# RELATIONSHIP BETWEEN ATTENTION DEFICIT DISORDER AND BASIC SCIENCE AND TECHNOLOGY ACHIEVEMENT OF JUNIOR SECONDARY ONE STUDENTS IN BASSA, NIGERIA

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**Abstract**

*The study investigated the relationship between Attention Deficit Disorder (ADD) and students' achievement in Basic Science and Technology in Bassa Local Government Area of Plateau State, Nigeria. The sample comprised 10junior secondary schools and 304 Junior Secondary one (JSI) students (males=142, females=162) selected from 2000 students in 23 public (18) and private (5) schools using systematic and simple random sampling techniques, respectively. The study employed a correlation research design while Students' Attention Deficit Identification Questionnaire was used to collect data from the students. Achievement scores of students in Basic Science and Technology for second term of 2015/2016 academic session were also collected from the examinations records of the schools used in the study. Three research questions and two hypotheses guided the study. The research questions were answered using mean and standard deviation while the hypotheses were tested using t-test and Pearson Product Moment Correlation Coefficient at 0.05 level of significance. Results obtained revealed that ADD (M=47.94,SD=10.94) was significantly related to achievement of students in Basic Science and Technology [r (302) =.25, p<.05].It was further revealed that there were no gender differences in ADD and achievement of students in Basic Science and Technology, respectively. It was recommended that Basic Science and Technology teachers should work hand in hand with special needs specialists in identifying students with ADD in inclusive classrooms, as well as, engage them meaningfully in Basic Science and Technology activities with innovative and strategic teaching methods in line with best practices across the globe. These would help them acquire scientific, critical and reflective thinking skills, as well as provide opportunities for the students to develop life manipulative skills required for effective living in the technology-based society and global relevance.*

**Introduction**

The importance of science and technology to national development cannot be overemphasized. This is because knowledge and skills in science and technology are very vital for the development of any nation. The rapid changing applications of science and technology and the global reliance on its processes and products in virtually all areas of human endeavours point to the fact that any nation that handles science and technology education with levity does so at the risk of not being globally relevant.  Such a nation will definitely not reach the target it sets for itself. (Aboh, 2018).  The changes in technology and the resulting global competition require the mastery of competences and acquisition of new skills.  This means that for an individual to be well-grounded in science, and competent enough to face the challenges of life in his society, he must have gone through a science and technology programme that is well planned and implemented. A programme that trains individuals in relevant and 21$^{st}$century skills. Furthermore, in the emerging world, for any nation to attain global competiveness and sustainable development there is need  for such a nation to recognize science  and technology education as a priority area for her citizens (Okedeyi, Ogunmade, Aderonke&Durojaiye, 2013).

To actualize the development of science and technology, the Nigerian government has taken some giant strides, such as, the policy of  60:40 ratio with regard to students' admission into the nation's  conventional universities, polytechnics and colleges of education for science-oriented courses, and, arts and social science courses, respectively(Ajibola, 2008). Others include the provision of science facilities in schools and training of teachers in the technical aid programme (Okpala, 2011). Moreover, there were the review and restructuring of the basic science and technology curriculum with the inclusion of  basic technology, physical and health education, and computer studies/information and communications technology, as well as, issues of value-orientation, poverty eradication, peace and dialogue, human rights education, family life/ HIV/AIDS education, critical thinking, entrepreneurship and life coping skills (Federal Republic of Nigeria [FRN], 2012)  in line with emergent issues that are of national and global concerns.

The federal government specified the goals of science education in the policy, stating that special provisions and incentives shall be made for the study of the sciences at each level of the nation's educational system. For this purpose, the policy states that functions of all agencies involved in the promotion of  the study of sciences shall be  adequately  supported  by government. It further states that government shall popularize the study of the sciences and the production of adequate number of scientists to inspire and

support national development (FRN, 2014).  Moreover, the policy emphasizes that science and technology shall continue to be taught in an integrated manner in the schools to promote in the students, the appreciation of basic ideas. These are clear indications that the national policy on education gives premium to science and technology education.

Furthermore, the federal government, through the ministry of education established the Federal Science Equipment Centers; the objectives of which are to upgrade and improve the instructional techniques and materials in the fields of science and technology, as well as, the training of some science teachers in foreign countries; all in a bid to improve science and technology education.

