in Mohamad, Abbas, Helan and Kiranjit (2011). Special needs students have different categories such as students with attention deficit hyperactivity disorder (ADHD).

Centers for Disease Control and Prevention (2014) defined ADHD as a biological condition that makes it hard for many children to sit still and concentrate in learning situation. ADHD is the most common neurobehavioral disorder of childhood

(Raishevich & Jensen, 2007). The possible causes of ADHD as identified by researchers include: gene and heredity (Blum, Kenneth, Amanda & Chen, 2008), differences in the brain (National Institute of Mental Health, 2007) and environmental factors (Yeates, Kira & Armstrong, 2005).

Three subtypes of ADHD have been described by Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV) and their symptoms outlined in the table below:

Inattentive type	Impulsive type	Hyperactivity type
<p>forgets things, seems “day dreamy” or confused and appears to not be listening;</p> <p>Finds it hard to concentrate and jumps quickly from one activity to another</p> <p>Gets bored with an activity unless it’s very enjoyable</p> <p>Struggles to get organized and finish tasks</p> <p>Has difficulty learning new things and following directions</p> <p>Is smart but doesn’t understand or “get” things you expect him to or that his peers grasp easily</p>	<p>impatient and has trouble waiting for a turn</p> <p>Blurts out inappropriate things and interrupts people</p> <p>Overreacts to feelings and emotional situations</p> <p>Doesn’t understand the consequences of his actions</p>	<p>Talks almost constantly</p> <p>Moves nonstop even when sitting down</p> <p>Moves from place to place quickly and frequently</p> <p>Fidgets and has to pick up everything and play with it</p> <p>Has trouble sitting still for meals and other quiet activities</p>

Table 1: Subtypes of ADHD by Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV)

The National Institute of Health (NIH) in the United States estimates that ADHD affects between 3% and 5% of all children (Biederman & Faraone, 2005). Children with ADHD may experience significant functional problems such as educational underachievement, increased incidence of physical injuries, troublesome interpersonal relationships with family members and peers and low self-esteem

(Bussing, Fernandez, Harwood, Wei, Garvan & Eyberg, 2008). However, Raishevich and Jensen (2007) postulate that early recognition and management of children with ADHD can redirect their educational and psychosocial development.

Studies done in various parts of the world have emphasized the importance of ascertaining the prevalence of ADHD in different sub-regions (American Academy of Pediatrics, 2000); Biederman, Faraone, 2005). The authors maintained that the prevalence of ADHD has been shown to vary from country to country and even within a country and from region to region. For instance, Atwoli, Owiti, Manguro &, Ndambuki (2011) estimated a prevalence of ADHD of 4-8% in USA, 7.6% to 9.5% in Korea (Green, Wong, Atkins, Taylor &, Feinleib, 2009), 10-20% in India (Thapar, Langley, Asherson & Gill, 2007), and 29.7% in United Arab Emirates (Breslau, Miller, Breslau, Bohnert, Lucia & Schweitzer, 2009). In Nigeria, various research studies have found the prevalence to range from 3.2% to 87% (Adewuya & Famuyiwa, 2007; Ambuabunos, Ofovwe & Ibadin, 2011; Umar, Obindo, & Omigbodun, 2012; Achilike & Achilike, 2016).

The prevalence could emanate from their inability to act without thinking and their hyperactive, and trouble on focusing. Braxton, Milem, and Sullivan (2000) maintained that these category of students are constantly bombarded by stimuli from all directions and do not have the mechanism other children have to filter out unwanted stimuli. As a result, children with ADHD have difficulties controlling their behaviour and do not have the internal self-monitoring/ regulation potential that will keep them on task and out of trouble (Blum, Kenneth, Amanda & Chen, 2008). Bener, Qahtani and Abdelaal (2006) in their study found children diagnosed with ADHD to be at increased risk for a broad range of negative outcomes, including depression, school failure and dropout, learning disabilities, conduct disorders, failed relationships, workplace underachievement, substance abuse and low self-esteem in adults.

