Chapter One

Introduction

1.1 Background to the Study

In recent times, there has been greater advocacy of the need for constructive, innovative, flexible and functional (applicable) learning structure in the Nigerian Education Sector. More still, the United Nations highlights the need for inclusive and equitable practices in schools through the Sustainable Development Goal-4 (SDG-4) programmes that are practicable by each country so as to promote lifelong learning opportunities for all[1]. It aims at developing individual's capabilities irrespective of their physical or social conditions, in other to pursue equity of growth, and nationwide development in all areas of life[1]. These initiatives are channeled to give consideration to persons who live with physical disabilities and other forms of disabilities such as; neurological, psychological and social disabilities. These forms of disabilities have percular traits that are observed in the learners in any standard teaching-learning classroom setting. While identifying these disabilities, it is not to say that they are ends to their meets as there are subsets in each of the category of disabilities, with each set having the unique characteristics that sets them apart from one another. The corncern in an inclusive learning environment is how to integrate the technical-know-how of teaching-learning strategies, which should be adapted by the teacher, parents and carers in other to ensure that their perculiar cases exhibit maximum and effective functionality. It is also important to note that the teaching-learning strategies for these categories of learners, are unique to each learner, in constrast to that which is obtainabled with the regular (Neurotypical) learners. More so, to understand the unique features of the enviornmental, social and physical variations that affects the way they interact with their environment - the school inclusive

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setting, their performance and consequently their achievements. Variations like social status, areas of residential location, age, gender, and other physical complexies are linked as factors that can affect the way people respond and react to learning situations[2]. People who live with impairment are no exception to this as they respond and react to learning situations around them. That is, they perform and achieve their set goals with differences which are worth exploring.

More to this, is the concern about the group of professionals, who are working with this learners, below their capabilities; such they are not attaining the expected targets learning required with the learners who are impaired. Thus, the need arises to define the team of experts that are required to work with impaired learners, starting with the medical personnel in the hospitals-where the learners are birthed, to the family, who initiates the social interactive skills, ethics and life's principles, even before they are considered to attend schools, where teaching-learning instructions are structured to form their career paths, in readiness for the job market, through the educators. The experts in these sectors are usually required to undergo certain form of continuous professional training, and be assessed aforehand for quality performance, that are expected from the tasks they offer. Such, the notion arises for there to be a concept that clearly defines the measurement of strategies that fits all-round functionality of both professionals and the learners. The learners are however the focal point of study here, starting with the initial point of their existence at the medical sector to the structured learning environment where they receive learning in an education setting, which includes the inclusive schools.

In the education sector, the concept of measurement stairs the assignment of numeric structure to the teaching-learning strategies, activities, assessments and behavioural disposition of

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learners. It should not exclude the learners' aptitude from the regular achievement. It should also consider the activities of the school mangers and parents, as well as the interwoven connections that are required for effective functional system of operational outlook as a whole. In a school set up, assessment (test) is used in so many ways to determine the progress of activities that needs to be attained. This is done before, during and after a given lesson, or programme of study had been introduced, which will be helpful for the implementer and the implementee[3]. While assessment is used to determine the projected account required of achievement that is attained at certain level, aptitude reveals the strength and direction of performance given in the achievement tests up to specified levels and parameters of attainment, using certain criteria of measurements[3]. The measurement of aptitude through performance, basically takes an observation procedure of the required task in a situation that needs to be assessed. It aids in planning as it gives direction to the path of achieving specific goal or target[4]. The components of assessment structures is useful in education, as a tool for the improvement of learners achievement, and for the reformation of policies, processes and procedures of operation in the school setting.

One of the foundamental components of teaching-learning procedure in a classroom setting is the strategies adopted for each lesson instruction to be performed by the learner, under the teacher's supervision. It should consider a systemic application of the procedures, as the learners perform the activities that surrounds the lesson instructions. It is observation-based, such its measurement scale is rated with componments that surrounds the required outcome. It measures specific softskill features in relation to the dictates of the academics or lesson task. The learners are exposed to certain form of interactive activities after they have received lesson instructions from their teachers. These activities assess the levels of understanding and

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application of the knowledge acquired in support of the applied concepts. Some example of standard features measured in an applied strategy include; level of tencity, display of technical skill, logical reasoning, time interval spent while performing the task[5]. Other feature that are measured are relative to academics such as handwriting skills, artistic disposition, arithemetics or mathematics, reading and comprehension. These features employ the use of rated parametric measures that can assign graded scores within specified threshold grading empirical standards that can be used to determine the level of operation, understanding or performance of the learners in the given content or lesson[5]. It can also be used to determine the level of outstanding performance, where the learners need to bridge the gap, in the understanding of the concepts learnt. All these breed the learner's achievement, which can be defined as the steady progression acquired, when a learner is exposed to specified structured academic work-plan, which consist of knowledge, materials and performance for a period of time[5].

The components of academic achievement are embedded in the features that enhance the learner's performance. These are; the levels of intellectual activities displayed, personality (disposition towards tasks), motivational drive, skills display, interests, study-habit, self-esteem and/or teacher-learner relationship. These features progress to what describes the learner's display of inherited traits that aid in the performance of tasks, which is the aptitude (the natural inherit ability to be able to do something or act in a specified manner). For the learner with peculiar learning disability, the aptitude to perform the concept of academic (cognition) learning is assessed, in addition to the academics, which form the adjoin needs that complement their achievements[5]. These range from routine links, spatial reasoning, behavioural checks verbal and non-verbal reasoning. They complement cognitive skills such as numeric reasoning, use of logic, reading and comprehension among other aptitude that are

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relevant for their cognition. These also, account for the baseline of the need for series of tests designs, which can be administered as a single test aimed at obtaining the totalities of some suspected phenomenon or factors that will be responsible for the performance of an action through diagnosis using a test battery[6]. The test battery is a series of psychologically-based assessments used as single or unit tool. It comprises of expected traits or features of the individual, that are required for efficient and effective functioning. The batteries are set with basic criteria of examining the mental prowess, character traits, emotional regulation and other psychological features[6].

This study is set to explore one of the three main compositions of Academic Functional Learning Assessment Tool (AFLAT). These compositions of AFLAT being; the psychoanalystic assessment procedures, the unique teaching-learning strategies and the progressive learning support education plan. The composition of AFLAT which this study focuses on is the teaching-learning strategies (methodological approaches) of the applied procedural pedagogy for impaired learners, who lives with Autism Spectrum Disorder (ASD). It aims at determining the learner's pre-learning as applied by the conventional strategies and the learning intervention as applied by AFLAT strategies, which makes use of achievement and aptitude tests that expose flexible learning approaches. It's purpose is to pursue functional learning content of study for the learners-that is the display of practical skills. AFLAT adopts the concepts of observational techniques and it comprises of the simultaneous application of achievement and aptitude tests.

The concept of observation, as required during AFLAT strategies' processes, revolve around the need for a good observer of self and of other people. In other to adopt a better awareness postulate, self-awareness, plus other awareness equal better awareness, where observation is

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conscious of these moves; pattern, style and result[7]. Pattern and style, in this case would be resident in the skills, logic and approach of attaining result. The processing of experience by the learners is also another factor required during observation[7]. First being the structure of awareness at the initial stage of receiving information, then the processing of information, analysis of the information, interpretation and then implementation. Such individual's level of receiving information varies from one level to another level based on experience and perception[8].

The learner with Autism Spectrum Disorder (ASD) will display symptoms, which resolves around neurological traits of mental impairment. These symptoms include; difficulties in social communication, social interaction and imaginative display, restrictive and repetitive pattern of behaviour, (hypo and hyper reaction to sensory concerns) such as being sensitive to particular sound, taste, touch and its impact on daily living[9]. In a typical Nigerian scenario, cases of children, who are clinically diagnosed with impaired communication defect, had been observed to be reverted within a socially active institutional platform, such as the school, where inclusion is practised[9]. The identification of autism in an individual would necessitate the need for assessments. The following display of conditions would be appropriate in consideration for assessments: stereotyped (rigid & repetitive) behaviour, resistance to changes or restricted interests; persistent difficulties in social interaction; persistent difficulties in social communication; and one or more of: difficulty in obtaining or sustaining employment or education; difficulties in initiating or sustaining social relationships; previous or current contact with mental health or learning disabilities and a history of neuro-developmental conditions coupled with comorbidity conditions such as attention deficit hyperactivity disorder, attention deficit disorder, cerebral palsy or other mental disorder[10].

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Autism Spectrum Disorder (ASD) can be diverse among the individuals with the disorder. Its diversity, ranges from the latent attributes and the level of exposure to the various parametric variables[10]. This study considers the main and interaction effects of the strategies applied in AFLAT on the academic performance of the learner with ASD. It also considers the main and interaction effects of various variables that could affect the applied strategies of AFLAT. Some of the variables that could affect the applied AFLAT strategies as applicable to this study; are the gender (male or female) of the learner, the location of resident (urban or sub-urban) and parental socioeconomic status (low, medium or high). These forms vital factors to consider while implementing the strategies because, one of the evident characteristics features in ASD is the inability to perform tasks independently[11]. AFLAT strategies applies the systematic link of integrated instructions using concrete information path that aligns with the learner's interest during teaching-learning process or while giving them the instructions to perform a given task.

In an inclusive school setting, all learners irrespective of their differences undergo learning under the same conditions, such as the pattern of receiving information for the instructions given. This practice had been observed to affect the case of learner whose communication is socially impaired, and their information processing unit as well as the responsive time intervals are subject to the dictates of their sensory display at the time of receiving instructional information[11]. Inclusion does not involve alienating the affected learners, but it explores avenues for which these learners can learn in their condition. The content of study may not be limited, but it may ensure a gradual systematic progression from the simplest known concepts to the complex unknown concepts using concrete and/or practical examples[11]. It is a process of gradual transformation, which evolves and modifies the performance levels of the learners in both behaviour and discipline during teaching-learning activities, and during the procedures

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of study. Such include the methodology/strategies, structured lesson activities and assessments that the students are engaged with in the learning environment[12].

The craving for the need of government's involvement in the development of education for the people with impairments led to the development of the National Policy on Special Education Needs in 1977, which was implemented between 1978 and 2013, when this document was reviewed in 2015[13]. The recently reviewed document of the policy statements guiding the implementation of programme set for the development of the sector had been subjected to various interventions according to the policy document[13]. The National Policy on Inclusive Education in Nigeria-2016 was developed as result of the evolving changes in meeting the requirements of special education and disabilities' needs in mainstream (where both regular learners and learners who live with some form of disability learn under equal conditions) school[14]. More so, the need as required by SDG-4, to ensure that all learners irrespective of their status acquire equal learning experience, in a competitive school setting.

In a pre-opinion survey conducted at the onset of this research study in June 2023, that was aimed at gathering information about the most recent practices of inclusion in the areas of; needs for academic aptitude assessment and the use of local tools for assessing the Nigerian learner, with ASD, it was discovered that the National policy on Special Education Need (SEN) and the National policy on Inclusive Education, had insignificant effect on the procedural practices for inclusive learning structure in most mainstream schools[15]. To this end, the policies were not considered as referral points of guidelines for effecting inclusive practices. Many private schools' practitioners owned their learning from external resources as guided by western countries such as the United Kingdom and United States of America. In a preview study for this research, the responses received as evidenced from the reliances of teachers on

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the Nigerian polcies, in the pie chart indicated that 72.7% of the respondents are of the opinion that government policies on inclusive practices were not helpful to their practices, while 27.3% said that the policies were helpful to their practices, (Appendix I).

When the respondents were asked to give reasons for their answers in the previous question, the responses received are evident. The respondents are of the opinion that government policies were not backed with actions and proper awareness. These have made the implementation difficult and near the impossibility cadre. The policies did not reflect the needs of the learners with ASD as well as specific learning disabilities, (Appendix I). The policies are only attuned to physical and mental disabilities, while other forms of disabilities are grouped as intellectual disabilities, which make the classification of traits and features rather difficult[15]. More still, the implementer of the policies have very little understanding of the actual required procedures of inclusive practices, as well as the actual learning procedures for learners with both physical and neurological disorders.

1.2 Statement of the Problem

The problem identified in this study, is the inability of ASD learners to perform up to maximum capabilities in their academic achievement alongside their neurotyptical peers, with a corresponding improvement in their academic achievement within an inclusive classroom setting. The learners with Autism Spectrum Disorder (ASD) in an inclusive classroom are observed to be non-responsive, non-participatory and underachievers in academics. Although, there had been several interventions in time past, which aimed at improving these deffectiveness among ASD learners, none of these interventions had aligned the used of academics and aptitude in solving the academic attainment that infuses the unique features of ASD learners with the required strategies for learning achievement. Other studies have

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explored; behaviour, sensorial, psychological and physiotherapeutic interventions. Studies have also reviewed qualitative responses from teachers' survery and the use of technological devices and skill-based learning approaches in enhancing ASD learning[16]. However, the need to further explore the assimilation capabilities of ASD learners in an inclusive classroom setting had not been nipped in the bud. This study infuses the concepts of academics and aptitude, by infusing a flexible, and differentiated teaching-learning strategic interventions to determine the unique functioning features and the performance abilities of each ASD learner, using AFLAT strategic approaches.

1.3 Aim and Objectives

The aim of this study is to determine the main and the interaction effect of the applied procedural strategies of AFLAT practices on the academic achievement of ASD learners in Nigerian inclusive schools. This is to improve the academic achievement of ASD learners.

The objectives of this study are to;

i. determine the main effect of AFLAT strategies on academic achievement of ASD learners in Nigerian Inclusive Schools.
ii. determine the main effect of gender (male and female) on academic achievement of ASD learners in Nigerian Inclusive Schools.
iii. determine the main effect of location (urban or sub-urban) on academic achievement of ASD learners in Nigerian Inclusive Schools.
iv. determine the main effect of socio-economic status (low, medium or high) on academic achievement of ASD learners in Nigerian Inclusive Schools.
v. determine the interaction effect of AFLAT strategies and gender (male and female) on academic achievement of ASD learners in Nigerian Inclusive Schools.

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vi. determine the interaction effect of AFLAT strategies and location of residence (urban and suburban) on academic achievement of ASD learners in Nigerian Inclusive Schools.

vii. determine the interaction effect of AFLAT strategies and socio-economic status (low, medium and high) on academic achievement of ASD learners in Nigerian Inclusive Schools.

1.4 Hypotheses

$H_0$1 There will be no significant main effect of AFLAT strategies on academic achievement of ASD learners in Nigerian Inclusive Schools.

$H_0$2 There will be no significant main effect of gender (male & female) on academic achievement of ASD Learners in Nigerian Inclusive Schools.

$H_0$3 There will be no significant main effect of location of residence (urban or sub-urban) on the academic achievement of ASD learners in Nigerian Inclusive Schools.

$H_0$4 There will be no significant main effect of socio-economic status (low, medium or high) on the academic achievement of ASD learners in Nigerian Inclusive Schools.

$H_0$5 There will be no significant interaction effect of AFLAT strategies and gender (male and female) on academic achievement of ASD learners in Nigerian Inclusive Schools.

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$H_0$6 There will be no significant interaction effect of AFLAT strategies and location of residence (urban and suburban) on academic achievement of ASD learners in Nigerian Inclusive Schools.

$H_0$7 There will be no significant interaction effect of AFLAT strategies and socio-economic status (low, medium and high) on academic achievement of ASD learners in Nigerian Inclusive School.

1.5 Significance of Study

This study is relevant to stakeholders in the inclusive education sector. The sub-sectors beneficiary in the education industry are; the special education needs and disabilities practitioners, test developers in the field of psychometrics, education psychologists, educators in various fields of study and facilitators. These set of stakeholders stand to gain the knowledge, practice and procedures of infusing AFLAT strategies into the curriculum of study, procedural guidelines for strategic application and procedural guidelines for assessing and reporting specific features of ASD psychoanalytic assessment using academic and aptitude of ASD learner's independent functionality approaches. The test developers will benefit from this study in the area of approaching specified moderations to test constructions that will consider the sensory features of ASD test takers. It will also expand the scope of the kind of tests that can be administered as transitional tests for ASD learners – tests can be taken as core module (simplified/moderated) or extended module, as in the case of Cambridge International Examination, administered by British Council[17]. The study is significant to classroom educators, who will require adequate information and knowledge about ASD cases and the procedural strategies and practices for teaching-learning path of individual learners with disabilities, especially ASD learners.

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The fact that this study is unique to the Nigerian setting makes it significant to the families of learners, with ASD as well as others professionals (medical and social workers) who works with ASD learners. The families of ASD learners will have access to progressive information about the academic disposition of the child, steps and guidelines on supervisory involvement in their learning and information on what to expect from the responses they express as a result of environmental discomforting situations and their dispositions to instruction. While the study will be relevant to professionals in the medical and social inclusive sectors in the areas of accessing relevant information about the approach to their learning. It also serves as insights for further studies in these institutions and to research scholars in such institutions who will find the result useful.

1.6 Scope of the Study

The scope of this study lies in the application of academic aptitude assessment strategies that will be used for determining the learning abilities of the learner with Autism Spectrum Disorder (ASD). The study gives a geographical representation of the regions in Nigeria. These regions include; south-west, south-east, south-south and north-central. The states covered in each representative regions are; Oyo, Rivers, Enugu, Plateau and the Federal Capital Territory - Abuja.

It also aimed at ASD gender (male and female)'s cases of learners who are within the learning levels of preschool (four years) to Junior High School (thirteen years). It gives considerations to the location of residence and the socio-economic status of ASD learners as these can affect their academic achievement. However, little emphasis is given to age, because it serves as an impediment during the learning process of ASD learners. Also, the ages of this category of

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ASD learners may not necessarily be chronological with the learning levels of their neurotypical peers, as a result of the conditions.

1.7 Limitation of Study

The limitations in this study are identifed in the quality of knowledge exhibited by school managers and teachers about inclusive practice; system, procedures and practices, and the available facilities required for actualising the lesson activities. The quality of knowledge displayed by the educators was evident during the interactive processes engaged in, with the teachers and the school managers of the Special Education Needs & Disabilities (SEN-D) implementers. The researcher observed that the information given during instructions were too complex to accommodate ASD learners' processing units and information decoding intervals. This was due to the fact that multiple key instructions were lumped up in one message, making it difficult for ASD learners to respond to the questions asked in such a way that the teacher would expect. The reason being that, ASD learner's sensory complexity requires information to be processed within a given time interval and/or link to concrete situational experience. These activities enable the ASD learner to access some perceptive-cognitive features like decoding, encoding and the putting together of words into sentences (use of language), before they can respond to the questions asked. The essentialities of these information were not being considered by the teachers during teaching-learning instruction taking, such the research tutored the teachers on how to construct sentences in such a way that would enable the ASD learners understand and respond to questions within the shortest period, and at the rate, which they process information.

Also, the parents, facilitators and caregivers, who worked with ASD learners generally, had routines and plans for the learners. However, these routines do not match the levels of

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attainment and consequent levels of expected academic learning outcome of the learners, such it caused some delay in the progress of the expected functioning rates of the learners. The researcher staged a one-on-one discussion session with interested parents, facilitator and carers, who learnt how to integrate each learner's routine with the academic learning.

Another limitation experienced was in the operation of the system and process of the school settings, which were the misconception about the practices of inclusion. While some schools claim inclusive practices, what was observed was segregation and exclusion of SEN-D learners, ASD learners inclusive. The reseacher requested for an arranged session of inclusive classroom where AFLAT strategies were implemented. The fact that most of the schools are non compliant with the culture of silence within the learning environment served as limitation to accessing the quality of results expected during the practice of AFLAT strategies, because ASD learners were resistant to noisy environment. More so, the schools did not have the multi-sensory facility that is required for suiting sensory discomfort, and engaging the learners with sensory learning practices. The reseacher made use of and improvised natural environmental site, materials and available resources to achieve activities that are relative for sensory suiting tasks.

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1.8 Operational Definition of Terms

For clarity and precision, the terms used in the study are explained as follows:

Academic Functional Learning Assessment Tool (AFLAT): This is a psychoanalytic academic aptitude assessment instrument which considers the three (3) domains of learning abilities of a learner with impairment, in other to determine the path suitable for achieving functional learning outcome.

Academic Achievement: The extent of knowledge or skill possessed by ASD learner within specific area of the school curriculum, in numeral, spatial/non-verbal reasoning, picture decode, logic, humanities and routine link.

Aptitude test: Aptitude refers to the natural inherit abilities displayed by ASD individual, showing the potential to perform in a specified manner in relation to the expected task given during the assessment. It is a determining factor that explores and enable educators direct the teaching-learning strategies. It is designed and used to predict how well ASD learner might perform in certain ability level in other the predict career path. Aptitude tested here include; pace walking, scholastic, musical, story formation, verbal/speech and routine link.

Autism Spectrum Disorder (ASD): This is used to describe a neurodevelopmental condition that affects the learning of an individual, with the evidence of deffects in communication - interaction, social acts and restricted/repetitive behaviour. The conditions are based on individual's variation in the type and severity of the symptoms that they experience.

Inclusive School (Mainstream School): This is a system of school operation where learners who have different kinds of learning disabilities or disorders are educated with other learners who are identified as non-disabilities (Neuro-typical or typically developing learners) in the classroom setting.

Learning Strategies: This defines the unique flexible procedures of performing specific task(s) that are given to ASD learners, with a focus on achieving the required lesson outcome.

Special Education Needs & Disabilities (SEN-D): This is used to identify a group of learners who have certain form of disabilities (basically physical) yet other forms of disabilities such as neurological, social, genetic and behavioural, which are also classified within this category are yet to be recognised.

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Neuro-typical Learners: These are learners within the mainstream school system that are identified as developing learners without any form of visible learning difficulties.

Latent Trait/Proficiency: This refers to the innate, inherited, mental distinguishing characteristics that cause consistent performance in an individual ASD that is assessed. These mental characteristics cannot be observed physically. They are referred to as latent trait that is hidden.