Despite the importance of science and technology education to national development and the efforts of the government to boost it, the desired results do not appear to have been realized, given the dwindling nature of students seeking admission into science-oriented courses in the nation's tertiary institutions. More students, particularly, females (Osuafor, 2016), appear to seek admission into arts and social science courses than science-oriented courses on yearly basis. This may be why Moneke (2007) lamented that science and technology education has failed to produce skilled human resources needed for transformation of the country into national prosperity.

Disturbed by this worrisome development, researchers (Akinyemi, 2006; Abdulahi, 2007) in the field of science education in Nigeria embarked on a series of studies to find out the reasons behind this unsatisfactory trend. Apart from the fore-going, evidences from literature show that students have been underachieving consistently in science and technology subjects in public examinations, such as, the West African Examinations Council (WAEC,  2010-2016). For a period of five years (2010 to 2015), the country moved within the orbit of 24.00% and 38.00% failure record.

Underachievement in science and technology has been attributed to teacher-related and student-related factors, methods of teaching and learning environment among others. For instance, the study by United Nations Educational and Scientific Organization (UNESCO, 2006) showed that the problem of underachievement in science and technology courses stemmed from the first form of science the child comes in contact with at the junior secondary school level. Basic Science and Technology, which is the first form of science taught at the primary and junior secondary school levels of education in Nigeria, provides learners exposed to it with sound basis for further studies in science and technology. By implication, a child that is not well grounded in the subject at this level may not have  the opportunity to be scientifically literate or the capacity to study core science subjects (biology,

chemistry and physics) at the senior secondary school level which are the prerequisites for studying science and technology courses at the nation's tertiary institutions.

One of the variables identified as being critical in students' academic achievement is Attention Deficit Disorder (ADD). It is a neurological disorder/condition that causes a range of behavior problems, such as difficulty in attending to instruction, focusing on school work, keeping up with assignments, following instructions, completing tasks and social interaction. Attention Deficit Disorder is a condition that can make it very difficult for a student to sit still, control his/her behaviour, and pay attention during classroom instruction. Therefore, learning can be difficult for students with ADD as success in school to a large extent depends on being able to pay attention, and control behaviour and impulses. Students with ADD are very capable of being successful in school given the right kind of environment. Educators must be adequately prepared to teach adolescents and to meet the individual needs of all students. The work of the teacher becomes more demanding when some learners have Attention Deficit Disorder (ADD), as they face the challenge of the learner's attention span, managing their impulses, and at the same time not interrupting the learning development or activities of others without the condition (Kleynhans, 2005). Children spend most of their time in classrooms and other school settings where they are expected to follow rules, act in socially proper ways, participate in academic activities.

Research findings have shown that ADD is more prevalent among boys than girls across all age groups (APA, 2013) Reports also indicate that 5 to 10 times as many boys suffer from ADD than girls. Cuffe, Moore and McKeown, (2005) in their study of the prevalence and correlates of ADD symptoms in the National Health Interview Survey reported a ratio of 4:1 in favour of males. In the same vein, a study in Nigeria reported a male to female ratio of 2:1 for all the sub-types of ADD with the exception of hyperactive/impulsive which was 3:2:1 (Adewuya & Famuyiwa, 2007).The reported gender difference in prevalence is understandable because boys respond to situations through more externalizing symptoms (aggressive or acting out tendencies) than girls, who are more likely to exhibit internalizing symptoms and thus less likely to be referred for evaluation(American Psychiatric Association, 2000).

Gender gaps have been found to exit in science and technology classrooms. There remain significant disparities in the subjects that males and females choose to study, with females less likely to choose scientific and technological fields of study than males. Despite the fact that both boys and

girls are taught Basic Science and Technology at the junior secondary school level of education,  experience as a science teacher shows that fewer number of girls register for science and technology courses  at the senior secondary school level. Apart from the issue of gender inequality in enrolment, boys still achieve better than girls (Osuafor, 2016) in science and technology courses.