The diagnosis of ADHD is based on the criteria specified by the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV) (American Psychiatric Association, 2000). The criteria state that the behaviour must be developmentally inappropriate, begin before age 7 years, be present for at least 6 months and occur in 2 or more settings such as disrupting class activities, and not be secondary to another disorder (American Psychiatric Association, 2000). The criteria also specified that information on whether a child is with or without ADHD will be obtained from parents, school, and health professionals who may have been consulted, along with an interview and examination of the child. The later criterion is based on assumption that the children may not be able to respond to the items soliciting for their behaviour pattern owing to their age.

However, the new 5th edition (DSM-5) incorporates older children and adults by stating that the symptoms can begin before 12 years, and for adults and adolescents age 17 or older and only 5 symptoms are needed instead of the 6 needed for younger children (American Psychiatric Association, 2013). This is based on the fact that while the symptoms of the disorders may change as a child ages, many children with ADHD do not grow out of it (Mannuzza, Klein, Bessler, Malloy, &

LaPadula, cited in U.S. Department of Education, 2008). For example, a preschool child may show gross motor over activity- always running or climbing and frequently shifting from one activity to another. Older children may be restless and fidget in their seats or play with their chairs and desks. This finding notwithstanding, majority of studies on ADHD were targeted on school children at lower and middle basic education, there is therefore little or no study on older children. The present study therefore sought to compare the read reading styles of junior secondary school students with and without ADHD in Nsukka Education Zone.

Studies by Ruban, McCoach, McGuire and Reis, (2003) and Taghreed, Mohammad, Afaf, and Reda (2014) indicate that students with ADHD differ significantly from their counterparts in their use of learning styles during academic study. For example, it has been found that students with ADHD prefer oral explanations or visual learning methods, whereas students without ADHD use more written examples and prefer more written explanations (Heiman & Precel, 2003). Brinckerhoff, McGuire, & Shaw, (2002) believe that ADHD school children tend to have poor auditory memory. Hatzes, cited in Heiman (2007) are of the view that though these children want to do well in school, their inability to remember information through lecture, discussion, or reading causes their low achievement especially in traditional classroom environment where teachers dominate and students mostly listen or read.

Since learners differ in their preferences, it will be important for teachers to examine the variations in their students on the features of their learning styles. This is because the information about learner's preference can help teachers become more sensitive to the differences students bring to the classroom (Felder & Spurlin 2005). Therefore, it is necessary to determine what is most likely to trigger each student's concentration, maintain it and respond to the students' natural processing style in order to enhance retention. To be able to teach in a pluralistic classroom setting, teachers must derive strategies that will meet the needs of various groups and individuals in the class.

The diversity in the classroom reflects the same challenge in Enugu State as well as other states of the federation. Teachers who are successful in educating children with ADHD begin by identifying the unique needs of the child and try to accommodate them in the teaching and learning process. Thus, research study found that when teachers accommodate the varied learning styles of students the educational process is likely to become optimized for both students and teachers (Mohamad, Abbas, Helan & Kiranjit, 2011). It is against this background that the present study seeks to carry out a comparative analysis of learning styles of students with and without ADHD: implication for teachers' effectiveness.

Statement of the Problem

Identifying the learning styles preference of students is important so as to be able to device the appropriate instructional strategies that will help in address their varied learning styles. However, research studies have shown that students' learning styles preference do not account in the choice of teachers' use of instructional

strategies. Hence students with disabilities such as ADHD were identified to have learning difficulties owing to teacher' use of instructional strategies which do not take cognizance of their disabilities. This has led most students with this disability to achieve very low academically and to disrupt peers and classroom activities with their hyperactivity display. Thus, the need for teachers to identify students' learning style preference and be able to employ appropriate instructional strategies that will address them. The problem of the present study put in question form is what is the learning styles of students with and without ADHD.