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Chapter Two

Literature Review

This chapter is presented systematically under the following headings sub-headings:

Chapter Two: Literature Review

2.1 Conceptual Review

2.1.1 Concept of Tests
2.1.2 Psychological Test
2.1.3 Aptitude Test
2.1.4 Academic Achievement Test
2.1.5 Academic Functional Learning Aptitude Test-(AFLAT)
2.1.6 Special Education Needs & Disabilities (SEN-D)

2.1.7 National Policy on Inclusive Education in Nigeria
2.1.8 Autism Spectrum Disorder
2.1.9 Associated Cases of Autism Spectrum Disorder
2.1.10 Diagnostic and Statistical Manual of Mental Disorder – V (DSM-5)

2.2 Theoretical Framework

2.2.1 Gestalt Learning Theory of the Mind Perception
2.2.2 Cognitive Functional Connectivity Theories for ASD
2.2.3 Advance Taxonomy of Blooms Learning Theory

2.3 Review of Empirical Studies

2.3.1 Effect of AFLAT on Academic Achievement of ASD Learners
2.3.2 AFLAT Strategies and Teachers Effectiveness with ASD Academic Achievement
2.3.3 Academic Functional Learning Aptitude Test Strategies and Affected Variables

2.4 Conceptual Model

2.4.1 The Conceptual Model of Academic Functional Learning Aptitude Test (AFLAT)

2.5. Summary of Gaps Literature

2.1 Conceptual Review

In this section, the basic concept of tests, psychological tests, academic achievement and aptitude tests are reviewed in relation to the pedagogical improvement for Autism Spectrum Disorder (ASD) learners in an inclusive school system. It backed up these concepts with two connective learning theories; Gestalt's Mind Perception and Advances Blooms Taxonomy, as these give considerations for ASD learning path. This chapter further supports the concepts raised with empirical studies about best practice teaching-learning strategies for ASD learners. Finally, it gives insights into the main and interaction effects of AFLAT teaching-learning

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strategies on academic achievement of ASD learners with a view to three main moderating variables that could impact the strategies, in a conceptual model developed.

2.1.1 Concepts of Test:

The ethical process of impacting any learner lies in the ability of the teacher to understand the way instructions are passed to the learners. This lies in the teacher's ability to understand the content of instruction, the strategies to apply and the type of activities to give the learners during teaching-learning processes. These three elements of the learning preparedness of lessons account for the performance of the learners when they are being tested for the learning they are taken.

Teaching-learning process should also consider the most paramount element of instructional practices, which lies in the consideration of recording achievement only or considering performance in addition. While considering the later, the teacher needs to master the practicalities of what the learners have mastered, and how each learner readdresses what they have learnt to suit what the given situation requires. During this procedure, the activities done by the learners constitute certain tasks that should be checked and recorded as progress for improvement before moving to next learning. This procedure explains the technical actions taken during a performance-based teaching-learning processes. On a general perspective, classroom test is a process of collecting and interpreting information about the teaching and learning procedures as it occurs in a classroom for the purpose of making decisions about the academics input of a learner[1]. It guides in determining the extent of the content learnt, and in improving the opportunities that come with learning progression[1]. It is a set of instructional practices that enables the learners put into action the concept that they had learnt, and enables the teacher to make decisions based on the performance of each learner and the overall achievement.

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Test has become the most acceptable form or procedure of evaluating the achievement of learners, candidates, trainees, vendors or any one and even animals. It can be conducted in diverse ways through written, interview and observation. It can be a stimulus used to elicit response(s) from a client in order to measure a trait or character that is observed. Test can either be used at the onset of a given training or at the end of the training. In the former case, it is referred to as pre-test or formative test. It is used to determine the current level of achievement before the set objectives are introduced[2]. While the later – post-test or summative test is used to determine the attained level of achievement after the objectives have been introduced and practiced. Test comprises of various types that are used by educators and psychologists in the education field, medical field and various private and civil service organisations[2]. Test is a tool that is used to measure the quality of learning achieved or mastered and the quantity of assimilated content of study by the testee[2].

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The Etymology of Test:

The word "test" originates from the 14th century, initially referring to the process of examining precious metals by melting them in a pot. The term was linked to old French and Latin words related to making earthen pots. By the 1590s, "test" was used to describe trial and observation for determining accuracy[3]. Over time, it became associated with English laws (that is; The Test Act) and quality control in various fields. In the 19th century, Henry Fischel developed the concept of academic testing to assess learners' knowledge and application of learned concepts. These were used to test the learners' abilities to apply the concepts learnt, to real-life situations. He categorised tests into interior (knowledge familiarity) and exterior (real-world application)

evaluations[3]. For this study, these categories were the baseline applied consideration for actualising the practice of AFLAT strategies.

Types of Tests

There are basically three (3) types of tests relevant to this study. These refer to the way they function and how each test items (questions or statements) are constructed as well as what they intend to check[2]. The tests are categorised as;

i. Diagnostics test

ii. Aptitude test

iii. Achievement test

Diagnostic Test: This test is used to determine the specific area of need or deficiency. It is guided by standard features of attainment that are required for the level or specific feature to test. The observed features are tested against to expected feature and assumptions are drawn for evaluation. It is usually used in Phonemes test for eloquent speech test, physicals and other performance related learning skills tests[2].

Aptitude Test: This is designed to measure the learner's capability to function and achieve success in the undertaking or proposed learning. It is used to show the extent of and path to the learner's abilities to acquire specific skills and learning. It can also be used to predict the learner's achievements in the proposed learning.

Achievement Test: As the name requires, it is what had been achieved. It is a test that is used to indicate the extent to which a learner has mastered specific skills or information on new learning in a given formal lesson or situation[3]. This type of test is basically related to school learning experiences, be it in the classroom or outside the classroom. It should also be limited

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to the components and the materials related to the entire curriculum, with a specified time frame and after specified instructional objectives, which should be met at the end of the learning. These categorises of tests can be used in any sector for the purpose of which it purports to *6check. However, this study reviews these test types for the purpose of the education sector and indeed for inclusive classroom improvement processes and procedures. These tests are basically used to determine the learners' attainment of instructional lessons, which is usually used for placement, readiness for specific instructional programme and the projection of strength and weakness when performing an academic task.

The Origin of Standardised Test:

The concept of standardised test originated from Henry Fischel's postulations in the late 19th century. However, China was the first to implement a structured examination system with the Imperial Examination in 605 A.D, under the Sui Dynasty to select government officials. This test assessed six arts, including music, archery, arithmetic, and writing, but was abolished in 1905[4]. In 1806, England adopted standardised testing as influenced by Thomas Taylor Meadows, who saw its benefits in China. Initially, Britain relied on open-ended traditional debates inherited from Greece, but after British, India successfully implemented a standardised test system, the method was gradually adopted in Britain for hiring civil servants, ensuring fairness and reducing corruption[4]. The use of standardised tests expanded worldwide, especially after the Industrial Revolution, when the need for skilled workers in Britain and the United States increased. It became the primary tool for assessing students' knowledge in educational settings[5]. By 1960, standardised tests were defined by their uniform conditions for all test-takers, ensuring reliability[4]. In the 21st century, the definition evolved to incorporate fairness, accommodating test-takers with disabilities and differentiating formats based on

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subject requirements such as oral, written, practical and auditions. This highlights the summary of how standardised testing transformed from an administrative tool to a widely accepted method for assessing knowledge and skills across various fields.

2.1.2 Psychological Test

Psychological test is a form of standardised measure of items that are put together based on assumed parametric statements that can be used to determine a sample of learner's performance in the area of their behaviour and/or interest that is used to measure individual differences that exist the learner and their peers[6]. A psychological test is an objective and standardised measure of an individual's mental and/or behavioural characteristics. It is a systematic procedure of observing the learner's behaviour or performance and describing it with the aid of a numerical scale or category system. It is important for school managers to understand the purpose and procedures of psychological tests in school before administering it. This is because they are used to determine the differences that exist among the learners so as to be able to teach individual learner appropriately. Psychological tests are written, visual, or verbal evaluations administered to assess the cognitive and emotional functioning skills of learners.

The Origin of Psychological Testing:

The historical origins of psychological testing, which emerged in the 18th and 19th centuries as a means to objectively assess human personality, capability, and behavior, was particularly for educational and employment purposes. Early psychological tests were rooted in pseudoscientific practices like physiognomy and phrenology[6]. Physiognomy was based on the belief that facial expressions and outward appearance could reveal inner character. It was used for personality assessment but was later discredited due to dishonest practices[6].

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Phrenology, which was founded by Franz Joseph Gall in 1796, suggested that measuring bumps on the skull could determine mental traits8. Despite early support, empirical studies-such as those by Marie Jean-Pierre Flourens and Paul Broca—debunked the theory, showing that brain function is not determined by skull shape[5]. While phrenology contributed to early neuroscience by suggesting localised brain functions, it was ultimately dismissed as pseudoscience[5]. The psycho-graph, a machine developed by Henry C. Lavery, attempted to measure phrenological traits but was also rendered obsolete[6]. The transition from these early, flawed methods led to the development of standardised psychological tests that form the basis of modern psychological assessment.

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Need for Psychological Test:

The basic need for psychological tests is to determine the learners' weaknesses and strength through the individualised path for attaining successful performance in the outline program of study (curriculum) set for them to achieve. The other needs are; to support individualised lesson plans, enables placement decisions, monitor learning progress, identify disabilities among individual learners, help the administrative, academic works and vocational ability.

For learners' academic performance, ability psychological tests may be used as tools in school placement, in determining the presence of a learning disability or a developmental delay in identifying giftedness, or in tracking intellectual development[7]. It may also be used with teens and young adults to determine vocational ability (for instance in career counselling). Tests are administered for a wide variety of reasons, from diagnosing psychopathology for instance personality disorder and depressive disorder to screening job candidates. They may be used in an educational setting to determine personality strengths and weaknesses and in academics to determine the path of learning achievement[7].

Characteristics of Psychological Test:

There five main characteristics of a good psychological test, which are as follows: objectivity; reliability; validity; norms and practicability[6]. These characteristics are adapted for the validation of assessments.

1. Objectivity: The test should be free from being bias in terms of selecting favouritism or deliberately placing factors that can influence or manipulate the outcome of the result, or judgement regarding the learners' ability, skill, knowledge, trait or potentiality to be measured and evaluated.

2. Reliability: This is the extent to which the test can obtain consistent results across board. When the test is administered on the same sample for more than once with a reasonable gap of time, a reliable test will yield same scores. This implies that the test is trustworthy. There are many methods of testing reliability of a psychological test, one of which will be adopted in this study.

3. Validity: This refers to extent to which the test measures what it intends to measure. For example, when an ability test is developed to assess specific ability in a given subject-topic at a given level of attainment, it should assess the ability of the learner in that regards and no other factors. The validity enables us to know whether the test fulfills the objective of its development.

4. Norms: This refers to the average performance of a representative sample on a given test. It gives a picture of average standard of a particular sample in a particular aspect. Norms are the standard scores, developed by the person who develops test. The future users of the test can compare their scores with norms to know the level of their sample.

5. Practicability: The test must be practicable in-time required for completion, the length, number of items or questions, scoring and so on. The test should not be too lengthy and difficult to answer as well as scoring.

Types of Psychological Test:

Just like the basic categorise of tests, psychological tests are of various types and they are designed to measure different factors of the learners' neuropsychological development. The following types of psychological tests are highlighted for the purpose of this study:

Intelligence Tests: These of course measure the level of intelligence present in an individual learner. It also assesses the learner's ability to relate with its foreign environment. Some of the well-known and widely used tests of this category are;

i. Stanford-Binet Intelligence Scale
ii. Wechsler Intelligence Scale for Children
iii. Wechsler Adult Intelligence Scale

Personality Tests: - These tests measure the type and traits of the individual's personality. These tests are used majorly for clinical and organisation's psychological purposes. Examples of some commonly known attitude tests are as follows,

a. Rorschach or Inkblot test -
b. Thematic Apperception Test (TAT)
c. Minnesota Multiphasic Personality Inventory or MMPI

Attitude Tests: - The individual's attitude towards a given situation or environment, other people or places is judged in this kind of test. Some common examples are,

I. Likert Scale
II. Thurstone Scale

Neuro-psychology Tests: The Neuro-psychological tests are usually conducted when an individual has suffered a traumatic stress or injury. To check the proper cognitive functioning of the brain, these kinds of tests are conducted. Some typical examples of these tests include,

i. Benton Visual Retention Test
ii. Wisconsin Card Sorting Test
iii. Halstead Reitan Neuropsychological Test Battery

Achievement Tests: Achievement tests are also a type of psychological tests that measure the learner's ability to comprehend specific topic; for example, mathematics. You can read through the following cases:

a. Peabody Individual Achievement Test
b. Wechsler Individual Achievement Tests

Aptitude Tests: - The aptitude tests measure the potential of performance in a person.

Examples are;

I. Armed Services Vocational Aptitude Battery
II. Bloomberg Aptitude Test

These are some of the different types of psychological tests that are commonly used for measurement of mental abilities and cognitive abilities. They can either be used as assessments for screening at corporate or educational institutes, or they can be used for clinical purposes to diagnose the issue and then to prescribe the best possible treatment for the psychological problem[10].

The revised scales and the advent of Intelligence Quotient:

In 1908, Binet and Simon published a revised version of their scale. This was the introduction of the concept of mental level. The idea of deriving a mental level was a monumental

development that was to influence the character of intelligence testing throughout the twentieth century[7] (which was later referred to as mental age). Binet argued that intelligence could be better measured by means of the higher psychological processes rather than elementary sensory processes such as reaction time[9].

The Stanford-Binet: Early mainstay of Intelligent Quotient (IQ)

Professor Lewis M. Terman (1857-1956), a psychologist at the Stanford University brought the Intelligence Quotient testing into limelight with his revised form of the Binet-Simon scales in 1916, with modified approached to the test now known as Stanford-Binet IQ test[9]. It consisted of individualised administered intelligence test, which focused on cognitive ability and display of intelligence during the test. This test was used for diagnosing developmental or intellectual deficiencies in pre-school learners. The test measures five weighted factors and consists of both verbal and nonverbal sub-tests. The five factors that are tested are; knowledge, quantitative reasoning, visual-spatial processing, working memory, and fluid reasoning- the cognitive ability to solve complex problems through logical path from recognising the pattern to recall to applying necessary concepts, making differential or discriminatory impressions and drawing inferences[9].

The development of the Stanford–Binet initiated the modern field of intelligence testing and it was one of the first examples of an adaptive test-a form of test that adapts the examinee's ability level[9]. It has been advanced to infuse the use of technological devise and known as Computerised Adaptive Test (CAT). The test adopts a procedure, which adapts the examinee's ability in such a way that their response to the previous item determines the type of item that will be raised next. If the examinee answers a seemingly difficult item correctly, then the next item will be progressively difficult and vice versa. The test originated in France, then was

revised in the United States. Alfred Binet, following the introduction of a law mandating universal education by the French government, began developing a method of identifying children who are slow at learning, so that they could be placed in special education programs, instead of labelled as sick and unfit for the society's development thereby placing then in the asylum[7].

The Origin of Wechsler Intelligence Scale Test

The initial creation by David Wechsler was in the 1930s when he faulted Binet's scale with the claims that it failed to identify specific elements that could be associated with intelligence test. Such that these elements (confidence level, attitude, fear of failure and other) could be isolated, defined, assessed and measured. These tests; Wechsler-Bellevue were innovated because:

1. They gathered tasks that were created for non-clinical purposes for the administration of "clinical test battery"
2. The point scale concept was used as against the age scale.
3. They included the non-verbal performance scale.

Having identified these and more criticism from Binet scale such as;

i. The lack of non-intellective factors (as mentioned above),

ii. Single score system,

iii. Binet's test was invalid for adults and adolescents,

iv. Emphasis on speed with scattered timed tasks,

v. Inconsideration for the fact that intellectual performance could deteriorate with age and

vi. His (Wechsler's) believe that mental age norm did not apply to adult.

These criticisms led to the drastic review of the Wechsler-Bellevue scale to the innovation of the Wechsler Adult Intelligence Scales test (WAIS)[10]. The Wechsler Adult Intelligence Scales test (WAIS) published in 1955, is an intelligence quotient test designed to measure the level of intelligence and cognitive ability in adults and older adolescents. It was defined as a test that measures the global capacity of a person to act purposefully, think rationally and deal effectively with his environment. The test specified elements, which are not entirely isolated but are interrelated, such general intelligence is composed of various specific and interrelated functions or elements that can be measured separately. Currently, Wechsler's scale (WAIS-IV) is in its 4th edition and many of the original concepts have become standards in psychological testing including the point-scale and performance scale concepts[10].

2.1.3 Aptitude Test

Aptitude refers to the natural inherit ability to be able to do something or act in a specified manner (perform). Initially, it was the primary yard stick for determining a person's level of competence until it became insufficient. The first known aptitude test was described as the intelligence aptitude test. However, it differs from the other I.Q test[7]. Sir Francis Galton produced the first aptitude test in the early 19th century. This was basically focused on physical and sensory, and they had been modified to include cognitive contents in recent development. An aptitude test would test the learners' ability to perform specified task and/or react to specified situations when performing the tasks. In most cases the situational tasks involve soft

skills activities such as prioritisation, appropriation, Synectic (method of solving problems), rate of processing & channeling information and exhibiting the potentials for making logical decisions (evaluation)[11]. The test of aptitude accounts for a major technique that is applied while teaching ASD learners. This is because it is performance-based and it has some elements of competence check, which is required during the practice of AFLAT strategies.

The Development of Aptitude Tests:

The first known tests were described as the intelligence aptitude test. However, it differs from the other Intelligent Quotient (I.Q) test. Sir Francis Galton produced the first aptitude test in the early 19th century. This was basically focused on physical and sensory; these had been modified to include cognitive contents.

The development of aptitude tests lagged behind that of intelligence tests for two reasons:

a. Statistical: A new technique, factor analysis, was often needed to discern which aptitudes were primary and, therefore, distinct from each other.
b. Social: The absence of a practical application for such refined instruments. It was not until World War II that a pressing need arose to select candidates who were highly qualified for very difficult and specialised tasks.

Types of Aptitude Test:

Research has revealed quite a number of aptitude that can be test over various purpose and requirement for the field in question. These ranges from; logical, spatial, organisation, physical, mechanical, science & technology and linguistic aptitude[12]. However, the scope of test, aptitude tests are set to determine two categories of ability which are speed (information

processing rate) and power (effort). While speed tests are simple, direct and expressive, checking for the display of promptness in providing solution to the task-question or statement, power test is usually minimal and complex because it requires logic and critical thinking metabolic activities before the result can be achieved[11]. The types of test include;

1. Verbal test of ability to use grammatical tenses and context, appropriate spelling and specified written instructions.
2. Numeric test of arithmetic, reasoning of sequential and directional pattern using the four (4) mathematics operation terms (+, -, x, ÷) and problem solving story activities.
3. Spatial reasoning test of geometric manipulations using simple to complex manual/electronic coding structures.
4. Abstract reasoning using the idea of logic to encode and decode pattern (Non Verbal reasoning) using diagram.
5. Data synthesis and analysis test using structured tables of information decode to provide logical solution.
6. Mechanical reasoning test of basic physical and mechanical principles are checked.

The Importance of Aptitude in Psychology:

The general concept of psychology studies the mental state of the human mind, as it can be used to determine the behaviour, social interaction and pattern of communication. Since aptitude determines the innate abilities propelled by certain characteristics features of human inherited traits, which forms their personalities, it therefore goes further to understand the human actions. For instance; the traits aid in the generation of abilities (aptitude), which helps

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humans determine what they are able to do effortlessly (strength) and what they struggle to achieve (weakness)[11]. When an individual struggles with the option of determining the direction to career path, for instance, it can result to stress[12]. This invariably is manifested in neurological, psychological, and in the extreme, psychiatric symptoms. A scientific approach can be used to assess the unique ability, inherent strengths and weaknesses, in order to determine the aspirations and career path of such individual[12]. This scientific approach that can be used, adopts a tool that is based on psychological discernment of specific yet expected traits that would enable the individual perform certain action with a specified period or space of time. The series of statements based on standardiased generations of expected manifestation of specified traits for specific action. Parameters such as various displays and components of skills, mode & pattern of display and channel of obtaining results are seen, when observing the individual. This tool is what psychometrics refer to as test batteries, which is a psychological based observation tool that can be used to determine how the individual works, what to expect and in a school set up, how the teacher should teach the learner.

Aptitude as Psychological Test:

Since psychological test involves the assessment of social act that has emerged over time to resolve the concerns observed in personality. It is also observed to provide objective analysis of a person's behaviour, social interaction and pattern of communication in a differentiated outlook. The purpose of which is mainly to detect the capability to function first in the education setting and to fit into or function comparatively in the market place/employment. It is expedient at this juncture that the personality be taken into consideration as this could contribute to defining the level of display of some characters in the individual. The scientific study of the human behaviour started in 1879, in Leipzig, Germany. It began with the goal of

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measuring and establishing the sensory and physiological capabilities of human organism in a more precise fashion, such making the need for test to become more standardised, through a phrenology[8].

Social interaction on the other hand, and according to (Bandura, N.D), the originator of socio-cognitive expressions of human functioning, viewed individuals as self-organising, positive, self-reflecting and self-regulating personality[13]. They are not just responsive to, or designed, and be monitored by external circumstances, but they have the authority to create and influence their own accomplishments to the point of producing specific result. Humans possess the capability to use regulator over their thoughts, processes, enthusiasm, effects and action to functions through devices of personal agencies. These agencies have the intellectual capabilities to operate as; autonomous, mechanically reactive or emergent interactive agencies[13]. Communication pattern is another skill, which creates complex form of interaction through verbal and non verbal approaches. The school system enhances these processes in the ways and manner through which individuals interact, as it represents a platform for teaching-learning operational procedures, which invariably interfaces with the personality differences of both individual elements in the school set-up, (teachers and managers) and the learners (peers). These individuals at one point or the other pose significant level of influence on one another's state of mind, which in effect affect their performance and influence the results of their achievements, while engaging in communication interaction processes[13].

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2.1.4 Academic Achievement Test

This is being reviewed on the basis of what the keywords; "academics" and "achievement" represent in this study. The concept of the former-academics, accounts for the structured workplan that is required to be achieved within a specified period of time in a school set up. It

is composed of the content of knowledge to be acquired which are outlined in sequential order. The aim or objectives to attain within the specified content of lesson, the teaching-learning strategies to adopt which best suit the learners' understanding, the lesson activities for students' practices and the proposed assessment method required for what had been learnt. This entire learning environment is guided by structured programme of study or package referred to as curriculum. The curriculum and its contents provide the structured plan for the learners' experiences, which considers the make up system (personality) of the learner and their ability to perform and achieve the required content of learning that are set for the period of attainment. These content are grouped as; academics and non-academics content of studies. While the former focus on subject-based structure; such as Mathematics, Grammar, Science, Comprehension, History, Socials, ICT and others as they may be grouped by individual school system, the later focuses on other activities such as clubs, games, events and the likes that enhance the learning from the former, and set to improve hands-on, skills and competence development.