Review of literature shows that there is paucity of studies in the area of Attention Deficit Disorder and science and technology achievement, as well as, ADD, gender and science and technology achievement, particularly, at the JSS level of education in Nigeria. It is against this background that the study investigated the relationship between Attention Deficit Disorder and Basic Science and Technology achievement of JSS1 students in Bassa Local Government Area of Plateau State.

Specifically the objectives were, to:
1. Find out the JSS 1 students' level of attention deficit disorder.
2. Determine to what extent JSS1 male and female students differ in the identified attention deficit disorder they come to class with.
3. Find out if ADD is significantly related to Basic Science and Technology achievement or not.

To realize the objectives, the following research questions were answered and hypotheses tested at 0.05 level of significance.
1. What is the level of JSS1students' attention deficit disorder?
2. To what extent do JSSI male students differ from the female students, in the identified attention deficit disorder they come to class with?
1. There is no significant difference between ADD mean scores of male and female Basic Science and Technology students.
2. There is no significant relationship betweenJSS1 students' ADD and Basic Science and Technology achievement scores.

**Method**

The population for this study comprised 23schools in Bassa Local Government Area of Plateau State and 2000 JSSI basic science and technology students in the study area.  The sample for the study was made up of 304 students (142 males and 162 females) from 10 selected junior secondary schools (seven schools out of 18 public junior secondary schools and three out of five private schools) from Bassa Local Government Area.

The research design used in this study was the correlation design. The design was considered as adequate because it dealt with the conditions and relationships that existed between the learners' Attention Deficit Disorder and students' achievement in Basic Science and Technology. Systematic sampling

technique was applied in selecting 10 schools that participated in the study. It involved taking the Kth sampling unit of the population, starting with a randomly selected case among the first K sampling units. The systematic sampling technique was employed also in the selection of students. Information on students' registers were used by the researchers to carry out the systematic sampling of students in all the schools used in the study.

The instrument was used for the collection of information from the students was an Attention Deficit Identification Questionnaire (ADIQ). The ADIQ consisted of 19 item statements of four-point scaled options, namely, Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). Values assigned to each scale are as follows: Strongly Agree (SA=4 points), Agree (A =3 points), Disagree (D =2 points) and Strongly Disagree (SD =1 point).

The structured questionnaire for the ADIQ was adapted from Ward, Wender and Reimherr (1993). The modifications made included bringing the language level to the level of understanding of the students, changing of lecturers to teachers, tertiary institution to secondary school, and level of study changed to junior secondary school level. The construct validity of the ADD was determined using factor analysis by an Associate Professor in Educational Psychology. The researcher employed the personal delivery method in data collection after obtaining permission from the principals of the schools. All the 310 participants were administered the (ADIQ). Ten Basic Science and Technology teachers from the schools used in the study served as the research assistants in the participating schools where they assisted in the administration of the instruments. Instruction on how to respond to the questionnaire was read to the participants that, ensured proper responses from the students. Data collection was done immediately after the administration of the questionnaire and all the response sheets were retrieved from the respondents. Out of 310 questionnaire copies administered, 304 were valid while six were invalid. The internal consistency of the ADIQ was established as 0.85 using the Cronbach-alpha method. Research questions were answered using frequencies and percentages, while hypotheses were tested using Pearson Product Moment Correlation Coefficient and t-test statistics.

**Results**
**Table 1: Descriptive Statistics on Level of Learners' ADD**

| Range of scores | Extent of ADD | Frequency | Percentage (%) |
|---|---|---|---|
| 19-38 | Low | 54 | 18.75 |
| 39-57 | Moderate | 203 | 66.78 |
| 58-76 | High | 47 | 15.46 |
| Total | | 304 | 100.00 |

Table 1 shows that 203 (66.78%) students had moderate attention deficit disorder, 54 representing 18.75% had low ADD, while 47 (15.46%) had high ADD. The most highly scored on the extent of ADD is moderate while the least scored is high. This means that majority of the students (66.78%) had moderate attention deficit disorder.

**Table 2**: **Descriptive Statistics on Level of Learners' ADD by Gender**

| Gender | N | $\overline{X}$ | SD | Av. Mean | Remark |
|--------|------|-------|-------|----------|--------|
| Male | 142 | 48.11 | 10.76 | 47.64 | High |
| Female | 162 | 47.23 | 11.13 | 47.64 | Low |

Table 2 shows that male students had higher mean 48.11, (SD= 10.76) as compared to their female counterparts with a mean of 47.23, (SD= 11.13) who scored below the average mean. This means that male students to a large extent had a higher attention deficit disorderthan their female counterparts.