Purpose of the Study

The main purpose of this study is to compare the learning style preference of students with and without ADHD. Specifically, the study sought to find the following:

1. identify the learning styles of students.
2. identify students with and without ADHD.
3. compare the learning styles of students with and without ADHD

Research Questions

The following research questions guided the

1. What are the learning styles of students?
2. What are the learning styles of students with and without ADHD?
3. What are the distinctions between the learning styles of students with and without ADHD?

Methods

The study adopted a survey research design. The study was carried out among junior secondary school students in Nsukka Education Zone, Enugu State totaling 1456. The sample of the study comprised 158 JSS II students (74 with and 84 without ADHD). This stream was selected because of the incorporation of older children starting from 12 years to having ADHD and the students in JSS II seem to be within the age range of 12 years. The instruments used for data collection were ADHD questionnaire and learning style inventory which serve as identification instrument.

ADHD questionnaire was adopted from Leslie & Wolraich (2007) Vanderbilt ADHD diagnostic teachers' rating scale. The instrument was adapted to fit students rating scale since the students used in the study can respond to the behavioural scale owing to their age. The students indicated their perception of the frequency of ADHD in each scale from 0 (never) to 3 (very often). A rating of 2 or 3 is considered to be a positive endorsement for each item. To consider whether students exhibited any of the subtypes of ADHD behaviour, at least 5 out of the ten items representing each subtype must be positive in the scales.

VARK Questionnaire was adapted from Fleming (2001) VARK Questionnaire, VARK stands for visual (V), aural (A), read/write (R) and kinesthetic (K) learning preferences. The VARK learning preference questionnaire was used to

identify the learning preference of students used in the study. The VARK includes 13 multiple-choice questions to examine four different modalities (i.e., Visual, Aural, Read/Write, and Kinesthetic). In each question, respondents are placed in a real life learning situation, offered four options and asked to choose option(s) which best characterizes their way of learning. The questionnaire is in frequency Code of 1 = Never; 2 = Occasionally; 3 = Often; 4 = Very Often where high mean score on any of the subscales indicates the type of learning style used by the students.

The research instruments were validated by three experts, one academic staff in the Educational Psychology Unit of Department of Educational Foundations, University of Nigeria, another from Education Measurement and Evaluation Unit, Department of Science Education, University of Nigeria, Nsukka as well as a school counselor from Girls' Secondary School Ibagwa-Aka. The experts commented on each item's appropriateness and acceptability and their judgments were used to confirm the validity of instruments prior to producing the final copy which were used for pilot testing. The instruments were tested in a pilot testing using 40 students from a different educational zone but identical to the sample of the study. Every comment, which reflected the students' difficulty in understanding instructions or items, was noted and the questionnaires were modified accordingly.

The scores of the test were used to test the reliability estimates of the two instruments using Cronbach Alpha method. The internal consistencies of the instruments were 0.84 and 0.78 for learning style inventory and ADHD questionnaire respectively. Data collected were analyzed using frequencies, percentages and crosstabulation. A crosstabulation is simply a presentational device, whereby one variable is presented in relation to another, with the relevant data inserted into each cell (automatically generated by software packages, such as SPSS).

Results

Table 1: Learning styles of students with and without ADHD

The scores of the test were used to test the reliability estimates of the two instruments using Cronbach Alpha Method. The internal consistencies of the instruments were 0.84 and 0.78 for learning style inventory and ADHD questionnaire respectively. Data collected were analyzed using frequency, percentage and crosstabulation.