The concept of academic achievement can be revealed in a structured and flexible learning environment where whatever is learnt in the classroom can easier be translated into the non-academics learning hemisphere. For instance if in Socials Studies the learners had learnt about, adornment, the concepts and learning of this topic can also be translated into the school's events and this can be graded and scored to pass for achievement. Certain parametric standards are set, awarded score/grades and measured to suit the learner's performance at the event. More so, why can the simple principle learnt in algebra, not be translated into chess game during extra-curricula activities, and the learners achievement are rated, graded and scored accordingly? This represents the performance outcome that indicates the extent to which a learner has accomplished specific goals, which are the focus of activities in a learning

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environment specifically the school system. These arrangements come as flexible and blended programme of studies, where both core studies and extra-curricula studies, which the learner is subjected to, by receiving certain form of instruction from a functional aspect of academic achievement learning. The grades achieved here can be used as point average and/or the cumulative point average as a measure of the learner's achievement[14].

Academic achievement is also seen as the magnitude of content of studies that the learner learns in a given period, be it short or long term goal. This learning magnitude should be regularly measured, which is why the learning goals/objectives are distinctively stated and specified in the instructional plan. the content of measurement being done through the test or assessment. The short-term assessment is referred to as continuous assessment and the long-term assessment is referred to as summative/cumulative assessment[14]. Academic achievement is considered as multifaceted construct that comprises of different domains of learning because the field is very wide; ranging and covering a broad variety of learning outcomes[14]. Therefore, the concept of academic achievement will be dependent on the indicators used for its measurement.

Components of Academic Achievement:

These comprise of the core curricular activities and the extra-curricular activities of learning structures in a school. It is imperative that these components be strategically integrated into the learners' programme of studies in other to attain the levels of required functionality for each class levels of learning and indeed for the inclusion of the learner with autism as much as with other learners with other forms of disabilities. The components should embrace the strategic structure of the curricula, which include; the scheme of work, schedule of studies

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(timetable), instructional plan (lesson plan), teaching strategies/methodology, instructional activities (classwork & homework), tests and assessments strategies.

Measures of Academic Achievement:

These are made up of the kinds of test/assessment used to measure performance during the learning activities[14]. These include;

1. Objectives: which may be dichotomous test items such as; true or false, yes or no.

   Multiple choice items having more response options.

   Fill in the blank with short answers such as one word, phrases/clauses or short sentences.

   Matching format to test for recognition of relationships between concepts that is meaning, events, dates, categories and examples.

2. Essay (subjective) assessment: which enables the assessor judge learners' ability to organise, integrate, interpret materials and express themselves using their own words. It focuses more on broad issues, general concepts and interrelationships rather than specific details. It gives opportunity for comments on the progress, expresses the quality of thinking, depth of understanding and the difficulty involved.
3. Problem set: this is usually based on specific concepts that requires problem-solving approach using critical thinking steps.
4. Oral examinations: this is where questions are given in advance, for study. The assessor would than require the learners to exhibit certain levels of understanding between the theory and principles of the concept required to have been studied ahead. Than the learner would be subjected to questioning by the assessor in a classroom learning structure. This method is usually used in an advanced learning institution.

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5. Performance test: learners demonstrate proficiency in conducting the actions required here. This can be done in scientific experiments by showing series of steps with specified time, taking to certain guided instructions, creating arts/crafts, manipulating materials of equipment or reacting to real or stimulated situations. For the learners to demonstrate their skills, performance test would be required to adopt:
    i. Specified criteria for rating levels of accuracy in performing the sequence of completing the task within specified time.
    ii. Problem task must be clearly stated for the learners to understand what is required of them.
    iii. Provide series of attempts for performance and take the best or an average.
6. Create-a-game test: this is where the learners are given a concept or they are to choose a concept learnt and create a game that covers basic principles on the information of concepts learnt. They will include the features of the games such as rules, board, pieces and other items required for playing the games.

Learners' Personality: Response Agent of Academic Achievement

Having identified the impact of socio-cognitive expressions of human functioning, as revealed by Bandura's theory in individuals as self-organising, positive, self-reflecting and self-regulating, the determining factors responsible for better achievement in any subject, may not be limited to teachers' personalities, since there has to be a response reaction from the recipients of the instructions in order to strike a balance in the levels of achievement. It is therefore expedient, to review the effects of students' personalities as it affects their achievements[11].

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In a work experience field exercise, it was observed that certain factors are responsible for students' achievements in chemistry, besides the teachers personality-this being, the interest of the student and the readiness of the student. These account for "self", irrespective of the teacher's input. The attribute of "self" may disrupt the outcome of effective achievement in student's learning. Researches had it that individual differences in academic performance are strongly correlated with differences in personalities and intelligence[15]. Also, that students levels of "self" attributes impact and account for the levels of their achievements.

In accounting for students achievement, due to personality differences, some factors need to be brought to lime light for teachers' awareness. These are response rate and information processing rate. These two factors are interwoven and the later is determinant of the former.

2.1.5 Academic Functional Learning Aptitude Test (AFLAT)

Etiological Background:

AFLAT is a concept that adapts the concept of psychoanalytic assessment and test procedures. It was first initiated in the year 2014, during a session of psychoanalytic assessment that was being conducted by a team of practitioners in Lagos, Nigeria. The team, which was made up of medical and education practitioners had the researcher as an academic curriculum developer for each child with peculiar learning needs. The concerns raised from the peculiarities of each learner and the need to ensure each of the learner's functionality, spurred the researcher to engage in further studies. The studies explore the need to determine learners' abilities that can be combined for their functionality in the areas of learning that they are exposed to. Having achieved success in the progress of teaching-learning approaches with SEN-D learners, the researcher extended the study to neuro-typical learners in inclusive classroom settings in 2016, with continuous records of progressive achievement of functional learning outcome for both

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learners with special needs and neurotypical learners across inclusive schools in South-Western region of Nigeria.

Assumptions of AFLAT

The assumption for the implementation of AFLAT approaches in achieving successful functional Academic Aptitude Assessment (AAA) was based on the premise that every learner is unique and each uniqueness is characterised by specific abilities that can aid the learner's performance at their ultimate achievement during learning[16].

Another assumption for the use of AFLAT strategies in schools, lies in its diagnostic function. In addition to the fact that it can be used for directing learning strategies, it can also serve as diagnostic tool for determining the path of academic learning using aptitude as the baseline path to determine the strength and weakness of the learner[17]. It is believed that in as much as diagnosis and treatment are conducted in the medical science fields; the education sector, which caters for all-round wellness of the learner, has the potential of diagnosing the cause of unproductive learning traits observed in the learner, and proffering strategies and activities (treatment) for correcting the abnormalities that are associated with such form of unproductive learning nature in the learner.

The Concept of Academic Functional Learning Aptitude Test– (AFLAT):

AFLAT tools is the acronym for Academic Functional Learning Aptitude Test It is comprised of achievement tests and aptitude (ability) tests, which are simultaneously conducted using observation technique.

The achievement test is constructed to include; items from expected lessons activities that the learners are required to have attained. While the ability test comprises of items which aim at

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determining the visible skills displayed, the effort put into activities, tenacity displayed while performing the required activities from the achievement items comprises of sub-tests of various expected traits that the learner is required to display when performing the tasks from achievement test. A combination of; Independent functional learning aptitude (IFL) for learner's Individual Practical Display – (IPD) skills and abilities combined tools to make - Academic Functional Learning Aptitude Tool-(AFLAT).

Certain parametric factors are observed directly and scored using a predetermined scale ranging from 1 - lowest to 5 – highest, on the ability test tools[19].

AFLAT uses academic parameters with specified sub-tests for standard levels of achievements in a given subject topic. It assesses the learner's ability to perform in each of sub-tests for each item's required level of attainment. AFLAT consists of achievement and ability assessments in the areas of academic dispense involving; cognitive (intellectual display of standard levels of interaction in a given task), affective (socio-emotional interaction, which emits interest and behaviour towards tasks) and psychomotor (stamina, tenacity and physical disposition while performing a task)[18]. Each of these tests include subtests in the following categories.

A. Cognition: Intellectual ability, Logical reasoning capability, Concept linking, Inferential reasoning of concepts and Information Processing rates.
B. Affective: Eye contact, Socio-reciprocity, Emotional stability/intelligence, Appropriation and Information Processing rates.
C. Psychomotor: Level of tenacity, Stamina effects, Craft skills (handing materials), Information appropriation and Pace walking skills.

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These are the standard parameters used for assessing the levels of tasks performance and attainment. The connecting sequence of information path being; receive, decode, encode, interpretation and presentation.

The rating scale measurement or approach, with a view to setting the parametric measuring range to adopt when the performance is being rated[19]. The indicators are deduced from Bloom's taxonomy of learning objectives and adjusted to suit the purpose required for this observation procedures it may be adopted when rating the activities observed[20].

These are;

1. Perceived information (use of the entire senses).
2. Recall information (use of the mind i.e information processing unit – IPU) the brain.
3. Apply the information (analytical reasoning commences here.)
4. Discrimination between & among concepts.

(the later is advance functionality – applying the practice of information)

5. Use concepts (information) in diverse forms-(making inferences).

Purpose of AFLAT:

AFLAT test considers various units of psychological expected functions and traits in an individual, which can make them function as expected. For this reason, it provides thorough and more comprehensive judgement about an individual, than a single straight off test, such as achievement test[22]. It gives a projection of the individual's capabilities in the areas assessed and gives direction to the functioning potentials. It guards the mentor, (teacher, counsellor or caregiver) in the path of operation for efficient performance. Its evaluation is based on

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individual's potentials such as skills, aptitude, traits and emotions. These give direction to the interelational propensity of the expected behaviour in such individual[21].

For the purpose of this study, AFLAT is a psychological series of expected academic abilities compiled in seven (7) sub-tests in academics, which are combined with each sub-test having ten (10) aptitudnial performance expectations, all in a single assessment profile for specific individual. They are required to determine how best to guide the learner's learning and project expected learning outcome. It makes use of the Individualised Learning Plan (ILP), which guides the content of the programme of study in the path of the learner's potentials, up unto as established visible result-oriented functionality[23]. The end result being independent functionality of the entire programme of study.

Components of AFLAT Test: The Interwoven stages of Achievement & Aptitude Tests

Survey on opinion polls conducted in recent times in Nigeria reveals a misconception among educators about the concept of achievement and aptitude tests[12]. While majority understand the concept and purpose of achievement test, the concept and purpose of aptitude test are not yet understood by the educators. This gives rise to the need to describe the distinctive structure that exist between the concept of achievement and aptitude test.

Over the years and with fast trending evolving technological needs, it has become expedient for educators to consider more flexible, yet standardised approaches to conducting tests. Innovation in assessment and test creation refers to the act of using new and simple methods during an activity or interaction process in a classroom to solve concrete problem. The problems, such that some extent of equality can be achieved in learning outcome between students living with disorder and neurotypicals. The psychological tests, identified some tools

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that are used for specified purposes. This includes tools that are developed for unique purposes or individualised exposure of the specified learner.

AFLAT is basically a psychological tool, which is created and used to observe, measure and evaluate (make judgement) the learning aptitude, that is the strengths and weaknesses in order to inform the plan for learning that can assist the teacher and the parent/caregiver in making decisions[23]. It is composed of four (4) major outlook, which are; assessment procedures, strategies, learning support and progressive all-round evaluation procedures. This study's focus is on the teaching-learning strategies procedures, that makes use of flexible innovative resources, with a combination that gives preference to the latent attributes of the learners. A systematic display of these procedures during teaching-learning processes, can be seen to improve the learners' performance, thereby improving the achievement on the long run.

In addition to this, it determines the way the learners can learn irrespective of their learning style -Visual, Auditory, Kinesthetic (VAK). The outcome of this approach takes practical result into consideration, and it is achieved by systematically highlighting the responses to any given activity indicated on the instructional plan[21].

The steps involve in conducting the Academic Functional Learning Aptitude Test;

These steps include:

a. Preparation of specified achievement, which may be constructed, adopted or adapted, and aptitude an adjoing aptitude test items, that specifies the expected skills to display as a reflector of the learners' symptom observed. The achievement test is paired with the ability test using the required levels of performance attainment skills for each topic tested. For each topic, there are expected levels of achievement and the abilities that the learners are required to display. The aptitude items are listed to cover all the factors

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required and the levels of attainment that are to be reached for each concept on the topic learnt in the subject.

b. Conducting the one-on-one assessment. This is usually done by strategic and systematic observation, which ensures that the factors identify in the aptitude test are crossed checked with the actions/performance required on the achievement test.

c. Preparing the assessment report. This is done using several parametric measures ranging from script scoring, rating abilities using Likert scales and analysing the scores along with the rates using simple descriptive statistical measurement i.e. percentage or mean (average). A threshold rating is used to benchmark the performance, which is the standard rating adopted from the Cambridge grading policy[24].

d. Developing an individualised education or learning plan. the individualised learning plan (ILP) or individualised education plan (IEP) is a structured learning plan specific to each learner living with autism[25]. It is made up of concepts or topics that are directed towards the learner's path of learning as revealed in the observed assessment. It can be drafted and directed at concepts required for specified career, or any other learning. It is usually not cumbersome and it takes an account of all domains of learning as well as a participants involved in managing the specific learning of the ASD learner.

e. Communicating the plan with the school managers, teachers/tutors, parents and caregivers. This simply looks out for the need for all to be well-informed about the plan and for each participant to understand the learning path required for achieving functional results.

f. Monitoring the identified teaching-learning paths during instruction to ensure that the targets are achieved.

g. Conducting a retest to determined the extent of improvement of applied AFLAT tool.

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h. Review the targets to re-assess the extent of progress made (Preferrably termly).

i. Proffer strategic actions for methodologies that appeared difficult to achieve.

2.1.6 Special Education Needs & Disabilities in Nigeria:

The National Policy on Education (NPE) 1977 host a section on the document, which was practised between 1978 and 2013 that makes provision for the required resources for the practice of inclusion in schools. This was devoid of basic and major procedures that should accompany inclusive practices[26]. The interventions provided included: teacher development, institutional development framework, establishment of special schools, curriculum reviews and other initiatives by the Government and Non-Governmental Organization (NGOs)[26].

Due to global research and discoveries as well as technological approaches to the concept that had been discovered over time, this policy was reviewed to include the global discoveries on inclusive practices, which brought forth the new policy on inclusive education (2016), in a statement, signed by the then, Honourable Minister of Education Mallam Ibrahim Shekarau, CON Sardaunan Kano in 2015[27].

Having set this review, the question is how effective has this been managed over the years? What are the evidences, in terms of turnout of the product of the new practice? Are the educators better informed and do they have updated knowledge, skills and competences that are required to sustain the practices? Are all schools' stakeholders ranging from government, mission and private proprietorship engaging in this practice? What are the factors responsible for effective or ineffective practices of inclusion in these categories of schools and why is there a disparity, if any? These are concerns raised for the evaluation of the guideline the posed the practice of inclusion in Nigeria.

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The following are the highlights of principles for guiding future practices of inclusion in schools as presented by the policy[28]:

1. Creating the least restrictive environment.
2. Zero Reject (Education for all irrespective of circumstance of life, setting and services).
3. Total inclusion of Persons with Special Needs within the ambience of societal operation.
4. Diversification of services beyond the school setting to include the home and the hospital.
5. Ensure the Implementation Guidelines on the National Policy on Special Needs Education.

The question raised here is; to what is the extent of attainment with the practice of these principles?

2.1.7 The National Policy on Inclusive Education in Nigeria:

The National Policy on Inclusive Education in Nigeria (2016) was developed as result of the evolving changes in meeting the requirements of special education and disabilities' needs in mainstream (where both regular learners and learners who live with some form of disability learn under equal conditions) school[28]. In a school setting, the paramount art of learning depends on the system, the tools and resources that are required to achieve the expected learning outcome. Some of the tools required include; the setting of the facilities and equipment; while the resources would include; all forms of materials, instruments, including human resources who will use the tools that are put in place for achieving the outcome.

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Towards the 19th century, the study of inclusive pedagogy become prominent in the field of social sciences where it was associated with the development of thoughts, learning institutions and progress of knowledge acquisition. It goes beyond the description or explanation of an art, to guided process of teaching and learning. That is a field that is relevant to the study of "how to teach." This study, described the methodology, strategies or the approaches adopted when passing an instructional lesson to the learners. This school of thought has brought the concept of pedagogy from the process of how to teach, to the functionality, that is the applied form of the process of teaching and learning[24]. It considers the acquisition of relevant knowledge and the translation of the knowledge acquired into practice, by evaluating the performance of latent knowledge via the display of skills during the process[24].

In the view of this postulates, this study pitches its standards on the concept of pedagogy in agreement with Vellas principles of the application and the functionality of the knowledge acquired during the teaching learning processes and procedures. This study reviews the concepts that are associated with pedagogy. These include; teaching strategies/methodologies/approaches adopted that are accompany lesson activities and assessment. These being the procedures that are examined in the course of achieving functional outcome during teaching-learning processes[29].

Summary of Inclusive policy:

The focus of the policy is basically to attain equity, justice and quality education for all learners irrespective of the learning abilities or physical abilities and disabilities. It identified that learners were excluded from mainstream schools, as a result of their physical or psychological impairment[28]. According to the policy, inclusion is the process of addressing and responding

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to diverse needs of all learners by increasing their participation in learning and reducing exclusion within and form education[30]. It is an approach of school system where learners who have different kinds of learning disabilities are educated with other learners who are identified as non-disabilities (Neuro-typical or typically developing learners) in the classroom setting[31].

The policy was drafted and targeted at addressing all such children, described in section 3.3 of the policy as vulnerable and marginalised groups[27]. These group include:

i. Learners excluded from or within education.
ii. Learners living in the streets.
iii. Learners involved in child labour.
iv. Learners from minority cultures and/or religions, including minority languages.
v. Learners who are physically and/or psychologically abused.
vi. Learners growing up in economic and/or cultural poverty.
vii. Learners with health challenges, including learners affected by Human Immunodeficiency Virus (HIV) or Acquired Immunodeficiency Syndrome (AIDS).
viii. Learners from families who are addicted to/ abusing drugs.
ix. Learners with temporary learning challenges.
x. Learners who have dropped out of school.
xi. Learners who learn differently, slower or faster, then the average learner.
xii. Learners with impairments/disabilities.
xiii. Learners experiencing barriers to learning caused by factors other than impairments.
xiv. Learners with social or emotional challenges, including girls who are pregnant or have given birth.

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The policy identified the situation that inhibits or limits the achievement of inclusive education in Nigeria as follows[32]:

i. The traditional cultural segregation: this had been mastered by the practitioners, so much more that they find it difficult to adjust to the contemporary approaches.

ii. The processes and procedure required for the practice of inclusion in mainstream schools are misconceived. The flexibility required in teaching-learning strategies (methodologies), activities and assessment for individual learners are still being misplaced by practitioners in mainstream schools.

iii. While the policy on special education adopts practices that focus on separate impairment and need using unconventional strategies, materials, activities, facilities and other subject matter to design the learning – that is behaviour adaption and vocation, the practice of inclusion identifies the unique abilities of each learner and encourages flexibility.

iv. Inclusive practices are presented as separated interventions for various groups of impaired learners in an exclusion/segregation system.

Inclusion Practices

The Sustainable Development Goal-4 mandated that there be equality in the standards of education. This approach of equality, should reflect an impactful learning outcome with the quality of lessons received by the learners. This lesson should be presented in a differentiated form, such that, it will enable all learners feel the impact of the lessons taught on daily basis[33]. However, these approaches are far from being the case in many developing countries including Nigeria. Despite various forms of inclusive education programme, many schools find it difficult to measure the performance and achievement output of the learners[34].

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Inclusion was defined as, an education environment for both learners who lived with special learning impairments and the neurotyical learners, all of whom are learning on the same school facilities, undergoing the same content of curriculum and pedagogical structures. Despite the fact that the system is inclusive, the learning content, programme and activities are individualised[35]. It is a process of gradual transformation, which evolves and modifies the performance levels of the learners in both behaviour and discipline during teaching-learning activities and/or during the procedures of study. These include; methodology/strategies, structure, lesson activities and scoring the plans of activities that the learners are engaged with in an inclusive learning environment. Inclusion does not involve alienating the affected students, but it explores avenues for which they could be reached in their state of needs without lowering the content of study, but ensuring a gradual systematic progression from the simplest known to the complex unknown using concrete and/or practical examples[35]. The United Nations Educational, Scientific and Cultural Organisation (UNESCO) highlighted strategies and key activities to adopt in an inclusive school setting. It gives the focus areas, strategies and activities for consideration. (Appendix II)

In as much as inclusion is defined and viewed by many researchers as a process that focus basically on the learner who is living with one form of disability or the other. This research study did not only focus on the disabilities observed in certain learners as a measure with the other learner. Rather, the process observed that inter-relational experiences of all learners irrespective of any form disabilities, and their learning experiences[30]. The learning experiences, which review; the academics and behavioural disposition of all the learners, with the elements of observation being the check of display of aptitude with the expression of undisputed socio-emotional, physical and psychological wellness required for successful operation in the school system. Inclusion takes a look at the teaching of inter-relational

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activities (academics and behaviour) of all learners who are exposed to learning giving the same conditions and using fairly equal standard of attainment of learning expectations, with consideration to differential mode of understanding, operations–path of working experience and achievement outcome. The learners working with these sets of conditions are regarded more than merely having a form of disability or the other-since some disabilities are latent in display of traits, such the learners are referred to as those who learn differently." For the purpose of this study, the term inclusion is referred to as the all-embracing inter-relational activities of learners who learn differently, under the same pedagogical and behavioural structural standard of learning for equal attainment. While the learners are not subjected to streamlined pattern of operation, they are allowed to display different approaches in their performance and in their learning achievements.

The Variables to Examine:

The variables described in this study include; the dependent, independent and moderating variables.

The dependent variable is the academic achievement of the group of learners that is being studied (Autism Spectrum Disorder-ASD). Academic aptitude test strategies are used to determine the achievement of the learner. While the independent variable refers to AFLAT strategies. It is the combined application of the achievement and aptitude tests. The application of unique test strategies for this group of learners determines the functional learning outcome of the learner with Autism Spectrum Disorder[36].