**Table 3: Descriptive Statistics on Learners' Level of Achievement in Basic Science and Technology**

| Range of scores | Interpretation | Frequency | Percentage (%) |
|-----------------|----------------|-----------|----------------|
| 0-49 | Low | 58 | 19.17 |
| 50-59 | Moderate | 86 | 28.20 |
| 60-100 | High | 160 | 52.63 |
| **Total** | | 304 | 100.00 |

Table 3 shows that 58 students (19.17%) scored low in Basic Science and Technology achievement test, 86 students (28.20%) had moderate scores while 160 students (52.63%) had high scores in Basic Science and Technology achievement test.

**Table 4 Summary of t-test Analysis of Gender Difference in Learners' Attention Deficit Disorder**

| Group | N | $\overline{X}$ | SD | df | t | p |
|-------|------|-------|-------|-----|-----|-----|
| Male | 142 | 48.11 | 10.76 | | | |
| | | | | 302 | .69 | .49 |
| Female | 162 | 47.23 | 11.13 | | | |

Table 4shows that the p= .49 is greater than the alpha (level of significance, α=.05) for df = 302. However, it was decided that there was no sufficient evidence to reject the hypothesis, therefore the hypothesis was

retained. It was concluded that there was no significant difference between the students' Attention Deficit Disorder mean scores of male (M=48.11, SD=10.76) and female (M=47.23, SD=11.13) Basic Science and Technology students, t(302) = .69, p>.05. It means that both male and female students had same Attention Deficit Disorder.

**Table 5**:  **Pearson Correlation of Learners' ADD and Basic Science and Technology Achievement Scores**

| S/n | Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|----------|---|---|---|---|---|---|---|
| 1 | Gender | 1 | | | | | | |
| 2 | Age | .012 | 1 | | | | | |
| 3 | Family structure | .09 | .07 | 1 | | | | |
| 4 | School type | -.01 | .33$^{**}$ | .04 | 1 | | | |
| 5 | Nature of school | -.03 | .19$^{**}$ | .08 | .56$^{**}$ | 1 | | |
| 6 | Learners Attention | -.04 | -.05 | .01 | -.03 | -.03 | 1 | |
| 7 | Academic Achievement | .07 | -.12$^{*}$ | -.14$^{*}$ | .13$^{*}$ | -.20$^{**}$ | .25$^{**}$ | 1 |
| | $\overline{X}$ | 1.53 | 1.28 | 1.44 | 1.68 | 1.87 | 47.64 | 59.55 |
| | SD | .50 | .47 | .81 | .47 | .34 | 10.95 | 12.32 |

**. Correlation is significant at the 0.01 level (2-tailed).* Correlation is significant at the 0.05 level (2-tailed).

In Table 5, the relationship between learners' Attention Deficit Disorder (M=47.64, SD= 10.95) and Basic Science and Technology achievement indicated a moderate positive relationship, r (302) = .25, p<.05. However, the overall decision means that the null hypothesis was rejected and it was concluded that learners' Attention Deficit Disorder was significantly related to achievement in Basic Science and Technology.

**Discussion**

The result of the study shows that majority of the students (66.78%) had moderate attention deficit disorder (see Table I). This finding is consistent with previous research documenting impairment across a variety of settings and in multiple areas of functioning for individuals with ADD (Barkley, 2006). Interestingly, ADD symptoms did not significantly predict difficulties in Basic Science and Technology, which is inconsistent with the multitude of previous studies that have documented increased school difficulties for

children and adolescents with ADD (Biederman, et al., 1996; Rapport, Scanlan& Denney, 1999; LeFever, Villers,'' Morrow & Vaughn, 2002; Barry, Lyman & Klinger, 2002,). Considering the high risk nature of the youth in the current study, it is possible that students with high levels of ADD symptoms also demonstrated comorbid difficulties (such as internalizing or externalizing problems, learning disabilities) that were not accounted for in the current study.