Results**Learning styles of students with and without ADHD**

	N	learning Styles	Frequency	Percentage
Students with ADHD	73	Visual	17	23%
		Aural	13	18%
		Read/write	9	12%
		Kinesthetics	34	47%
Students without ADHD	85	Visual	39	46%
		Aural	19	22%
		Read/write	15	18%
		Kinesthetics	12	14%
Total		Visual	56	69%
		Aural	32	40%
		Read/write	24	30%
		Kinesthetics	46	61%

he learning style profile of students were determined by examining the percentage of the mean scores of students in the test items. Second is by taking into account the learning styles elements. The results in the table above were used to answer the three research questions posed for the study. In answering research question one, 56 students representing 69% were identified as having visual learning style as their learning style preference, 32 students representing 40% were identified as having aural as their learning style preference, 24 students representing 30% were identified as having read/write as their learning style preference, finally, 46 students representing 61% were identified as having kinesthetic learning style preference.

For research question two, from the table, it shows that among students with ADHD, 17 students representing 23% had visual learning style preference, while 13 students representing 18% of students had Aural as their learning style preference, 9 students representing 12% had read/write as their learning style preference. Finally, 34 students representing 47% had kinesthetic learning style preference. On the other hand, among students without ADHD, 39 students representing 46% had visual as their learning style preference, 19 students representing 22% had Aural as their learning style preference, 15 students representing 18% had read/write as their learning style preference and 12 students representing 14% had kinesthetic as their learning style preference.

By comparison, 17 students with ADHD representing 23% had visual learning style preference, while 39 students representing 46% of the students without ADHD identified that they prefer visual learning style. 13 students with ADHD representing 18% had Aural learning style preference, while 19 students without ADHD representing 22% had Aural learning style preference. Also, 9 students with ADHD representing 12% had read/write learning style preference, while 15 students without ADHD representing 18% had read/write learning style preference. Finally, 34

students with ADHD representing 46% had kinesthetic learning style preference compare to their 12 counterparts representing 14%.

Discussion

The findings revealed that most students have visual learning style preference, followed by those who have kinesthetic and Aural learning style preference and the few students had read/write learning style reference. The findings support the postulation of Chuah Chong-Cheng as cited in Mohamed, Abbas, Helan and Kkiranjit (2011) which maintains that most students favour to learn in particular way with each style of learning contributing to the success in relating to what they have learnt. The preference of learning style was observed from students' learning ability and disability. For instance, those with ADHD most likely prefer to get involved in learning styles that will favour kinesthetic form owing to their hyperactive nature. On the other hand, students without ADHD were found to prefer aural and read/write learning style owing to their calm nature which will help them to be calm.

The finding reveals that majority of the students with ADHD learn by hands-on-activity, followed by those who prefer to learn by watching demonstrations. This could be due to their attention deficit, few students can learn by listening and interaction with others. Also, few students prefer to learn using printed materials. The finding contradicts the findings of Heiman and Precel (2003) which maintains that most students with ADHD prefer oral explanation or visual learning style. Owing to the fact that such students lack good attention focusing ability, the only way to keep their attention for a relatively long period is by keeping them physically busy with manipulative materials.

On the other hand, majority of the students without ADHD learn by watching followed by those who learn by listening and reading. Very few of them prefer to learn by hands-on-activity. The findings on the students without ADHD differ significantly with their counterparts. This is in agreement with the studies by Ruban, McCoach, McGuire and Rris (2003) and Taghreed, Mohammad, Afaf and Reda (2014) which indicated that students with ADHD differ from their counterparts in their use of learning styles during academic study.

Conclusion

Every student has certain degree of preferences in each type of learning style irrespective of their abilities and disabilities. Within the learning style dimension, the findings revealed that most students with ADHD strongly preferred hand-on-activity learning style than others, while most students without ADHD preferred listening and reading material to others.

Recommendations

It can be recommended that the learning preferences of students should be verified prior to the start of their academic tasks by using VARK questionnaire. This is to find appropriate teaching strategy and to achieve educational goals. According to

results of present study, regarding different types of learning styles, students need to try different learning strategies to educate themselves. It is essential for teachers to know the effective way of teaching, by this way, they can come close to providing optimal learning environment for most students in a class.

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