While the moderating variables are gender, location of residence and socio-economic factors. These are the factors that impact progressive achievement of AFLAT strategies, when compared with the conventional strategies.

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Ethics of Observing Impaired Learners in Inclusive Classroom:

Further to the focus for consideration highlighted in the strategies to adopt in an inclusive classroom, it is identified that these strategies should also itemise or explore procedures for observing the learners who might display symptoms of certain form of impairment or the other.

While it is important for teachers not to focus their attention on seeking for suggestive traits or behaviour that may give the impression that a learner might require special attention, it is important for teachers to observe and take necessary steps in communicating their observation about the learner in their care. This can be documented and reported to the school managers, who will inform the parents. It is also important to note that while reporting observations made about a child, there should be a recommendation and/or means of constructively approaching what they had observed. It is advisable for teachers to possess first-hand information about the approach to take when interacting with the learners observed. Such observation, enable the teacher to notice certain irregularities in their behaviour or physical expressions that may be obscure and may not be easily detected. More so, the teachers and school managers should be aware of ethics and practices that guide discriminatory disposition and/or use of socially unacceptable language in describing the learners observed to display some form of irregularities in the behaviour[37].

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2.1.8 Autism Spectrum Disorder

What is Autism Spectrum disorder?

The early account of the term autism was considered to exist across a seamless continuous series of strands, with invisible links of degrees of impairment and functioning especially in social interaction[38]. There are large number of terms that expresses the various presentations of autism disorder. These range from Asperger's syndrome or disorder, high functioning,

Pervasive Developmental Disorder (PDD), Semantic-Pragmatic Disorder (SPD), Pathological Demand Avoidance (PDA), Non-Verbal Learning Disability (NV-LD) and Atypical Asperger's Syndrome (AAS)[39].

In recent times, autism is thought of as a neurodevelopmental condition that can affect the victim's communication, social interaction & interest and academic learning. It is evident in developing children before the age of two years and its characteristics features are; engagement in repetitive activities and stereotyped movements, resistance to environmental changes in daily routines and unusual response(s) to sensory evoked experiences. A learner living with autism may have their social interactions and communication impaired and these may lead to repetitive interests and behaviour. The term autism spectrum condition is preferred to autism spectrum disorder, so as to wad off stigmatisation[40].

The spectrum is used to describe the extent of the condition[41]. It consists of a broad base characteristics features that describes the extent of severity of the condition. On one end is the highly functional case – which though may have mild display of social insensitivity or distractions due to sensory reactions, the other may not necessarily display this insensitivity. With orders such as Asperger's syndromes, who are able to relate socially and interact well with peers, there may be others within this class as well whose social interaction may not form the logical display of coherent discussions. There are others on the extreme end of the spectrum whose conditions are of classic autism with more complexity and difficulties in functioning. The spectrum perspective is usually the best approach to understanding the degree of the condition[42].

Autism is described as a set of heterogeneous neurodevelopmental conditions, whose characteristics features are early-onset difficulties in social communication and unusually

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restricted, repetitive behaviour and interests, thus giving the neurological perspective of the origin of the condition[43]. The research findings revealed that more male are affected than female individuals and comorbidity (effect and presence of other factors or disorder) is common[42]. Typical of autism spectruvm diorder is the cognition profiles, such as impaired social cognition, social perception, executive dysfunction and atypical perceptual & information processing[41].

The genetic perspective of the origin of autism identified that ASD –Autism Spectrum Disorder is highly genetic with heterogeneous dissolution, and it may be caused by both inheritable and other gene variations, such that had been seen to contribute to serious deficits in communication, social, cognition and behaviour that are experience by the people living with the disorder[44]. Environmental exposure also has significant contributions to the origin of social communication and social interaction[45]. As much as genetic origin accounts for about 10 % to 20% cases of ASD, the patients who have similar pathogenic variants may be diagnosed on different levels of the spectrum, sometimes resulting from environmental convergent signaling pathways, such as parental age, teratogenic compounds, perinatal risks, which are common factors that put ASD at environmental infused risks[45].

For ASD, there is also a level of severity that should be specified that ranges from Level 1 to Level 3. The severity levels focus on the level of impairment and also the level of support needed to be successful in day-to-day activities. Often, there is an assumption that the route from Level 1 to 3 is linear and many people refer to people with ASD as "high-functioning" 0 for Level 1 or "low-functioning" for Level 3, implying that there are two ends of a linear continuum, but ASD is far more complex than that. An example of this is the assumption that because someone is nonverbal, they are "low-functioning". When in fact, there are many

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people who are nonverbal, but have average and above-average intelligence and are highly skilled and less affected in many areas of functioning[46].

The spectrum is more likely in recent times to comprise of a spiral beaming array of syndromes with connectivity. The connectivity, span across various sensitive functions, thus making the functions closely undefined and inseparable for distinction in specific individual[47]. That is what is considered functional in seeming likely cases may be non-functional in another close but likely case. Such the spectrum is slight complex in terms of assigning distinctive levels for the individual cases. This analogy accounts for the terms; mild and severe cases, but can be applied to the level of sensitivity expressed. For instance; in a mild case while communication may be expressive, stability may be staggering. Also, in the severe case, communication may be partially expressive and stability may be firm. It all depend on the make and personality of the individual living with autism.

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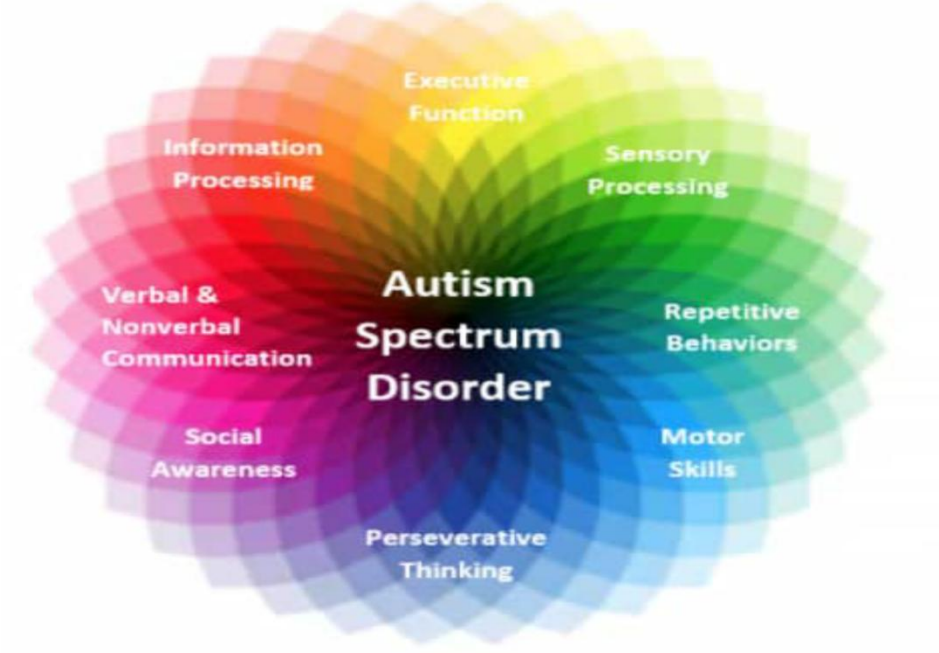

Figure 2.1a: A Typical Array of the Spectrum for ASD
Adopted from The Carmen B. Pingree Centre Resouruce (2020)

Prevalence of Autism Spectrum Disorder In Nigeria:

Autism spectrum disorder in Nigeria is received with a sense of denied perception on basis of religious beliefs. Even though religion was used as an excuse for this denial, it was discovered that most cases were hidden due to lack of funds to care for their loved child with autism. Another reason is the fear of sigmatisation, which evades the social status of the parents of ASD child. Statistics, (from PMC PubMed) show that in Nigeria, Southwest records 2.3% & 34.5% of 2,320 cases respectively in urban & rural settings, Southeast 11.4% and over 50% of the case is prevalent in Northern region Nigeria. This report corroborates the findings in this study as 58.3% of the 60 ASD participants are from Northcentral. Although many of the million cases that are registered are yet to be diagnosed using the standard DSM-5. Studies also reported that majority of the cases identified in Nigeria are males and without diagnosis. Again, this assertion is confirmed in this study as 80% of 60 ASD participants are males and the remaining 20% are female. Some of the cases are observed with non-verbal, hyperactive sensual behaviour – inflicting harmful objects on self and self-isolation, this level of severity observed are more in female than male[44]. While some showed prompt intellectual display in number reasoning and critical associations, others hide themselves, shielding away from the noisy surrounding. Even though more male are diagnosed with ASD, female ASD who are observed with seemingly severe symptoms, are recorded as being better at responding to activities, due to the structure of the brain formation[47]. This study received a systematic flow in the reponse shown by female then male. It confirms the assertion that female ASD learners are more sociable and responsive to social interaction than male[45].

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A prevalence rate of 0.08%, which shows a low recorded rate in clinical records of attendance, for registered cases was recorded[48]. This transcend the school's record of 1 to 10 learners of ASD cases are admitted in most "so called" inclusive schools, of which male learners dominate the admission list as against the female learners[39]. Many of the inclusive schools were observed to practice segregation or exclusion, due to lack of adequate procedural knowledge required to run the teaching learning procedures[35].

In a mental hospital clinic setting in South-eastern Nigeria, it was recorded that a prevalence of 0.8% for ASD among a total of 393 children attending the clinic over a one-year period[49]. This falls between more males than female. In this study, only male ASD participants are recorded in this region. It was observed that the level of cognition identified among these ASD male learners are high irrespective of the severities and social status.

Southwestern Nigeria documented a prevalence of 2.3% for ASD among 2,320 new cases seen at child neurology and psychiatric clinics over a six-year period[50]. In recent studies, this study inclusive, it was observed that male ASD learners are more than female learners. It was also observed that female ASD learners participated better during AFLAT activities (strategies) than the male. After the Northcentral prevalence in this study, Southwest is next with 16.7%. This is an indication of increased rate of prevalence in the region when compared with past reports[48]. This report gives a clarion call to the need for preventative measures to be put in place where possible in other to prevent more cases.

Prevalence of ASD among children with intellectual disabilities or neuron-developmental problems.

Prevalence of ASD among 44 children with intellectual disabilities in a privately-owned special school for children with neuron-developmental disabilities in South-eastern Nigeria

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was recorded to be 11.4%. The same group of children under the age of three years were screened through the National Program on Immunization (NPI) in Lagos State, Southwestern Nigeria, where a documented prevalence of 14.8% for ASD among a group of children identified as having a neuron-developmental delay[51]. In a community-based sample of 85 children with neuron-developmental problems documented a prevalence of 34.5% for ASD in Lagos State, Southwestern Nigeria[40]. The indication of this shows a prevalence occurrence of neuro-developmental disorders in southwest as against southeast Nigeria. This study revealed a prevalence of 10% to 16% ASD prevalence of ASD cases among the intellectual disabilities categories in the representative regions covered.

Prevalence of ASD Inclusive Schools.

In a school-based epidemiological study conducted among mainstream elementary and secondary schools in South-eastern Nigeria, a prevalence of ASD to be 2.9% of 2320, which is about 67 children between the ages of 3 and 18 years, twenty-one (21) children fulfilled the criteria for autism giving a prevalence, with a significant association between age in categories (fishers exact test, p = 0.013) and social class (p=0.033) who are of the urban and sub-urban areas[52]. In this study, only 10% of the sample hails from southeast out of 60 children identified with ASD, in urban location.

Conditions and Symptoms of Autism Spectrum Disorders:

It is important to note that learners with autism spectrum disorders experience variations in problems basically with social communication and interaction, restricted or repetitive behaviour or interest and other associated symptoms that are usually referred to comorbidity association symptoms[53]. This comorbidity implies an association of one or more other

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conditions that are exhibited alongside the symptoms or characteristic features of autism spectrum disorder.

Social Communication and Interaction:

This is a condition of uncoordinated interaction or communication skills. This condition can be really challenging for ASD as they are characterised by inability to attach deductive or inferential meaning to concepts. This inability makes the interpretation of certain ideas difficult, as they are only able to give literal meaning to whatever they hear. For instance; for some levels of ASD, taking to more than one instruction at a given interaction may be difficult to process, express and respond to. Such communication in this regard becomes impaired as they are unable to understand which is required before the order, due to the interference in sensory processing units in their brain[54]. Often times, it is recommended that information be given with one instruction at a time and also, time should be given for them to process, express and respond to the information, up to the point of mastery before engaging them with another. Some of the observed actions of social communication and social interaction characteristics seen in ASD learners are:

1. Avoids or does not keep eye contact.

2. Does not respond to name by 9 months of age.

3. Does not show facial expressions like happy, sad, angry, and surprised by 9 months of age.

4. Does not play simple interactive games like kick-a-ball or throw soft toys around or even feel the need to connect with such toys by the time they are a year old.

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5. Uses few or no gestures by 12 months of age (for example, does not wave, smile or giggle).

6. Does not share interests with others by 15 months of age (for example, shows you an object that they like).

7. Does not point to show you something interesting by 18 months of age.

8. Does not notice when others are hurt or upset by 24 months of age.

9. Does not notice other children and join them in play by 36 months of age.

10. Does not play pretend games – like try to be something else, like a teacher or mum or dad, during play by 48 months of age.

11. Does not sing, dance, or act for you by 60 months of age[53].

These are basically expected standards, however, there had been individual testimonies where none of these characteristics were evident in a child until 2-years of age or even sometimes 3-years of age[55].

Restricted or Repetitive Behaviours or Interests:

This symptom is observed as an isolated show of gestures[53]. The learners living with autism may be seen alone in quiet places; shaking, rocking, hitting an object or even hitting themselves (inflicting harmful incisions, cuts or scratches on themselves). Some of the observed actions here would include:

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i. Lines up toys or other objects and gets upset when order is changes.

ii. Repeats words or phrases over and over (called echolalia).

iii. Plays with toys the same way every time.

iv. Is focused on parts of objects (for example, wheels).

v. Gets upset by minor changes.

vi. Has obsessive interests.

vii. Must follow certain routines.

viii. Flaps hands, rocks body, or spins self in circles.

ix. Has unusual reactions to the way things sound, smell, taste, look, or feel.

2.1.9 Associated Cases of Autism Spectrum Disorder

Managing Comorbidity

These are associated symptoms that results due the extreme effect of discomforts that are experienced. Most learners living with ASD have other related characteristics. These might include; delayed language skills, delayed movement skills, delayed cognitive or learning skills, hyperactive, impulsive, and/or inattentive behaviour (Attention Deficit Disorder -ADD or ADHD Attention Deficit Hyperactive Disorder), epilepsy or seizure disorder, unusual eating and sleeping habits, gastrointestinal issues (for example, constipation), unusual mood or emotional reactions, anxiety, stress, or excessive worry and lack of fear or more fear than expected. It is important to note that some of the learners with ASD may not have all or any of the behaviours listed as examples here, due to divergence in the sensory associations[54].

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Managing Autism Spectrum Disorder and Procedures:

The discovery of the conditions associated with autism begin from birth through the prenatal and postnatal visitation and observations. Although there had been pre-notions about a child being autistic that are based on possibility of factors such as parental age, environmental variance and the likes. These are assumptions with little theoretical evidence of possible contract of the condition. Researches have proven an associated discovery of the condition with neuro-genetic and developmental series of clinically associated records from birth. In this regard, it can be said that the first point of call for the discovery of autism conditions is the medical institution through the neuro-paediatricians. The Neuro-paediatricians conduct an observed diagnosis of the disorder, after which they are recommended for a clinical assessment. The clinical assessment takes a series of periodical observation in order to ascertain the level of severity of the condition and a report is issued from the outcome of the assessment[55].

The Need for Early Intervention:

Autism Spectrum Disorder may sometimes not be evident early in a child until about 18 – 24 months and this may sometimes be triggered by simple routine checks or vaccines received during some of the natal visits. It is usually advised that regular routine check-up be made, so that where the condition lies, it can be diagnosed early, and as early as by 2-years of age by the experienced professional, whose diagnosis is considered reliable[55]. In advanced countries, certain criteria are set in place by medical practitioners as guided recommendations for all children to be screened for developmental delays and disabilities during the child's visits early in life. By so doing, when detected early, it makes it easier for treatment to commence timely.

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The American Academy of Paediatrics (AAP) recommends that all children be screened for developmental delays and disabilities during regular well-child doctor visits (a special programme set for this purpose) at ages; 9 months, 18 months & 30 months[53]. An additional screening is highly recommended for any child who is at high risk of the developmental problems because of preterm birth or low birth weight. High risk cases would include cases due to preterm births, low birth weights or having sibling or parents living with autism. The flow chart below shows an account of the screening part and recommended treatment options for positive and negative diagnosis[53].

Selecting a Screening Tool:

When selecting a developmental screening tool, the following guides are taken into consideration[53]:

a. Domain(s) or areas that the Screening Tool Covers. What are the questions that need to be answered? What types of delays or conditions do you want to detect?
b. Psychometric Properties. These affect the overall ability of the test to do what it is meant to do i.e. the purpose or aim of the test.
c. The sensitivity of a screening tool is the probability that it will correctly identify children who exhibit developmental delays or disorders.
d. The specificity of a screening tool is the probability that it will correctly identify children who are developing normally.
e. Characteristics of the Child. For example, age and presence of risk factors. Setting in which the Screening Tool will be administered.

   Will the tool be used in a physician's office, day-care setting, or community setting?

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Screening can be performed by professionals, such as medical practitioners or education practitioners or by trained paraprofessionals, such as occupation therapist, speech pathologist, physiotherapist, clinical psychologist and others, which may be required for specific symptoms observed.

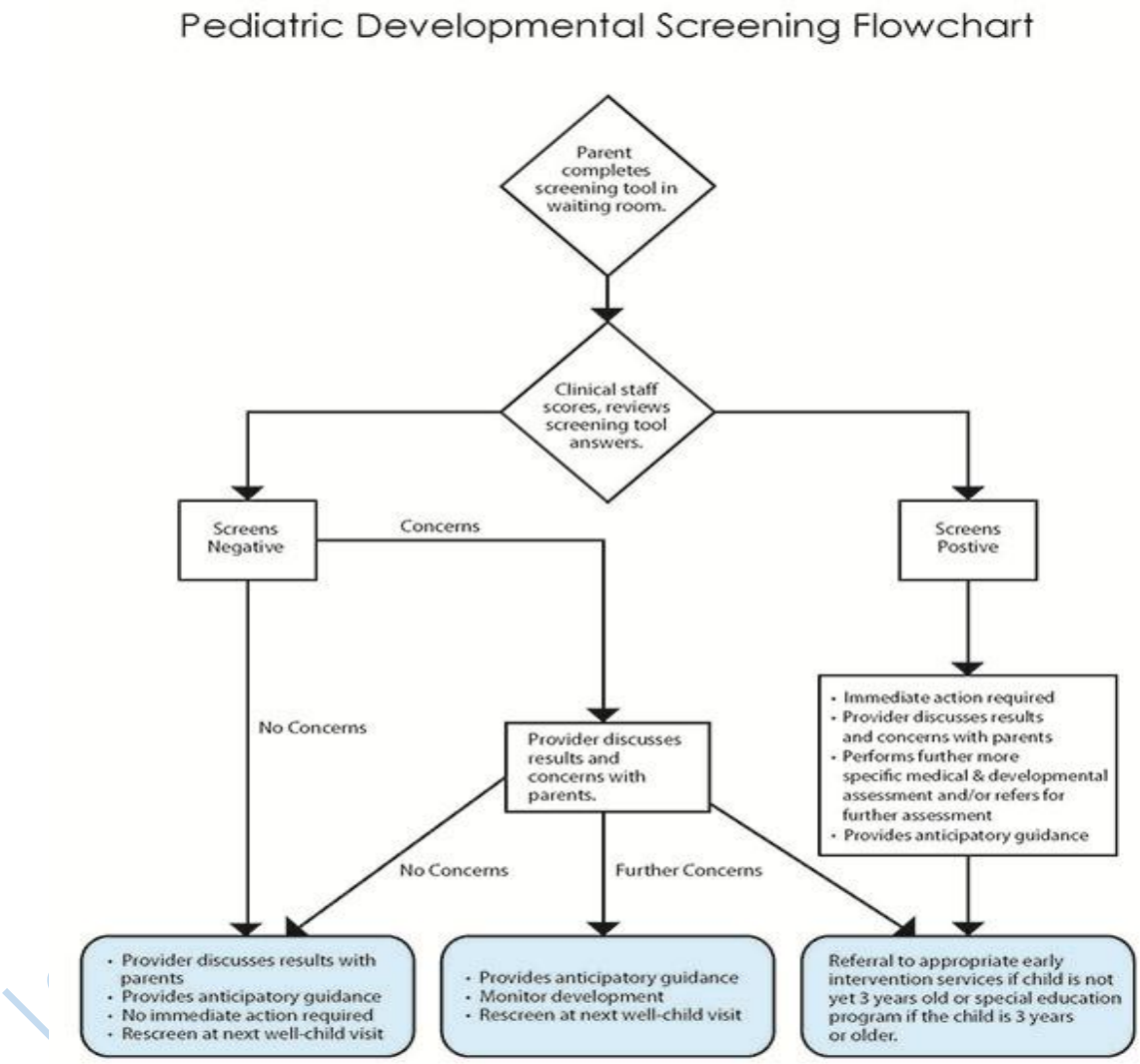

Figure 2.1b: Paediatrics Developmental Screening Flowchart
Adopted from United States Centre for Disease Control and Prevention (2016)

Types of Screening Tools:

There are many different developmental screening tools, which are adopted for medical and educational purposes. List below are tools adopted for general developmental purposes and for autism[53]:

i. Ages and Stages Questionnaires (ASQ):

   This is a general developmental screening tool. Parent-completed questionnaire; series of 19 age-specific questionnaires screening communication, gross motor, fine motor, problem-solving, and personal adaptive skills; results in a pass/fail score for domains.

ii. Communication and Symbolic Behaviour Scales (CSBS): Standardised tool for screening of communication and symbolic abilities up to the 24-month level; the Infant Toddler Checklist is a 1-page, parent-completed screening tool.

iii. Parents' Evaluation of Developmental Status (PEDS): This is a general developmental screening tool. Parent-interview form; screens for developmental and behavioural problems needing further evaluation; single response form used for all ages; may be useful as a surveillance tool.

iv. Modified Checklist for Autism in Toddlers (MCHAT): Parent-completed questionnaire designed to identify children at risk for autism in the general population.

v. Screening Tool for Autism in Toddlers and Young Children (STAT-YC): This is an interactive screening tool designed for children when developmental concerns are suspected. It consists of 12 activities assessing play, communication, and imitation skills and takes 20 minutes to administer.