It has been documented that a wide-range of difficulties often co-occur with ADD (Biederman, Newcorn, & Sprich, 1991; Decker, McIntosh, Kelly, Nicholls, & Dean, 2001) and these difficulties may have been even greater for students in the current study, as participation in the larger study required indication of a variety of related risks. It is possible that other unknown confounding variables may have accounted for more of the variance in Basic science and Technology achievement than ADD symptom logy in this sample of at-risk students.

The result in Table 2 shows that male students had higher ADD ($\overline{X}$=48.11, SD=10. 76) than their female counterparts ($\overline{X}$= 47.23, (SD= 11.13) who scored below the average mean. This result is in line with the findings of American Psychiatric Association(2013) where an estimated 1.46 to 2.46 million children with ADD constituted 3−5 percent of the student population with more boys than girls diagnosed with ADD. Although for years it was assumed to be a childhood disorder that became visible as early as age 3 and then disappeared with the advent of adolescence, the condition is not limited to children. It is now known that while the symptoms of the disorders may change as a child ages, many children with ADD do not outgrow it (Mannuzza, Klein, Bessler, Malloy, &LaPadula, 1998).

Table 3 shows that 58 students (19.17%) scored low in Basic Science and Technology achievement test, 86 students (28.20%) had moderate scores while 160 students (52.63%) had high scores in Basic Science and Technology achievement test. Students' academic gain and learning achievement are affected by numerous factors including gender, age, teaching faculty, students' schooling, father/guardian's social economic status, residential area of students, medium of instructions in schools, tuition trend, daily study hour and accommodation as hostelries or day scholars. The utility of these studies lies in the need to undertake corrective measures that improve the academic achievement of Basic Science and Technology students. Table 4 shows no significant difference between the ADD mean scores of JSSI male and female Basic Science and Technology students. This finding is at variance with those of APA (2013), Cuffe etal. (2005) Adewuya and Famuyiwa (2009) which showed gender differences in ADD in favour of boys.

In Table 5, correlation among the major study variables, revealed that learners' Attention Deficit Disorder (M=47.64, SD= 10.95) and Basic Science and Technology achievement indicated a moderate positive relationship, r (302) = .25, p<.05. However, the overall decision means that the null hypothesis was rejected, meaning  that learners' Attention Deficit Disorder was significantly related to Basic Science and Technology achievement.

**Conclusion**

The findings of the study show that Attention Deficit Disorder and Basic Science and Technology achievement indicated a moderate positive relationship. Gender was also shown not to have any significant influence on ADD and achievement of students in Basic Science and Technology.

**Recommendations**

Students with ADD may benefit from adjustments to several aspects of their lives. If parents and educators, especially the Basic Science and Technology teachers, along with other service providers, are able to work together to help these students, they are more likely to become independent adults. A combination of individual, family and school counselling, parent training and support groups, appropriately structured educational programmes, and sometimes medication may be recommended. Other recommendations are:

1.    The most fundamental element in effectively managing this disorder is increasing the understanding of ADD in teachers, parents, and the students with ADD themselves. Students need to be helped to develop a positive attitude about learning to deal with ADD rather than to lean on the label as an excuse for lack of effort and learned helplessness.

2.    When Basic Science and Technology teachers have a thorough understanding of ADD management strategies, they can plan and provide activities such as sitting the student away from doors and windows that may distract him or her. The student may work best closest to the teacher.

3.    Physical activity breaks (stretching) and incorporation of  movement activities into a lesson should be practiced. Basic Science and Technology teachers should engage students in hands-on and outdoor laboratory activities. The implication is that instructional materials and other relevant facilities should be made available and used in teaching these students.  This will help to get their  attention, make learning meaningful, exciting and interesting to them.

4. Basic science and Technology teachers should engage students in collaborative and worthwhile activities in small groups during instruction. This will help to reduce distractions for students with ADD that occur when they are made to work in a large group.
5. When giving directions, teachers should make eye contact with the student and be as brief as possible.
6. Most importantly, students need guidance, compassion and understanding from their parents and teachers as they navigate the path of dealing with ADD and as such, public and private schools should employ  adequate number of special needs teachers to work hand in hand with Basic Science and Technology teachers for meaningful and effective  teaching and learning of the subject.