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2.1.10 Diagnostic and Statistical Manual of Mental Disorder-V (DSM-5):

This is the standard tool that is currently being recommended for the diagnosis of ASD. Although INDT-ASD tool, which is adopted in India was recently updated to incorporate the DSM-5 related changes for adoption in India, the basis of which is being validated to accommodate the reversed version of DSM-5, there has not been assertions of its generalisation and acceptability globally yet.

Diagnostic and Statistical Manual of Mental Disorder-V (DSM-5) Diagnostic Criteria:

In other to meet diagnostic criteria for ASD according to DSM-5, a child must have persistent deficits in each of three areas of social communication and interaction, and at least two of four types of restricted, repetitive behaviours[53].

A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history, as stated, but are not limited to the underlisted:
    1. Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
    2. Deficits in nonverbal communicative behaviours used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.

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3. Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behaviour to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.

Specify current severity:

"Severity is based on social communication impairments and restricted, repetitive patterns of behaviour. For either criterion, severity is described in 3 levels: Level 3 – requires very substantial support, Level 2 – Requires substantial support, and Level 1 – requires support."[53]

B. Restricted, repetitive patterns of behaviour, interests, or activities, as manifested by at least two of the following, currently or by history:

1. Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypes, lining up toys or flipping objects, echolalia, idiosyncratic phrases).
2. Insistence on sameness, inflexible adherence to routines, or ritualised patterns of verbal or nonverbal behaviour (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day).
3. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverance interests).
4. Hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of the environment (e.g. apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

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Specify current severity:

"Severity is based on social communication impairments and restricted, repetitive patterns of behaviour. For either criterion, severity is described in 3 levels: Level 3 – requires very substantial support, Level 2 – Requires substantial support, and Level 1 – requires support."[53]

C. Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities, or may be masked by learned strategies in later life).

D. Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.

E. These disturbances are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay. Intellectual disability and autism spectrum disorder frequently co-occur; to make comorbidity diagnoses of autism spectrum disorder and intellectual disability, social communication should be below that expected for general developmental level.

Selected examples of diagnostic tools:

1. Autism Diagnosis Interview – Revised (ADI-R):

   A clinical diagnostic instrument for assessing autism in children and adults. The instrument focuses on behaviour in three main areas: reciprocal social interaction; communication and language; and restricted and repetitive, stereotyped interests and behaviours. The ADI-R is appropriate for children and adults with mental ages about 18 months and above.

2. Autism Diagnostic Observation Schedule – Generic (ADOS-G):

   A semi-structured, standardised assessment of social interaction, communication, play, and imaginative use of materials for individuals suspected of having ASD. The

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observational schedule consists of four 30-minute modules, each designed to be administered to different individuals according to their level of expressive language.

3. Childhood Autism Rating Scale (CARS):

   Brief assessment suitable for use with any child over 2 years of age. CARS include items drawn from five prominent systems for diagnosing autism; each item covers a particular characteristic, ability, or behaviour.

4. Gilliam Autism Rating Scale – Second Edition (GARS-2):

   Assists teachers, parents, and clinicians in identifying and diagnosing autism in individuals ages 3 through 22. It also helps estimate the severity of the child's disorder.

In addition to the tools above, the American Psychiatric Association's Diagnostic and Statistical Manual, Fifth Edition (DSM-5) provides standardised criteria to help diagnose ASD.

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2.2 Theoretical Framework

The underlining theories reviewed in this study which are used to explain, and to support the identified concepts in these characteristics features are; Gestalt Learning theory of the mind perception, behaviour learning theory and the theory of cognitive functional connectivity. All these theories are wrapped up in the cognitive learning theories. The theories are reviewed as a result of the link that predisposes the channels exposed towards learning path for the learner

with ASD (Autism Spectrum Disorder. Some of whose features are observed and are reflected, while AFLAT assessment is in progress).

2.2.1 Gestalt Learning Theory of the Mind (ToM)'s perception:

The mind perception is the central information disseminating focal point for ASD[56]. The entire being of the learner with ASD has the mind at play. A great number of the actions of this category of learners are usually the outward responses from their perceptions, which bear the blurry uncoordinated signals received from their sensory lines.

The Gestalt Theory, pioneered by Max Wertheimer (1880-1943); Kurt Koffa (1886-1841) and Wolfgag Koher (1887-1967), all Germans had significant influence on the psychological sphere of Germany up until 1933. The literal meaning of Gestalt originated from the concept that part of an object being identified separately to have different characteristics as compared with the whole referred to as organised-whole[57]. For instance when an ASD learner describes a face in isolation as being; the shape and form of specified objects (eye, nose, lips, chin and others) using different characteristics description, in comparison to seeing the face as a whole with single characteristics. The reversed was the case projected in Gestalt has a perceptive focus on the belief that human consciousness cannot be broken down into elements. Such the Gestalt theory proposes that the operational principle of the brain is holistic, parallel and analog with self-organising tendencies that the whole is different from its parts. It refers to the form-forming capabilities of the senses, especially in respect to the visual recognition of the figure instead of a collection of lines and curves[58].

Another school of thought places Gestalt as law of simplicity or law of pragnanz (centre figure or configuration). This law states that every stimulus is perceived in its most simple form. This law is applied in this study, while introducing some complex concepts in Mathematics to the ASD learners, on Factors and Multiples. The law is also referred to as law of clarity is an

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applicable pathway for the implementation of AFLAT used for the academic assessment. It clarifies the perception of holistic views and accessible form of figures or concepts in a simplified form, such that the learner can relate with during the assessment and while teaching-learning instructional plan is going-on.

The Gestalt concept of perception was linked with human learning by many researchers including this study, thereby forming proposed principles of perceptual organisation of learning concepts, as it should and applicable to teaching-learning strategies. These principles includes; good forms, figure/ground, similarity, proximity, closure and continuity:

1. Good form is based on the premise that the initial experience or unit of perception forms a firm (driving vision) or force.
2. Principle of figure (ground discrimination) projects the perception of figure and the discrimination grounds as well as the aptitude to support with evidence on what can be seen.
3. Principle of proximity: This signifies closeness or togetherness. The mind of the ASD learner perceives this as grouped items with similar views. Such grouping items should be done in closely realistic forms or when imagined, should be presented in a more concrete form.
4. Principle of Similarity: This is good and it sees the mind's perception as that which is able to identify similar ideas or figures in abstract terms or concrete terms respectively.
5. Principle of closure: This Principle checks and observes the display of promptness of he mind to pick on missing details, irrespective of how tight the features may appear or no matter how hidden the cases may be. An ASD learner has the capability to pick on this during AFLAT assessment and/or during the teaching-learning activities.

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6. Principle of Continuity: This is perceived as viewing a single strand of information as an unbroken entity. Even when the information is broken and it requires connectivity. The ASD learner is seen to learn the path of continuity to include; learning to identify the instruction given by processing the information. Learning to identify, recall and act on the information received. Learning to know when to stop while performing the action from a given information. Thus, for ASD learner, instruction are given in simple form from single-cause to multi-causes and these are gradually increased until mastery is achieved.

The Gestalt theory somewhat connects with theory of the mind, where people are seen to be initiative dualist. This present the viewing the mind as ethereal-extremely delicate and light in a way that seems not to be of this world, which is distinct from the body[56]. In an experiment set to check the principles that guide reasoning and mind agents in autism spectrum disorder, the dualist reasoning is known to compromise of the theory of the mind. In the first three experiments conducted, the first result showed that people with ASD are likely to view psychological traits as embodied (that is as shown in a replica of the body) when compared with the control, where no object was presented. The second shows that people with ASD do not consider thoughts as disembodied; it was proven that ASD should promote nativism, that is innate mental capacities of acquiring knowledge rather than by learning-since the perception of psyche promotes embodied innateness. However, for the neurotypicals (the regular learners), difficulties with the mind's theory correlates with physical perspectives of the being results here. This result showed that ASD reduces the effect of dualist reasoning, which links to the mind and the body. The mind perception is the central information disseminating focal point for ASD.

Gestalt's Engram Concept of Memory Trace:

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This concept viewed the dynamic nature of memory processing for any individual's personality as also for the ASD's personality. The Koffka's analysis and proposal on learning and memory using the sound perception was used to explain this concept[59]. The theory approaches the aspects of memory in terms of; formation, storage and retrieval from the mind. However, the contrary objections revealed in this by, showed the place of the emparistic-which is the experimentalist who intentionally or unintentionally subscribe to simple associated views (mechanistic) that revealed that whether in perception or in memory, the stimuli are not studied in their wholeness but in fragments – decomposed form of the existing information[59]. The logic attached to this reasoning was based on the opinion that the processing of successive sequences of sound information rely on both perception and memory-related functions. This was determined using the processing of sounds in rhythmic form. The formation of Gestalt's observation was due to the fact that when the musical notes were compared simultaneously, successive (visual, auditory, tactile and other organs) formations involve more intensive use of memory process, that is working with memory. Such, having varied perception, which are borne out of the fact that in music and indeed language, the last note in melody and task word in a sentence does not only arise from the preceding note/word, but that it is already in the music or language sentence[59].

Another important area of focus is the auditory[59]. Here, the musical tonic solfa – do re mi fa so la ti... where it was identified that what was heard is holistic melody, which is usually not a simple result in sequential. It was observed that during transition, of say, mi to fa, a hooking sound interferes, which will naturally not become successive[59].

The Brain as Perception, Memory Processing Agent:

In this concept, an experiment where participants were presented with rhythmic light pulse appearing in the centre of a screen was performed. The study examines how the brain processes

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perception and memory, particularly in the context of temporal flow. Koffka's experiment involved participants observing the rhythmic light pulses on a screen and later replicating the rhythm through tapping. The findings suggested that perceptual and mnemonic time are processed in different brain regions—while spatial flow is re-experienced in memory, temporal flow is conceptually reconstructed rather than phenomenally replayed[59].

This experiment was later adapted, during the demonstration of academic aptitude assessment procedure using the AFLAT. It replaces visual stimuli with sound therapy (music). The study focused on learners with Autism Spectrum Disorder (ASD), comparing them with neurotypical learners as the controls entity. The results indicated that neurotypical participants struggled with rhythm replication, while some ASD learners continued with the procedure without difficulty. This suggests that ASD learners exhibit a form of perceptual and memory regularity that influences their learning process[60]. However, exceptions were noted, particularly with severe ASD cases, where variations in sensory processing affected rhythm retention. The study highlights the role of structured information grouping in predicting working memory capacity, which enables the ASD learners access, retain, process and respond to information.

Information Processing Rate and Response:

This accounts for the rate at which the learners accepts information into their central processing units in the brain, encodes and decode the information in readiness for interpretation. What the teacher needs to understand, is the fact that information need to be clearly stated, given time for processing before expecting a response. In revelatory study of how memories can last longer, given that, long term memories occurs in stages of long and short term memories, based on sensories than physical perscerptions[61]. Responses on the other hand aids in determining the level of understanding and application of the knowledge acquired. It also give insight into

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how much learning had occurred, thereby helping the teacher to determine the point or level of where information that is received during a lesson had been bridged. This revelation can help the teacher determine the areas, where the learner would require help for misunderstood information.

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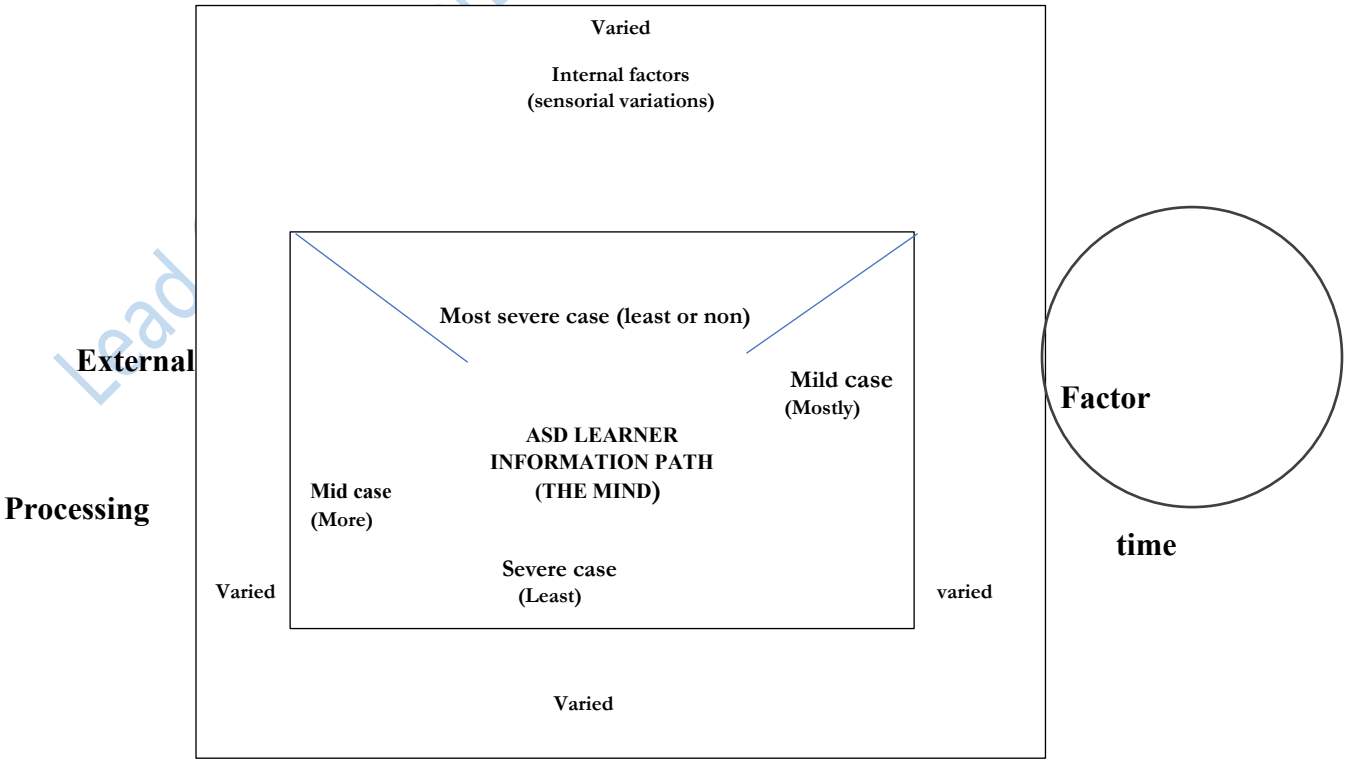

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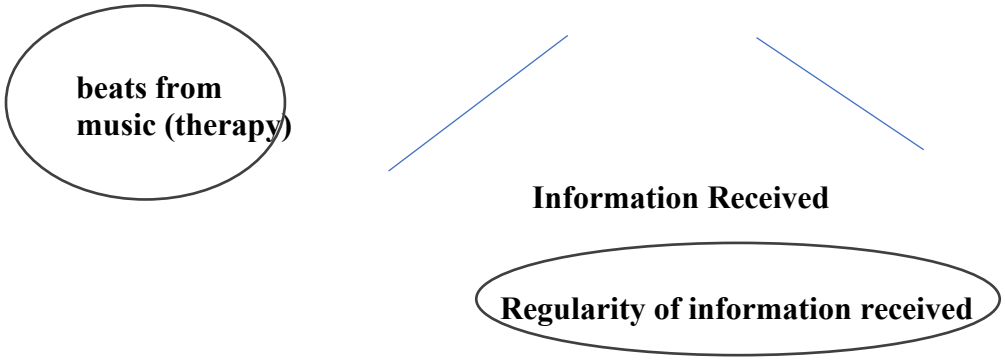

Figure 2.2a: Model of Information Processing Path
Outcome: Access, Retain, Process & Respond to Information

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2.2.2 Cognitive Functional Connectivity Theory in ASD

Learning in itself is conditioned to be associated with the state of the mind, which is a direct result of environmental influences[62]. Many people's actions are borne out of the experiences they had from their immediate environment. The influences from the environment in turn have reciprocating effect on their responses or reactions, such that affect the kind of behaviour displayed.

This explains the cognitive functions that are directly related to interactions between the brain's functional networks. It gives an insight into how the ASD learners might experience the world and respond in the way they do under the condition that they experience. The concept of cognition for ASD learners help in solving the "why" riddle and the "how" best to adapt, which reduces the anxiety and the support participation in the set learning programme[68].

The cognitive functional connectivity theory in ASD describes the principles of cognition (being able to think and display of intellectual activities) and ability to function (applying abstracts or imaginative concepts in real-life situations. The cognitive theory in autism spectrum disorder highlights six (6) elements of thinking ability, some of which are linked with mind perception, soft skills application and concentration skills. These are; mind perceptions that is developed from joint attention and an understanding of abtracts experience and actions. Executive functioning exhibits a more complex approach to the application concepts by engaging in sequential organisation of thoughts and action, as well as being in control of impulses. For ASD learner, central coherence limits the ability to focus on the context of statement or the bigger picture of simple action. Here, attention are best focused on details and fixated on gray areas of specific action or content. The element of context blindness limits their ability to focus on obvious situation and also combine the sensory receiption of information into unified context in action or experience, their sense of judgement usually depicts the initial

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thought perceived or seen in a situation or action. Double empathy is the case of misplacing or misunderstanding intentions. When receiving information, there is the tencdency for intentions to be misplaced or misunderstood, such information should be communicated in the most simple and direct approach to ensure that ASD learner understand the expectations required. Finally is the element of montropic attention, which focuses ASD's attention on single action at a time. Any intention to shift this will be fruitless and it may attract discomforting situation that can lead to tantrum throwing by the ASD victim.

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Table 2.2a: Cognitive Theory in Autism Spectrum Disorder.
Adopted from Marion Rutherford and Lorna Johnston 2019

Cognitive Theories: Autism					
Theory of Mind	Executive Function	Weak Central Coherence	Context Blindness	Double Empathy Problem	Monotropism
•Develops from Joint attention •Understanding other people's thoughts feelings, beliefs and experiences •Taking account of this understanding in your own actions	•The ability to: •Plan, organise and sequence thoughts and actions •Control our impulses	•The tendency to focus on details, rather than the 'big picture' which affects the person's ability to consider context	•Challenge in processing or using all of the information from visual, auditory, Historical and social contexts to make sense of experiences in the moment •Missing the 'obvious'	•A mutual challenge of misunderstanding intentions, motivations or communication between autistic and non-autistic people	•A tendency to focus attention on one thing at a time, with difficulty shifting attention and processing mutliple stimuli which might support understanding

The summary of the various perspective of the cognitive theory related to the ASD learner are as follows:

Observation Learning in ASDs

The child with ASD is limited in learning by several factors, top of which is the incoherant assocations of environmental activities that interfaces with various connections. These activities make it impossible or close to being impossible for ASD victims to comprehend what is happening around them. This leads to a distortion in their innate coresponding elements that aid in activities such as; having clear perception of a given situation, ability to recall, remember and even process information that they receive or they want to share. These situation is responsible for their inabilities to relate as expected, they thereby leading a few of them (who can perceive) to imitate some behaviours during the teaching-learning process. While others may just sit in the classroom, actionless and clueless about what is happening around them. This is why the need is required for prompter who can aid in guiding their learning and also maintain sustainance for long. This action by the prompter required is referred to as instructional intervention for the ASD learner.

There are expected skills associated with observational learning that the child with ASD is deficient in, these are; discrimination ability, attention and imitation on initiation of social interaction. The ASD learner, in most cases express lack of interest that is restricted interest, which may affect their attention. Observational learning strategy increases the functional ability and it does not necessarily depend on explicit instruction, but makes room for independence in functionality, which can be explained in the functional connectivity theory of the brain network.

Perspective Learning Theory

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This is used to explain how the internal and external factors influence the individual's mental processes to supplement learning, as drawn from the theory, which was initiated[63]. That is how the brain processes information, the human brain functions in three (3) distinct stages, which are encoding, storage and retrieval[64]. Cognition refers to the ability of the brain's mental processes to absorb and retain information through experience, senses and thoughts[65]. Cognitive learning is therefore an active style of knowledge acquisition that focused on improving the intellectual capabilities by maximizing the brain's potential. This process makes it easier to connect new information with existing ideas thus expanding and deepening memory and retention of the learners'capabilities. The brain context not only with memory and retention, but also thoughts processes, attention/concentration aptitude, assimilation, problem-solving via critical thinking exposure, perception and others[65].

The components of cognitive learning are; comprehension, memory and application. While comprehension exposes the ethical knowledge acquisition process that aids the learners' understanding of the underlining purpose of specific instruction or the course of study, the memory aids in improving the ability to relate new knowledge with previous information or experience and the cognitive learning strategies aids in the application of new information or skills acquired via critical thinking approaches[65].

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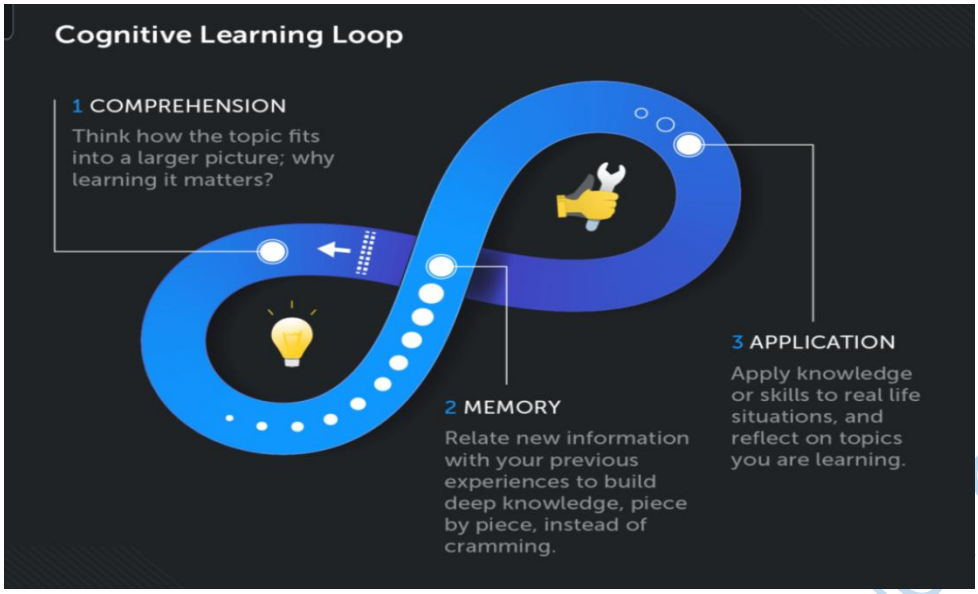

Figure 2.2b: Cognitive Learning Loop:
Adopted from: Valamis.com 2024

Principles of Cognitive Learning Theory:

The underlining path of the cognitive learning theory is how the learners' minds receive, organise, save and retrieve information. In a classroom, the theory offers an advantageous learning environment that evolves through interactive mental activities that stimulate the thinking ability of the learners. That is when learners listen to thought provoking questions, it channels their brains to switch beyond their current information levels to stored up information, as well as the ability to retrieve such information for appropriate use. This theory views learning as the application of critical thinking and experiences. Learning is usually not approached through memorisation of information, which is referred to as passive learning[65]. Cognition is an essential part of academic learning because it tends to enable learners understand, think about, integrate and process new information[65]. The new information adds to familiar knowledge in the memory of the learner. There are major principles of cognition for effective classroom learning. These are;

1. Learning must be purposeful and focused.

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2. Learning must be self-directed.
3. Learning must come from analysis to discovery, organising information into schemes to help learners build conceptual models.
4. Long-term memory is enhanced to enable learners to organise and encode learning materials. The content of the curriculum must be well-sequenced and understood in the context of the bigger picture. Such cognitive learning is the acquisition of information that concentrate on helping learners learn how to maximise their mental abilities.
5. Cognitive learning makes it easier for learners to connect new information with previous understanding thus spurring their retention and memory capacities. It involves long-lasting constructive and active involvement of learners in the practice of new knowledge.
6. The use of information technological devices makes learning easier and faster. It reduces excessive thinking ability and helps to regulate self-decision towards anticipated path of learning.

Cognitive Learning Strategies:

The cognitive learning theory has its classroom strategic mode and they include: the application of visualisation to enhance recall and basic understaning of concepts. Showing active participation during classroom interaction, hands-on activities and justifying their thoughts by helping the learners to understand and explore the connections between different ideas, asking learners for reflections of stored up knowledge[66]. In all, a captured evaluative view of how the learners' learning can be stratified was modeled and it is presented[67].

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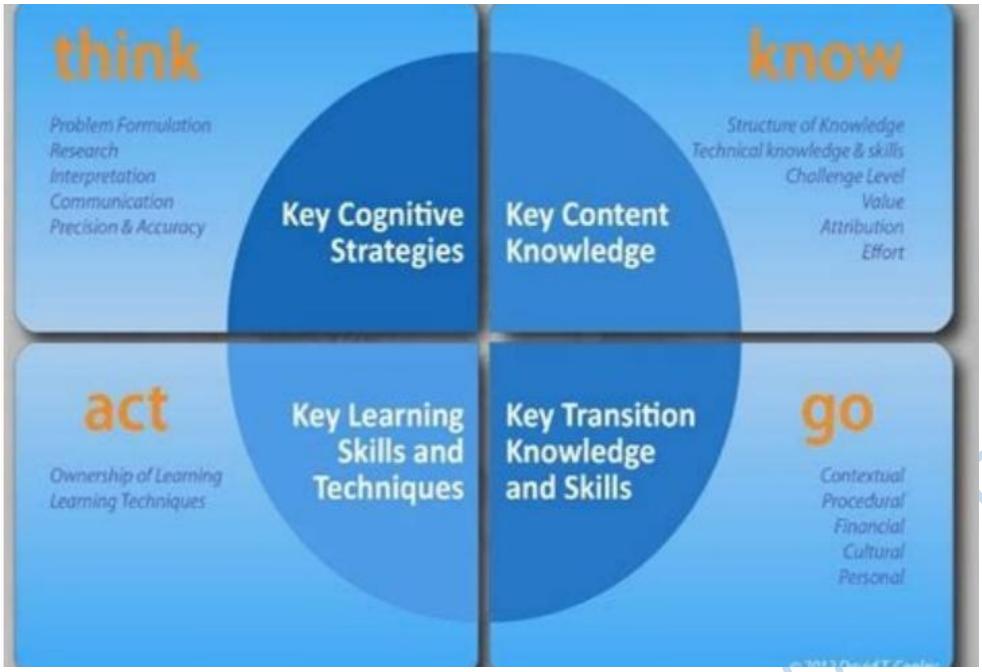

Figure 2.2c: The link of the Cognitive Learning Theory Principles and Strategies Adopted from: Valamis.com 2024

In like manner, the highlights of 5E model of instruction, where it was expected that the learners should have full participation as: Engage, Explore, Explain, Elaborate and Evaluate[65]. The teacher who is the modifier of instructional processes gives the learners certain task that should lead to new learning, he/she must engage the learners' thoughts in such a way that it will insight their current knowledge and experience to think and work, but these knowledge and experience may not be sufficient in meeting the required task's expectations, in this way the learners become engaged with their new learning.

The next stage, which is the exploring stage, which consists of guided inquiry activity, where the teacher acts as the facilitator. The processes provide opportunities for the learners to review alternative ideas and build their own logical explanations. Here they investigate by asking questions, share observations, suggestions, explanation and discuss their interpretations.

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The next is explain, which is achieved through presentation. The learners show certain degree of understanding of the new information and its relevance to the explorational practices, which can fit into the bigger picture for adaption.

The elaborate level is the activity-based stage that requires that the learners apply the new concepts and their procedures to solving new problems or existing ones. Here the new information will have the opportunity to be proven as appropriate for the purpose it was searched for. Finally is the evaluation level where the new knowledge is assessed through activity that challenges the structure of their understanding.

The Functional Connectivity in Autism Spectrum Disorder:

This theory explains the modal structure connections between the distinct region of the brain and the coordinated functional activities within networks of the different brain regions[63]. Sometimes, the regions may or may not share direct structural connections, such both structure if the brain and functional connectivity are interrelated. The interrelation is so expedient in that any attention in structure can affect the functional coordination within the brain networks thereby atltering the functional activities. Such the measure of how tightly synchronised two or more brain areas are is referred to as connectivity, that is the degree of functionality[70]. Thus for connectivity theory of autism, communication, between the regions is atypical – i.e. not a representation of the regular or expected, but the complexity is still nearing clarity as studies are still being conducted to reveal the diverse nature in the existence of this occurrence for specific autism cases[70].

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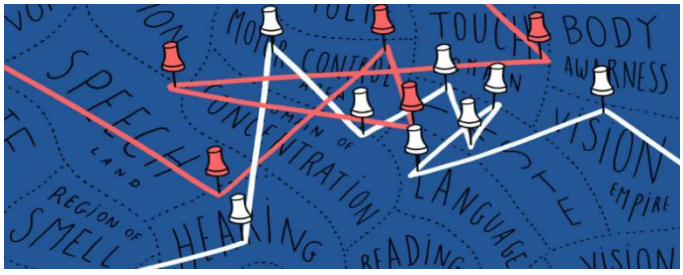

Figure 2.2d: The Brain Network in the Connectivity Theory (illustrated by Laurene Boglio in Rachel Zamzow 2020)

The brain is characterised by underconnectivity between distinct regions of overconnectivity between neighbouring, ones, while others show differences in connectivity within certain brain networks[70]. The underconnectivity attributes the disorder to reduced anatomical and functional connectivity between the frontal cortex and more posterior areas of the brain. Underconnectivity compromises the brains ability to communicate information between the frontal cortex – brain area involved in higher order social, language, executive processes and abstract thoughts or reasoning. This affects behavioral performance in any of the type of actions where thinking is involved, i.e. when substantial participation of frontal cortex is required. It also accounts a large number of diverse findings, such as the characteristics, social cognitive and language symptoms in autism. Each case of ASD is has a unique constellation of behaviour, experience and genetics. Another factor which affect connectivity and it's closely linked with teaching-learning operations is the age. Connectivity differs between adult and child with autism[70]. For instance studies have it that ASDs children have stronger connections than ASDs adults in some networks[71].

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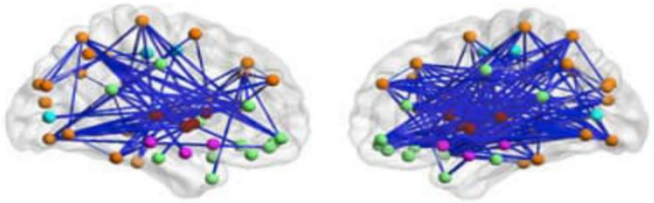

Figure 2.2e: Showing overly connected brain regions involved in sensory processing, emotion and motivation – which are tightly sychronised in children with autism – (right) than in adult in the (left) – (John P. Hegarty, Antonio Y. Hardan and Ralph-Axel Muller 2021)

2.2.3 Advance Taxonomy of Blooms Learning Theory

The 5E model can be related to Blooms' taxonomy of cognitive skills and learning outcome. Here the taxonomy was originally represented by six different domains of instructions which are; knowledge, comprehension, application, analysis, synthesis and evaluation[66]. The expansion in this taxonomy has led researchers to consider the affective domain in terms of the learners' values, interest, appreciation, attitude and feelings referred to Krathwohl's perspective of the taxonomy of affective domains of instructional activities[69].

Affective Domain of Learning

This is categorised as:

i. receiving, which is regarded as the lowest level of learning, it is referred to as the learner's willingness to attend to particular stimuli that is, classroom activities, some key word to use include-identify, choose, name, pay attention, sit, select and others in its regards;

ii. responding is the next category and it infers active participation of the learner, where learner reacts to certain ideas raised in the classroom. The higher level of this category can be seen in the instructional objectives that are usually classified as interest-based-

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seeking enjoyment of particular activity. Key words such as – respond, assist, confirm, recite, read, report, write and others are usually used here;

iii. valuing is another category concerned with the worth the learner attaches to a given object, phenomenon or behaviour. This is based on internalisation of a set of specified acceptable worth or importance attached to the object, phenomenon or behaviour. Words such as - complete, describe, differentiate, follow, initiate, join, justify, share and others are used here;

iv. organising is the fourth category, which is concerned with aligning, values, resolving conflicts and building an internally consistent value system – based on comparing, relating and synthesising value system, the outcome of which may lead to the development of new concepts, which recognise the need to take up certain form of responsibility. Words such as- adhere, alter, arrange, compare, combine, complete, change, order, prepare and so on;

v. finally the characterisation by value or value set is concerned with the aptitude that enable

the learner develop a value system that controls his/her behaviour for a sufficiently longer period. This behaviour and new life style can be pervasive, consistent and predictable. The major learning outcome here is that the behaviour is typical or characteristic evident of the learner. Words like- discriminate, display, influence, listen, practice, solve among others are the verb instructional expressions used here.

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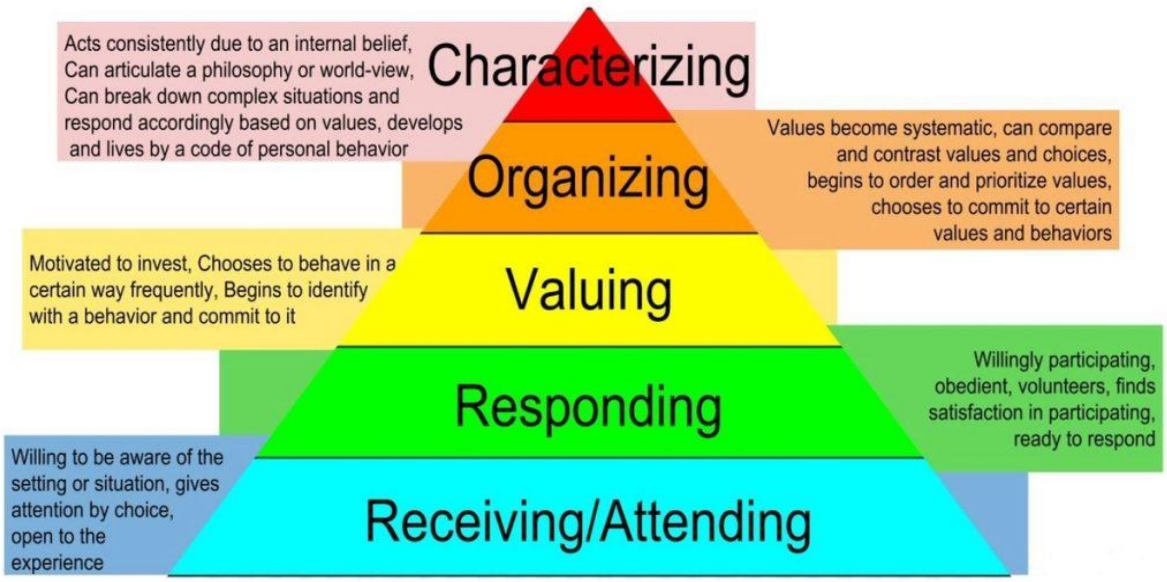

Figure 2.2f: Krathwohl's perspective of the taxonomy of affective domains of instructional activities
Adapted from Ahmad Gulzar (2021)

The Psychomotor Domain:

This considers varieties of motor skills; such as the development of physical fitness, dexterity-skills in performing of hands-on activities, agility-which checks for assertions, firmness and confidence at some point, using the pace walking activity for coordinating body control is also pivotal to AFLAT assessment[69]. The taxonomy is organised according to the degree of co-ordination, which includes involuntary responses and learnt capabilities, starting with simple reflexes and all the way to complex highly expressive movement. This requires coordination and precision-that is being exact and accurate as possible. The model levels set good criteria for the learners' perceptive abilities, diagnosis challenges and proposing appropriate exercises in physicals education class activities[69]. The levels of this taxonomy is arranged according to the degree of coordination, which includes involuntary responses as well as learnt capabilities. The simple reflexes movement to complex neuromuscular coordination are categorised as follows:

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a. Reflex movement: these are automatic reactions elicited, usually not learnt. Some ASD learners are prone to be effective level, while others would need series of lessons. When the former is identified, it serves as strength to apply in other areas where academics may be approach by. Key word to apply here are; stretch, flex, extend, straighten, stiffen, relax and others.

b. Fundamental movement: these are inherent movement patterns formed by a combination of reflex movements and they are the basis for complex skilled movements. For instance a combined movement in pace walking activity include; heads up, shoulder's high and walking a specified line, without missing your steps. It may involve walking to specified rhythm to increase the complexity of the action for an achieved purpose, where this may be applicable. The words associated include; crawl, slide, walk, grasp, jump, handle, support and others.

c. Perceptual Abilities: refers to being able to interpret various stimuli in such a way that enable the learner make adjustment to the environment through visual, auditory, kinesthetic or tactile discrimination. ASD learner, who is mild on the spectrum are able to coordinate appropriately on this level. A fairly good verbal communication is also an advantage in expressing their perceptions. Words like; catch, bounce, eat, write balance, bend, imagine are applied from memories to distinguish by touching and explore.

d. Physical Ability: refers to the need to endure, display strength, vigor and agility. This shows effective functioning of the body system. The AFLAT assessment uses this measure to check out on strenuous effort on some activities for a period of time. Word associated include increase, try, start, stop, move further, improve on and the likes.

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e. Skilled Movement: to attain this state, some degree of efficiency should have been attained as a result of constant practice and mastery. Such constant practice makes good mastery and skills.. associated words are; type, play, arrange the file, juggle, paint, and the likes.

f. Non-discursive communication: this is communication through bodily movement ranging from posture to gestures, creative movement, facial expression, act a part in a script and choreographic movements. Words likes stand, gesture, sit, perform and others are used to express the need for skillful display of mastered acts.

Table 2.2b : The Summary of Harrow's Taxonomy of Psychomotor Instructional Domain Adapted from Ahmad Gulzar (2021)

Reflex movements	• Reactions that are not learned, such as an involuntary reaction
Fundamental movements	• Basic movements such as walking, or grasping.
Perceptual abilities	• Response to stimuli such as visual and auditory.
Physical abilities (fitness)	• Stamina that must be developed for further development such as strength and agility.
Skilled movements	• Advanced learned movements as one would find in sports or acting
Non-discursive communication	• Use effective body language, such as gestures and facial expressions

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Each of these facets has broaden the teaching-learning processes and procedures and has provided differentiated approach to content deliveries in terms of individualised learning bearing the learners' abilities wrapped up as Visual, Audio and Kinetic – VAK.

A closer review of the 5E model would reveal an incorporation of one or more levels of Bloom's processes and in consideration with the learners' interwoven abilities displayed.

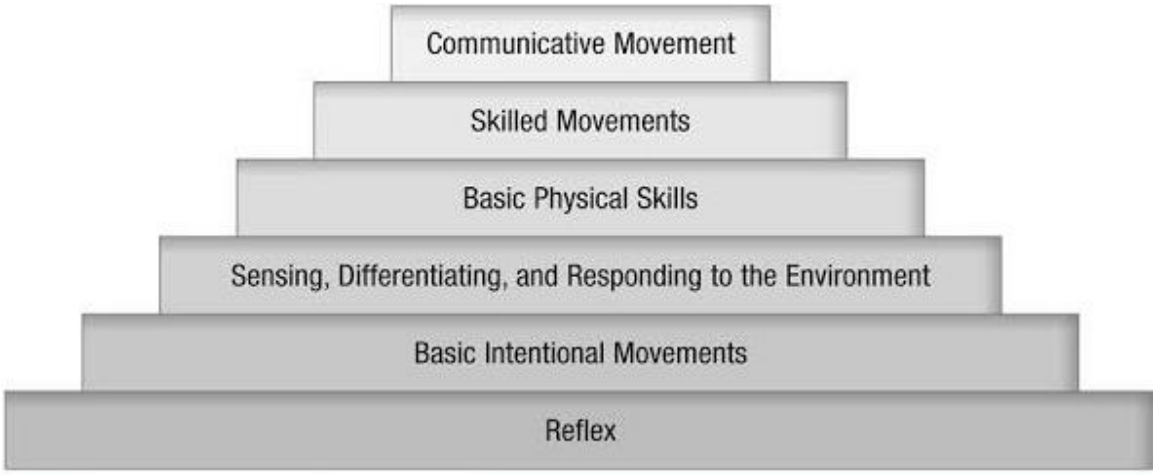

Figure 2.2g: Anita Harrow's Taxonomy of Psychomotor Instructional Domain Adapted from Ahmad Gulzar (2021)

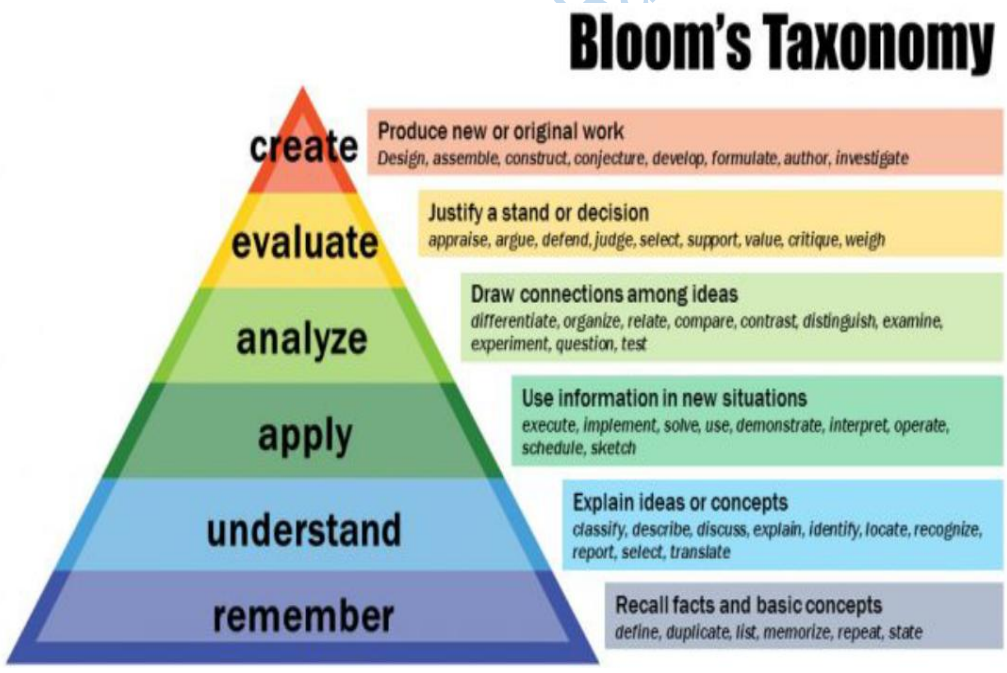

Figure 2.2h: Revised Bloom's Taxonomy of cognitive perspective (by Armstrong Patricia. 2010)

Practical Modelling of Blooms Taxonomy In Relation to Autism Cognitive Learning:

A practical model of the application of Bloom's taxonomy fits into the revised learning which all considered skills and abilities improvement except knowledge, which is seen as mandatory prerequisite for putting skills into practices, with the aid of disposed abilities.

The taxonomy was revised and made broad by expanding on the concepts and classifying same under the domains as they apply[67]. It includes six categories and multiple sub-categories:

a. Remember: recognising and recalling

b. Understand: interpreting, exemplifying, classifying, summarising, inferring, comparing, explaining

c. Apply: executing and implementing

d. Analyse: differentiating, organising, attributing

e. Evaluate: checking critiquing

f. Create: generating, planning, producing.

Such for knowledge: the following taxonomy was created:

i. Factual Knowledge: knowledge of terminology and specific details & elements

ii. Conceptual knowledge: knowledge of classification & categoroies, principles & generalisation and theories, models & structures.

iii. Procedural Knowledge: knowledge of subject-specifics, techniques & methods and knowledge of criteria to determine when appropriate procedures can be used.

iv. Metacognitive Knowledge: self-generated knowledge, intellectual thinkability of tasks at hand including appropriate contextual and conditional knowledge.

This taxonomy as be seen to be helpful when teaching both the neurotypical and the ASD learner in an inclusive classroom setting. The planned instruction could be adopt the following:

1. Organise learning objectives according to priortised options from simple to complex task to achieve.

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2. Planning and delivering the instructional content in the sequential simple and easily understood to the complex, which can build on simpler information to enable its understanding
3. Describing valid assessments that suits learners' learning.
4. Evaluating lessons and learning objectives.
5. Assuring that both instructions and assessments align.