**References**

Abdulahi, A. (2007). Functional science, technology and mathematics education for National Economic Empowerment and Development. *A speech delivered at the school of science national conference* held at Federal College of Education, Zaria, April 2-5.

Aboh, H. (2018).  Institute calls for proper funding of science and technology. Retrieved from pmnewsnigeria.com on 5th October.

Ajibola, M.A. (2008). Innovations and curriculum development for basic education in Nigeria: Policy priorities and challenges of practice and implementation. *Journal of International Studies*, *8*, 51-58.

Akinyemi. O.F. (2017).Curriculum enrichment of science, technology and mathematics education as a basis for sustainable development. In N. Udofia. *Proceedings of the 50th anniversary conference of Science Teachers' Association of Nigeria*. (p. 2), Ibadan: HEBN Publishers.

American Psychiatric Association.(2013). *Diagnostic and statistical manual of mental disorders.* Washington, DC: American Psychiatric Association.

Barkley, R. (2006). *Attention deficit hyperactivity disorder: A hand-book for diagnosis and treatment.* New York: Guilford Press.

Biederman, J., Faraone, S., Milberger, S., Guite, J., Mick, E., Chen, L. & Perrin, J. (1996). A prospective 4-year follow-up study of attention-deficit hyperactivity and related disorders. *Archives of General Psychiatry, 53*, 437-446.

Cuffe, S.P., Moore, C.G, & McKeown, R.E.(2005).Prevalence and correlates of ADHD symptoms in the national health interview survey. *Journal of Attention Disorder; 9*(2):392-401

Decker, S. L., McIntosh, Kelly, A. M., Nicholls, S. K., & Dean, R. S. (2001). Comorbidity among individuals classified with attention disorders. *International Journal of Neuroscience, 110*, 43-54.

DuPaul, G. J. & Stoner, G. (2003). ADD in the schools: *Assessment and intervention strategies.* New York, NY: Guilford.

Federal Republic of Nigeria (2012).*National core curriculum for junior secondary schools.* Abuja: NERDC

Federal Republic of Nigeria.(2014*). National policy on education*. Abuja: NERDC.

LeFever, G. B., Villers, M. S., Morrow, A. L., & Vaughn, E. S. (2002). Parental perceptions of adverse educational outcomes among children diagnosed and treated for ADHD: A call for improved school/provider collaboration. *Psychology in the Schools, 39*(1), 63-71.

Mannuzza, S., Klein, R. G., Bessler, A., Malloy, P., &LaPadula, M. (1998).Adult psychiatric status of hyperactive boys as grown up. *American Journal of Psychiatry, 155*, 493–498.

Okedeyi, A.S., Ogunmade, T.O., Aderonke M.B., &Durojaiye S. (2013).Nigerian science teachers' perceptions of effective science teaching and their classroom teaching practices in junior secondary schools in Lagos State, Nigeria. *Journal of Education and Practice, 4*, 25.

Okpala, P.N. (2011). *Reforms in STEM education*. Keynote address at the 52nd annual conference of the Science Teachers' Association of Nigeria held from 15-20 August I Akure, Nigeria.

Payam, Z. (2013). *Closing the gender gaps for women in science*. Impress Magazine.

Polanczyk, G ., de Lima, M.S., Horta, B.L. (2007). The worldwide prevalence of ADHD: A systematic review and met regression analysis. *American Journal Psychiatry, 164* (6), 942–8.

Rapport, M. D., Denney, C., DuPaul, G. J., & Gardner, M. J. (1994). Attention-deficit disorder and methylphenidate: Normalization rates, clinical effectiveness, and response prediction in 76 children. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*, 882-893.

Osuafor, A.M. (2016). Issues of girls and women's participation in science and technology in Nigeria: Challenges and the way forward. *International Journal of Science Technology and Mathematics Education,* 4 (1), 50-61.

UNESCO (2006). Gender and disciplinary choices: Women in higher education in India. In K. Chanana, *Power, authority and dissent: Critical perspectives on the emerging knowledge society* (pp.267-294). Paris: UNESCO

WAEC (2010-2016). *Chief examiner' report.* Yaba, Lagos.  West African Examinations Council.