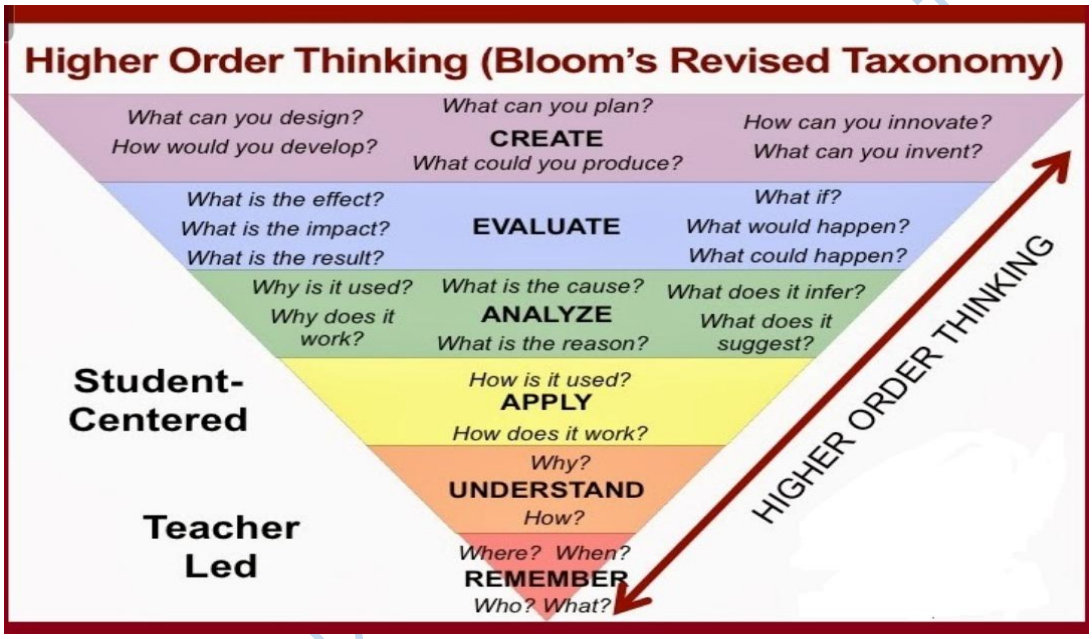

Figure 2.2i: Taxonomy of Teaching-Learning and Assessment
Revised Blooms Taxonomy (2019)

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2.3 Empirical Review:

2.3.1 Effect of AFLAT on Academic Achievement of ASD Learners

The intent of this study is to determine the main and the interaction effect of the applied procedural strategies of AFLAT practices on the academic achievement of ASD learners in Nigerian inclusive schools. This is so as to improve the academic achievement of ASD learners.

AFLAT is beyond the general test tools used for the regular academic assessment or tests purposes. The tool is used to determine individual change observed in an academic teaching-learning environment, where the strategies/methodologies, lesson activities and type of tests are considered. In any teaching-learning procedure, particularly those in inclusive schools, the procedures used in passing instruction or testing the learners with impairments, play important role in determining their levels of academic attainment and the path of learning achievement[72]. The latter being the type of strategies to adopt, which is based on the abilities displayed by individual ASD. Thus, the strategies for individual learner rather than group are what AFLAT seeks after in this study.

The fact that AFLAT is made for specific individuals, arises the need for it to have standard measures for determining the aim of its strategies and the effect on ASD bearing other factors

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that may either enhance or hinder its application. This will enable researchers and the users of AFLAT strategies, to meet up with its parametric measures required for standard checks despite their diversities observed in individual ASD learner or even in the neurotypicals when they are compared[73]. A comparative study of various learning strategies that can be adapted for ASD learners are reviewed in the empirical studies of tackling challenges that makes it difficult for ASD learners to achieve their maximum potentials in their academic achievement and social interactions, with the strategies aimed at reducing anxiety and distractions; and enhancing their focus levels[72]. The study mentioned the relevance of social skills in enhance effective learning. Skills such as; asking for help, avoiding distractions, following classroom rules, listening to others, taking turns, taking responsibility for one's behaviour and staying calm are revealed as being vital to enhance learning[72]. It is generally observed that social-skills are more prominent in female ASD than their male counterpart. This is because female ASD has higher-level of cognitive functioning in addition to social-skill[73]. This place them at a vintage level for interaction, which may necessarily not be logical during conversations. What AFLAT did was to consider each of these social skills, determine the levels of response to each of the skills, and applied a natural systematic practical intervention of instructions. By this, the instructions are modified to suit individual ASD's assimilation and response. The expected reaction or performance is also guide with systematic guide towards each performance, until the expected outcome or result is achieved. Further practices are given to give room for mastery and perfection, while performing the task. It is important to note that performance and achievement outcome is based on individual competence only.

While this experiment used computer assisted instruction (CAI) and the principles of Theory of the Mind abilities (capacity for emotional awareness, comprehension and control) as strategies for enhancing reading[74]. The study identified that ASD can acquire certain areas of

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learning using expressive learning technique. In a study set to measure the systematic learning on emotion recognition and emotion-related language comprehension, with 9 years old ASD learners shows better levels of progress on how teaching-learning process is improved by the acquisition of emotion-recognition abilities[72]. This principle of expressive learning technique was adopted by AFLAT using the natural situational occurrence within the ASD learner's learning environment, unlike the one recorded in the empirical study. It was observed that ASD learners in the local learning environment responded constructively to expressive techniques. This included non-verbal ASD learners.

Another key ability that AFLAT leveraged on in enhance academic strategies for ASD is the perception, recall, discrimination and diverse application of information. While the experience in this empirical study, interposed interpersonal awareness and empathy on emotional awareness and comprehension, AFLAT applied systematic or moderated approach of passing information. Instead of depending on computer Assisted Instructions, AFLAT applied situational/experiential instructions from real-life that allows ASD learner empathises directly with the task, event or situation. It allows the performance of the tasks and enables the ASD learner to take personal decisions on which approach to decide on while trying to arrive at the required results. This application did not tracked CAI, because there are contents of studies that adopted CAI strategies even with AFLAT strategies. In an experiment conducted to determine the effectiveness of a program and colouring graphics on a task, with ASD learner, CAI had strategy has better participation than colouring graphics. This result leads credence to the claims that ASD spends less time engaging in stereotypical behaviour, when they are involved in highly preferred tasked[73]. For activities involving colours, AFLAT adapted puzzles; using creation and synthesis to build and construct information. With this experiment, it reveals that for every impaired condition, an intervention is set in place that can strategically

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and systematically be applied to suit the need of the ASD case that the teacher is confronted with.

2.3.2 Academic Functional Learning Aptitude Test Strategies and Teachers Effectiveness with ASD Academic Achievement

This empirical review is focused on the teachers in inclusive schools. The teachers who are engaged with ASD learners and the coping mechanism aimed at assisting the ASD learners' academic achievement. The teachers' sense of self-efficacy is seen as main factor in the successful implementation of teaching-learning strategies that can improve academic achievement in inclusive classroom setting[74]. Bandura's social cognitive theory's proinciple was adopted in considering the teaching strategies that are necessary for ASD learners' holistic well-being. These include; developing intrapersonal strength, promoting self-regulation and increasing motivation[75]. The study reveals that even though the teachers understand that these factors are essential elements for achieving the desired change required for ASD learners achievement in academics and general social learning, the teachers are not well-capacitated to implement apply these factors in order to create flexible teaching learning strategies that will be required for supporting ASD learners[74]. These undesirable nature in swift performance on the teachers' part is attributed to non-chalant drive for professional development and change in upgrading the skills required, to move them from their comfort zone of conventional teaching strategies, that group all the learners as a single entity where instructions given can be understood as soon as they are given. It does not take the learners VAK (visual auditory and kinetics) learning style into consideration. Thus, a differientated teaching-learning strategies

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and approaches are advised to keep ASD learners engaged, learning different skills as these yeild constructive results[74].

In approaching the teachers skills, with AFLAT intervention, it was a case of individualised approach for each ASD[75]. The teachers were made to understand, by identifying and discussing the unique characteristics nature that they had observed in the ASD learner in their classroom. Has each trait was mentioned, the researcher explained the reason for such display of traits and profer intervention for submounting such trait, in order to bring the ASD learner to learning readiness before applying the basic strategies of AFLAT. This approach served as motivation for each teacher, because the researcher ensured that the teachers practiced the unique strategy for meeting a given task, and the teachers were required to give feedback about the experience. This approach boosted the teachers' self-efficacy and their capability to deliever result, as much as they applied same approach in assisting their ASD learners to achieve the desired result[75].

Practical Senarios of teacher's Intervention Strategy for Creative Writing:

Lessons 1: Creative Writing

Strategy Implementation:

1. Calm the learner at the first contact. This ensures mind settling and set the learner on perceptive mood.
2. Inform the learner about the purpose of visit and simultaneously introducing the topic of lesson by givin an overview position.
3. Set the learner on the need to recall previous learning experience. This aids to see determine how much information was received, retained – encoded and decoded by self-instinct. Repetition aids the retainance of information further.
4. A systematic, logical release of information required for the lesson should be

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achieved next. (Ensure to stay within the context of clearly defined terms and purpose of the information required for learning[76].

5. Check regularly in-between lesson instruction to ascertain that the learner's reasoning path is tailored along with the guided given instructions. This is a test for the learner's absorption and retention of information.

6. The learner may be subjected to self-evaluation by asking him/her to express the information received in speech or writing. Each of these have its success criteria measurement scale, which can be determined at the teacher's discretion.

7. The key required concept of the lesson should be reflected in the information received. This must be infused or integrated with clear visual or linked expressions-situations, objects or events that can enhance recall, amist memory inference. Features such as; recognising, Identifying and linking information with visual examples may be explored.

Lessons 2: Mathematics

Strategy Implementation:

i. Establish the key concepts of the topic, that is the basic concept in a systematic approach.

ii. Link the basics to real-life application. Ensure the learner can work independently using this approach.

iii. Integrate the concepts with relative subject-topics.

iv. Practice the linked concepts until mastery is attained, both in text and real life till the applied concepts are clearly understood.

v. Guide the learner to create simple story/word problems and also apply the maths to solve the problem created.

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vi. Problem Construction should be systematically considered with all key parameters. This will be achieved using the learner's own sentence.

Lessons 3: Sensory Adjustment Intervention (Logical Reasoning, Verbal and Non-verbal Reasoning, Use of Laguage and Speech Development)

Strategy Implementation:

Though sensory activities activities varies from one ASD level to another, it is important for educators to define the path of reasoning in the ASD learner[77]. This will guide the educator on how to apply the strategies that are identified[78]. It is important to bear in mind that the approach here is basically from specific information first. When mastery is attained on the step level information received, than other levels may be infused and finally the information may be generalised, for better inferences.[77]

It is also important for educators to identify the focus of intervention that is required. For instance, the symptoms of sensory impairment may include; besides common sensory avoidance activities such as intolerant to bright light, noisy evironment, itchy or scratchy, fear from cuddle, hugs or surprise touch, the educator would need to look out for the consequence of these actions to learning. These include: lack of awareness of periods-moment, time, occurrences, situations and events; tendency to repeat word or phrases after the instructor (imitation) and lack of understanding in the use of, and managing first and second person pronouns during interactive conversations[79].

Strategies:

a. Ensure constant link of activities with the basics to real-life situations, circumstance and events.

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b. Ensure that a prior information is given before expecting performance of an activity, and such should be guided initial and gradually lead the learner to independency.

c. The conversational approach should point one directional example of the pronouns that is to be mastered. That is “me” or “you” and vice visa.

d. Use of multiple prompts is encouraged so as to correct repetitive speech and imitating words and sometimes actions.

2.3.3 Academic Functional Learning Aptitude Test Strategies and Affected Variables

The Male and Female ASD Cognitive Functionality

Further studies reveal that that ASD diagnosis in male and female cases varies relatively as a result of the brain connection, which is a function of the cortical thinning in the cerebral cortex of the brain layer that is responsible for the cognition. Its functions in thinking, memory, reasoning, sensory and perception[80]. In female, this is obseved as being higher than that of the male. When these skills are combined with the prominent social skills in the female ASD, it puts them at a higher display of exceptional performance during learning process.

In an experiment conducted with a 5-year old female ASD cases, in recent time showed that several assessment reports revealed that there are no symptom of ASD exhibited. The gap was discovered using clinical and brain data of advance research tools from 17 international sites of 773 female and male ASD. The data was analysed using artificial intelligence-based algorithms that are used to examine the differences between groups in large data. The result showed that female ASD has a different brain setting with higher functioning in motor, language and visuospatial attention, when compared with male. There were other findings, such as association of the motor aptitude with restricted and reptitive behaviours[80]. This experiment provides the first artificial intelligence evidence that the brain of female and male with ASD are functionally organised differentfly.

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Socioeconomic Status and Autism Spectrum Disorder:

Socio-economic status (SES) can be defined by many factors, which is usually a reflection of an individual's personality or disposition. It can stand as an influencer towards enabling the individual to attain their set objectives or even their goal. In terms of academics, socio-economic status can impact the outcome of academic performance and consequently the learners' achievement[81].

Socio-economic status can have an effect on ASD learner's performance in two main persceptive. The first is where the child is from a higher SES, here they can be exposed and have access to interventions and supports that can hasten their improvement. This is where the family is seen to live with sofiticated ammenties such as education, income and access to technological devices that can enable them surf for solutions or where to get solutions. For ASD learners who find themselves with families from this category of SES, they tend to access better chances of quality education, materials, supports and involvement of all instructors. The other category are ASD learners who are from lower SES. The categories of learners tend to be delayed in terms of having early intervention, and they are usually at higher risk of poor functionality[82]. In an experiment to establish that SES significantly associates with symptoms of ASD who are receiving early intervention, out of about 193 ASD children between the ages of 5-12 years. these children were accessed for early intervention and SES, using three (3) psychoanalytic assessment tools – Vineland Adaptive Behaviour Scale (VABS), Adaptive Behaviour Composite (ABC) and Wechslers Preschool and Primary Scale of Intelligence (WPPSI). The result showed that parents of ASD who had university degrees are better compliant with the routines, in contrast to those of lower education status. This implied that

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ASD childern whose parents are more enlightened get involved more in their children's internvention.

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2.4 Conceptual Model

2.4.1 Conceptual Model of AFLAT:

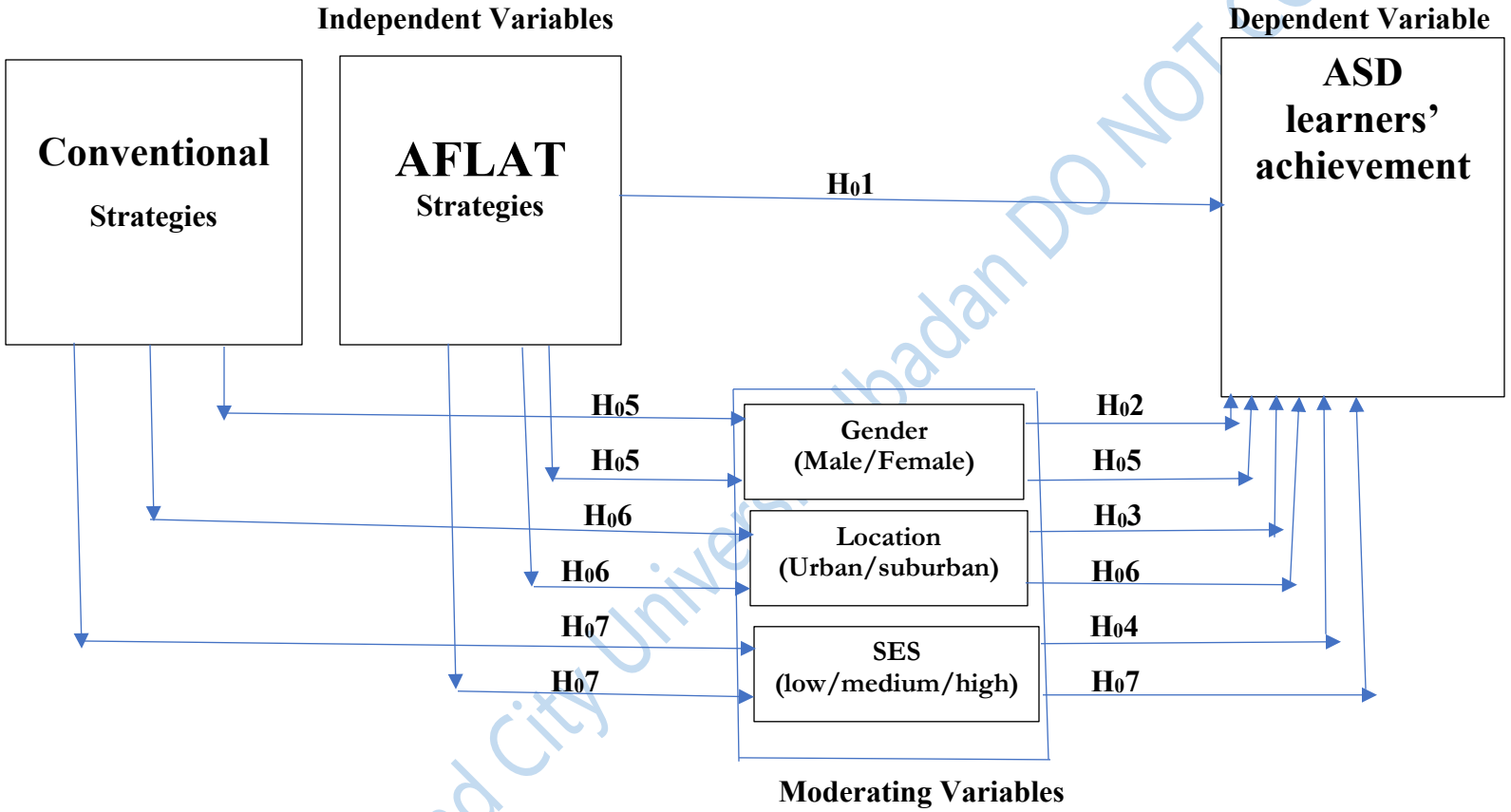

Figure 2.4.1: Conceptual Model of AFLAT's Main and Interaction Effect on ASD's Academic Achievement

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Link between Independent and Dependent Variables:

This study is aimed at determining the main and the interaction effect of the applied procedural strategies of AFLAT practices on the academic achievement of ASD learners in Nigerian inclusive schools. This is so as to improve the academic achievement of ASD learners. The variables identified are the independent variables (conventional strategies and AFLAT strategies), the dependent variables (academic achievement of ASD learners) and the moderating variables (gender, location of residence and socio-economic status) of individual ASD learner. AFLAT strategies is the treatment that is used to improve the achievement of ASD learners within the inclusive classroom, as against the regular conventional strategies, which served as the control in this study. Giving the effect of moderating variables; gender, location and socioeconomic status of ASD learners, null hypothesis one shows the direct main effect of AFLAT strategies on ASD learner's achievement, while the null hypotheses two to four show the main effect of the moderating variables on ASD learner's academic achievement. Null hypotheses five to seven indicate the interaction effect between AFLAT strategies and each of the moderating variables. The model also shows the existing link between the control effect and moderating variables.

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2.5 Summary in Gap of Reviewed Literature

The gaps identified in this literature is observed in the need for differentiated learning strategies in the pedagogy processes of ASD learners in the classroom and school's inclusive structure. Unlike the conventional teaching-learning strategies, AFLAT strategies approached teaching-learning by giving consideration to the unique learner's aptitude, such it was essential to imbibe the differentiated flexible learning strategies. The aptitude of each learner is observed as traits that define their levels of strength and weakness, while performing their tasks. It is in the observation of these activities, that strategies are made flexible in order to enable the learners achieve the desired result or enhance the mastery of skills where improvement is needed. AFLAT strategies also gives consideration for lesson integration, in the sense that topics from various subjects can be infused into different lessons as the study may be required or channeled. It made use of natural practical life situations, circumstances and teaching-learning materials, more than computer-based instructions to enhance the social interactions and communication skills of ASD learners. It explores their sensory needs and discomforts, while proffering natural course of intervention that is also integrated into their learning.

Another gap revealed in this study, is the categorisation of autism spectrum disorder alongside other intellectual disabilities, which is the categories of impaired learners, with cognitive disorder. Autism spectrum disorder is an entire phenomenal study in itself. This is because it is not just characterised by intellectual (cognition), but it has many more features that set the impairment apart. These include; sensory, perceptive and complex neurosis conditions, such grouping ASD as intellectual disability only, will undermine the study of the condition and also distort the level of intervention that the victims can access. More so, categorizing the

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impairment with such versatile scope of uniqueness, as intellectual disability along with other unique disorder, would limit the scope and quality of knowledge that should be explored for by educators for comprehensive intervention and treatments. It would also limit the understanding of unique characteristic features and how they operate within the confines of each unique cases. Such ASD case should be an entity in its own confines, in other to gain appropriate and appreciable attention, that is required for intervention and further treatment.

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Chapter Three

Methodology

This chapter presents the methodology and procedure of this study. It explored information about the design of this study, the population of the study, sample and sampling techniques, the instruments, reliability, the validity, the data collection procedures and the method of data analysis

3.1 Research Design

The quasi experimental research design is adopted in this study. This design is considered appropriate for the study because it considers an intervention estimate for the causal main and interaction effect of AFLAT and conventional strategies of teaching-learning procedures on ASD learners in an inclusive classroom setting in Nigeria[1]. It makes use of the pretest and post-test scores of the performance rates of learners. The study involves the direct application of AFLAT strategies as intervention to the conventional strategies, of the ASD learners understudied in a life inclusive classroom setting.

3.2 Population of Study

The population target in this study are the learners who leave with Autism Spectrum Disorder (ASD), and who attend inclusive school setting in Nigeria. However, there are other associated members of the population who worked with the researcher on this study. These are; the teachers, facilitators and parents. The National Commission for Persons with Disabilities

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(NCPWD) categorised persons with ASD under the intellectually chanlleged conditions[2]. Here, the total population presented is 54,328 learners, out of which 5,861 learners (a representation of about 10%) are categorised under intellectual disabilities.

Table 3.2a: Population Target for Intellectual Disability Learners

Region	State	Local Government Area	Gender		Total
			Male	Female	
Southwest	Oyo	Ibadan Northwest	86	122	208
Southeast	Enugu	Enugu North	51	75	126
Southsouth	Rivers	Oyigbo	129	105	234
Northcentral 1	FCT Abuja	Abuja Municipal	81	69	150
Northcentral 2	Plateau	Jos North	112	124	236
Total					**954**

Source: The Nigerian Reader Digest (2022)

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The targeted population (ASD learners in inclusive schools) were drawn from this category, which represents 954 learners (a representation of about 16%) from the four regions studies.

The second category of population targets are those who supported the researcher during the study, besides the reseacher assistants. These are; the teachers, facilitators, parents and carers. The total population targets for the school and family across the four regions are 461 and 144 respectively[2].

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Table 3.2b: Population Target for School and Family

Region	State	School	Family
Southwest	Oyo	59	34
Southeast	Enugu	67	21
Southsouth	Rivers	66	47
Northcentral 1	FCT Abuja	113	17
Northcentral 2	Plateau	156	25
Total		**461**	**144**

Source: Field Survey (2024)

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3.3 Sample and Sampling Technique

The multi-stage sample technique is used to select the samples.

Stage 1: The simple random sampling technique was used to select the regions, states and local governments areas in each state[3].

Stage 2: The selected local government areas were clustered into sub-urban and urban locations, and purposive sampling technique was used to select the inclusive schools that were used in each location. The purposive sampling technique was used because the sampled private

schools had the required characteristics features of inclusive classroom structure, which best suit the condition for the study[4].

Stage 3: This is the convenience sampling technique, which best suit the selection of ASD learners in the inclusive classroom. The researcher identified learners with autism spectrum disorder in the classroom by assessing each learner, using the characteristics features of ASD that are specified in this study, and adopted from the Diagnostic Statistical Manual for Mental Disorder – fifth edition (DSM-5)[5]. The convenience sampling technique was also adopted due to the limited number of ASD learners enrolled in schools in some states and consequently in the regions. The selection is based on ASD learners' availability and accessibility in the schools selected. This technique was also juxtaposed for selecting the teachers, facilitators, parents and carers who supported the researcher in this study.

The samples consist of four (4) regions; Southwest, Southeast, Southsouth and Northcentral; five (5) states which are; Oyo, Enugu, Rivers, Plateau and the Federal Capital Teretory (FCT Abuja) in Nigeria. A total of sixty (60) learners with ASD symptoms, sixty-nine (69) teachers and facilitators and fifty (50) parents and carers participated in this study.

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Table 3.3a: Table of Samples for ASD Learners, School Teachers and Family

Region	State	ASD Learners	School Teachers	Family
Southwest	Oyo	10	10	8
Southeast	Enugu	6	12	5
Southsouth	Rivers	9	13	13
Northcentral 1	FCT Abuja	12	10	5
Northcentral 2	Plateau	23	24	19
Total		**60**	**69**	**50**

Source: Field Survey (2024)

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3.4 Description of the Research Instruments

The instruments for this study are self-constructed assessment tests-achievement test and aptitude assessment. These are the constructed tools (Instruments) that are used to retrieve data in this study. The research instruments are;

i. Specified Achievement Test (SAT-Guided Test) in Number Reasoning, Spatial Reasoning, Picture Decoding/Text Reading & Comprehension, Logic, Non-verbal Reasoning, Speech and Routine Linked with Health & Humanities.

ii. Academic Aptitude Assessment Report (AAA-R), which is the corresponding aptitude features that are expected to be performed along with the required solutions from SAT-Guided Test.

Instruments i & ii constitute Academic Functional Learning Assessment Tool (AFLAT).

Specified Achievement Test (SAT-Guided Test)

This instrument is based on individual ASD learner's level of attainment in the topics learnt from previous subjects. It is drawn to fit into the learner's acquired knowledge from previous learning experience. The instrument consists of constructed items, adopted items and in extreme cases, where concepts contain globalised instructions, the items are adapted (sometimes these aids in determining the level of global awareness that the ASD's learner had attained). This instrument is prepared specifically for each ASD learner, in projection of their learning attainment and it is used to conduct both pretest and post-test. The constructed and adapted items are objectives and/or reasoning items. These are drawn from the standard National Curriculum of learning for early years (preschool), elementary and junior secondary school. The practical modelling of standard Bloom's taxonomy, was drawn in relation to ASD's cognitive learning and it was used to classify the items[6].

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Table 3.4a: Template for Individualised Table of Specification for Learners with Differences
Source: Field Survey 2023
Purpose: Level of Cognition

	Tasks levels of description from previous knowledge					
Skills	**Perception Retention, Identification & Recognition**	**Comprehension Recall of information & interpretation**	**Application Implementing & executing**	**Analysis Information Discrimination**	**Creative Use of information in diverse Forms**	**Total number of items**
	20%	**25%**	**30%**	**15%**	**10%**	**100%**
Subjects						
Number & Spatial Reasoning	2	2	3	2	1	10
Picture & Text Reading	2	3	3	1	1	10
Nonverbal Reasoning & Logic	2	3	3	1	1	10
Humanities & Routine Links	2	2	3	2	1	10
Total Number of Items	**8**	**10**	**12**	**6**	**4**	**40**

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The samples of the specified achievement test, are grouped into each ASD learner's functional levels, which are low and high functioning levels. (Appendix III).

Academic Aptitude Assessment Report (AAA-R)

This tool comprises of the various observable traits, character and behaviour that are expected to be displayed and aligning with the required performance for the items in the achievement test (SAT). It comprises of observation of the skills, stamina, tenacity, abilities and efforts that are put into the given task while performing the assessment. It is used to determine the levels of learning attainment, the path to effective functionality and most of project the expected career path. This instrument applies the caution of appropriateness in the language of instructions given that enables the learners' understanding, and guide the path to functionality. This tool adopts the percentile scores and the Likert scale of measurement from 5 to 1, drawn in other of progress made during the performance[6]. It is rated as; excellent (5), very good (4), good (3), fair (2) and need improvement (1) respectively. (Appendix IV).

3.5 Validity of Research Instruments

The research instruments were critically reviewed and subjected to validity. This is to ascertain that the instruments measure what the items purports to measure[7]. AAA-R instrument was given to experts in the filled of psychometrics, who conduct assessment for ASD learners and also had experience in conselling parents. SAT (guided achievement test) was given to experience teachers and senior school managers (who are not part of the study). These measure was set to ascertain the face and content validity of the instruments. The instruments were then given to the researcher's promoter, who also reviewed the items along with its parameters to ascertain the face and content validity. Construct validity (convergent) was used to ascertain

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the relationship between SAT (guided achievement test) and AAA-R which are combined assessment for AFLAT.

The instruments, which constitute AFLAT are first subjected to pilot test among fifteen (15) ASD learners in Lagos State inclusive schools (these were not listed in the main study). The paired sample correlation of t-test, using SPSS was used to determine how the mean and standard deviation vary between the initial assessment (P0) and actual assessment (P1). An indication of high levels of ASD learner's academic achievement between P0 and P1 corelation is obtained at 0.943 using AFLAT strategies and minimal level between gender correlation at 0.561.

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Result of Pilot Test for Validity:

Table 3.5: Paired Sample Correlation for Pilot Test Validity

		N	Correlation	Sig.
Pair 1	Preassessment Performance Rating Scores Pretest (P0) & Posttest (P1)	15	.943	.000
Pair 2	Posttest 1 (P1) & Gender of each ASD Cases	15	.561	.030

Source: Field Survey, 2023

3.6 Reliability of Research Instruments

The inter-rater reliability coeficient of test retest was used to determine the stability and level of consistency in the rating of AFLAT tools between the researcher and the research assistants

who administered the assessment. A reliability coeficient scale of 0.781 (unbaised), was considered suitable for AFLAT instruments. The determinant of unconstrained matrix of Chi-square goodness of fit at 5.52 indicates minimal response to specific items in AFLAT instruments. The choices of paired correlation analysis and Chi-square are due to the small sample size in this study[8].

Result of Pilot Test for Reliability:

Table 3.6a: Reliability Statistics of AFLAT Instrument's Stability

Common Variance	83.748
True Variance	41.289
Error Variance	42.459
Common Inter-Item Correlation	0.493
Reliability of Scale	0.745
Reliability of Scale (Unbiased)	0.781

Source: Field Survey, 2023

Table 3.6b: Reliability of AFLAT Instrument's Goodness of Fit Test for Pilot Study

Chi-Square	Value	88.641
	Df	4.000
	Sig	0.000
Log of Determinant of Unconstrained Matrix		5.520
	Constrained Matrix	12.611

Under the parallel model assumption

Source: Field Survey, 2023

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3.7 Data Collection

The data for this study were collected using the following procedural steps. Having selected the locations for the study: Six (6) research assistants were identified from school settings and bodies of special education practitioners, who were familiar with the conditions that are required for teaching learners with conditions across the regions in Nigeria, and in the states that were selected. These group of practitioners were trained in readiness for the study through physical and virtual presentations using focus group discussion. The focus group discussion was held to elicit information about the knowledge of inclusive practices, the strategies applied when teaching the learners, the constraints experienced and the solutions proferred[9]. In addition, series of trainings were conducted in order to intimate the research assistants and the teachers with the teaching-learning procedural strategies, as well as how to shilft from one level of strategy to another level of strategy when engaging ASD learners in tasks delivery processes. The research assistants were guided to select study field/centers, which are inclusive schools within sub-urban and urban locations in their states of residence. Due to the irregularities in the number of enrolment of ASD learners, the study adopted an average of Ten (10) learner-participants with ASD for each representation region and state. However, some state (Enugu State) and (River State) had less than ten (10) participants, while other states such as Oyo, and Plateau States had more than ten participants.

The study consisted of the experimental and control groups. The experimental group is made up of about 75% of the sampled population, while the control group is made up of about 25%. The researcher observed the teachers as they taught in a life inclusive classroom, using the conventional strategies, in the areas airmaked for control study. The reseacher rated the performance of the ASD cases in the class and scored as required. In the areas airmarked for

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the experiemental study, the researcher's first task was also to observe the teachers as they taught their ASD learners in a life inclusive classroom setting using their conventional strategies. The instruments that make up AFLAT (SAT and AAA-R) were then adminstered by the researcher, in a pretest -P0 session and the results were rated for each ASD learner. The researcher then, trained the teachers on the procedures to adopt when switching strategies as required in AFLAT strategies. These included how to moderate the instructions given to ASD learners, and how to apply systematic flexible performance strategies, with close monitoring of ASD learner's performance during the tasks. It also gives consideration to ASD learner's responses and it alingning with the key required instructions. The researcher then allowed the teachers to conduct the second test (posttest P1). The strategies are further applied and monitored for progressive achievement for two (2) weeks, after which the researcher conduncted the same assessment (Posttest -P2). All the results from AFLAT strategies were collected, sorted and set for analysis.

A period of six (6) weeks was used to conduct the study in each geographical region and a total period of 30-36 weeks was used to collect data for the study in Nigeria. The lenghty period spent was due to the need to ascertain the autenticity of the progressive performance of ASD learners.

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Analysis of the period scheduled for data collection per geographical region:

Selection and training of research assistants commenced in July, 2023 up until the end of data collection in January 2025. In each geographical region that was visited for the study, the following schedule of conducting this study was adopted.

1st week:

Training of teachers and field workers: Strategies included; focus group interaction, discussion of AFLAT procedures and preobservation of conventional teaching-learning approaches.

2nd – 3rd weeks: (Pretest Administration)

Pre-assessment using DSM-5 recommended scaled symoptoms, to identifiy ASD cases. Conventional strategies and AFLAT individualised strategies - (P0) were used at intervals for both groups of ASD learners, that is the control groups and the treatment group respectively.

4th – 5th week: (Treatment Plan)

Teaching-learning activities in life inclusive classroom were applied using AFLAT procedural strategies and results were collated for pretest (P1)

6th Week: (Posttest Administration)

Implementation of intervention plan; re-assessment using AFLAT strategies and result collation for posttest (P2)

Maximum period on field **6 week per region**

Total number of period scheduled for study in Nigeria **30–36 weeks per region and state visited.**

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3.8 Data Analysis

Research hypotheses were set to determine the main effect and interaction effect of AFLAT strategies on ASD academic achievement. Special considerations were giving to the moderating variables that affect ASD academic achievement in the inclusive classroom setting. Such, this analysis is multi-factorial design where the effect of AFLAT strategies interact with multiple moderating variates; gender (male and female), location of residence (urban and sub-urban) and socio-economic status (low, medium and high)[10]. The independent variables; AFLAT strategies and Conventional strategies are rated to determine their effects on the dependent variable – academic achievement and aptitude of ASD learners. Descriptive statistics of frequency and percentage were used to analyse the demographic data. The analysis identified the control and the experimental groups. While the control group was measure in Southeast and Southsouth regions, the experimental groups were measured in Southwest and Northcentral regions. This approach was adopted as a result of cost and safety constraints.

Hypothesis 1 is set to determine to main effect of AFLAT on academic achievement of ASD learners are analysed using Analysis of Covariance (ANCOVA) statistical test. Hypotheses 2 to 4 were set to determine the main effect of the moderating variables on ASD learner's academic achievement, and were analysed using Analysis of Covariance (ANCOVA). Hypotheses 5 to 7 are set to determine the interaction effects of AFLAT on each of the moderating variables on the academic achievement of ASD learners, and each are analysed using Analysis of Covariance (ANCOVA) statistical test[10]. All hypotheses are set at 0.05 level of significance.

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3.9 Ethical Approval

This study was presented for ethical approval and conducted with high ethical considerations for the confidentiality of the population understudied - Autism Spectrum Disorder (ASD) cases, the inclusive schools and the parents who participated in this study.

The study proposal was presented to the Education Faculty leadership members, who reviewed the proposal for approval. The faculty board consisted of the representative of postgraduate college, the dean of faculty, head of education department, the researcher's supervisor, and internal external professors within the education faculty of the domicile institution where this study was initiated – Lead City University, Department of Arts and Social Science Education, Faculty of Education. Next was the issuance of introduction and consent approval letter for the researcher to conduct the study in the regions, states and the inclusive schools that were sampled. This procedure sought for the voluntary participation and approval of each school visited from the board of directors of the inclusive schools in the regions and states sampled for the study. Finally, the school further sought the consent of the parents by introducing the researcher, and informing the parents about the purpose of the study. The parents consented for their children to participate in the study. Some samples of the approved consents from schools, following the introduction of the researcher are attached here. (Appendix V).

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Endnotes

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Chapter Four

Results and Discussion of Findings

This study sought to determine the applied procedural practices of AFLAT strategies on the academic achievement of ASD learners in inclusive schools in Nigeria. This chapter presents the results of the analyses and discussion of findings. The results and discussion of findings are presented in two stages on the basis of the demographic characteristics of the participants and the hypotheses raised in this study. The results are presented in tables as follow:

4.1 Demographic Data Analysis

The result below are the socio-demographic characteristics of the participants.

Table 4.1a: Distribution of the Participants by Gender

Gender	Frequency	Percent (%)
Male	48	80.000
Female	12	20.000
Total	60	100.000

Source: Field Survey, 2025

Table 4.1 reveals that 80.0% of the participants are males, while 20.0% are females. This indicated that, most of the participants are males and only few are female.

Table 4.1b: Distribution of the Participants by Geographical Location

Geographical Location	Frequency	Percent (%)
South-west (SW)	10	16.700
North-central (NC)	35	58.300
South-east (SE)	6	10.000
South-south (SS)	9	15.000
Total	60	100.000

Source: Field Survey, 2025

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Table 4.1.2 reveals that over half (58.3%) of the participants are sampled from North-central, only –a few of about (16.7%) are sampled from South-west, and a lesser few of about (15.0%) are equally from South-south, while the lowest of (10.0%) were from South-east. This indicated that, substantial number of the participants were from North-central region of Nigeria.

Table 4.1c: Distribution of the Participants by Location of Residence

Location of Residence	Frequency	Percent (%)
Urban	39	65.000
Sub-urban	21	35.000
Total	60	100.000

Source: Field Survey, 2025

Table 4.1.3 reveals that almost two third (65.0%) of the participants are attending inclusive school in urban areas of the regions, over one third (35.0%) of the participants are attending inclusive school in the sub-urban areas of the region. This indicated that, considerable number of the participants attend inclusive school in urban areas of the regions.

Table 4.1d: Distribution of the Participants by Socio-economic Status

Socio-economic Status	Frequency	Percent
Low	15	25.000
Medium	26	43.300
High	19	31.700
Total	60	100.000

Source: Field Survey, 2025

Table 4.1.4 reveals that less than half (43.3%) of the participants are from medium level socio-economic status background, almost one third (31.7%) were from high level, while one quarter (25%) were from low level socio-economic status background. This implied that, a sizable number of the participants are from medium level socio-economic status background.

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Table 4.1e: Distribution of the Participants by Treatment Groups

Treatment	Frequency	Percent
Treatment (Academic Functional Learning Aptitude Test Strategies)	45	75.000
Control (Conventional Strategies)	15	25.000
Total	60	100.000

Source: Field Survey, 2025

Table 4.1.5 reveals that three quarter (75.0%) of the participants are sampled for experimental group, while one quarter (15.0%) are sampled in the control group. This means that, most of the participants were exposed to Academic Functional Learning Aptitude Test Strategies, while a few were exposed to Conventional Strategies.

4.2 Presentation of Data:

4.2.1 Hypotheses

The following hypotheses were tested in this study at 0.05 level of significance.

$H_0$1: There will be no significant main effect of AFLAT strategies on academic achievement of Autism Spectrum Disorder Learners in Nigerian inclusive schools.

Table 4.2.1a: Analysis of Covariance of Main Effect of AFLAT Strategies on Academic Achievement of Learners with Autism Spectrum Disorder

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11655.580	2	5827.790	139.733	0.000	0.831
Intercept	532.626	1	532.626	12.771	0.001	0.183
Pretest	11204.330	1	11204.330	268.647	0.000	0.825
Treatment	826.288	1	826.288	19.812	0.000	0.258
Error	2377.270	57	41.706			
Total	155459.000	60				
Corrected Total	14032.850	59				

Source: Field Survey, 2025

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Table 4.2.1a shows that there is a significant main effect of AFLAT strategies on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools ($F_{(1,57)}$=19.812, p<0.05, η^2=0.258). The null hypothesis of no significant effect is therefore rejected. This implies that the treatment (AFLAT strategies) show effective improvement on Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools. Also, the eta square value of 0.258 shows the contributing effect size of 25.8%.

Table 4.2.1b: Estimated Marginal Means of AFLAT Strategies on Academic Achievement of Learners with Autism Spectrum Disorder

			95% Confidence Interval	
			Lower	Upper
Treatment	Mean	Std. Error	Bound	Bound
Treatment (AFLAT Strategies)	50.698	0.963	48.769	52.627
Control (Conventional Strategies)	42.106	1.671	38.760	45.451

Source: Field Survey, 2025

Table 4.2.1b shows that the participants exposed to AFLAT Strategies (treatment group) had higher posttest mean ($\bar{x}$) score of 50.698 on the Academic Achievement of Learners with Autism Spectrum Disorder in Nigerian inclusive schools; than their participants in the control group with posttest mean score of 42.106. This means that participants, who are exposed to AFLAT Strategies (treatment group) performed better than those in the control group, who took the conventional strategies. It implied that AFLAT Strategies proved to be effective methods that improved Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools.

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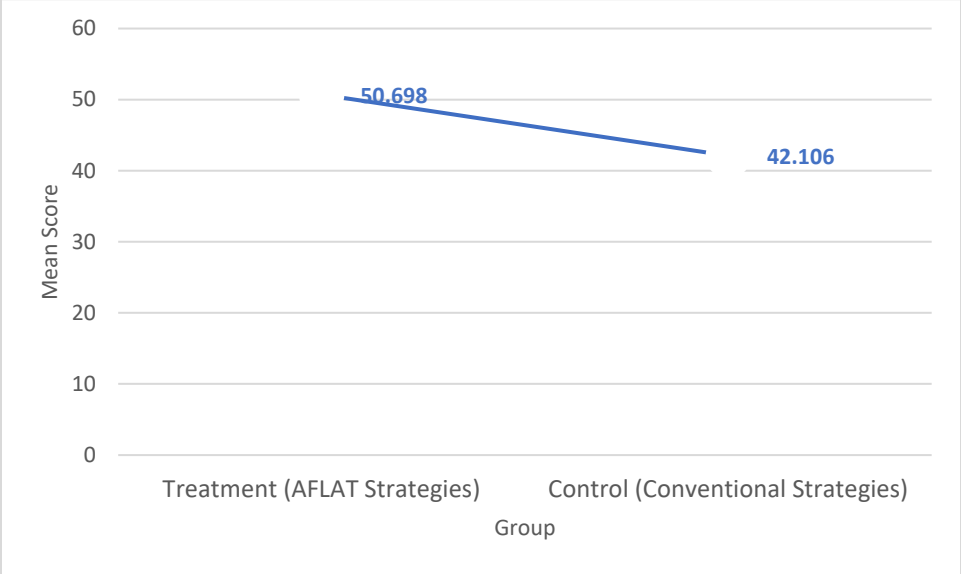

Figure 4.1: Chart Showing of Estimated Marginal Means of Treatment and Control Group

This figure reveals that participants exposed to AFLAT Strategies (treatment group) had higher posttest mean ($\bar{x}$) score of 50.698 on Achievement of Learners with Autism Spectrum Disorder in Nigerian inclusive schools; than their participants in the control group with posttest mean score of 42.106. This means that participants exposed to AFLAT Strategies (treatment group) performed better than those in the control group.

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$H_0$2: There will be no significant main effect of gender on academic achievement of Autism Spectrum Disorder Learners in Nigerian inclusive schools.

Table 4.2.1c: Analysis of Covariance of Main Effect of Gender on Academic Achievement of Learners with Autism Spectrum Disorder

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10879.644	2	5439.822	98.335	0.000	0.775
Intercept	1044.679	1	1044.679	18.884	0.000	0.249
Pretest	10866.106	1	10866.106	196.425	0.000	0.775
Gender	50.352	1	50.352	0.910	0.344	0.016
Error	3153.206	57	55.319			
Total	155459.000	60				
Corrected Total	14032.850	59				

Source: Field Survey, 2025

Table 4.2.1c shows that there was no significant main effect of gender on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools ($F_{(1,57)}$=0.910, p>0.05, η^2=0.016). The null hypothesis was therefore accepted. This implies that gender had no significant effect on Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools. Also, the eta square value of 0.016 shows contributing effect size of 1.6%.

Table 4.2.1d: Estimated Marginal Means of Gender on Academic Achievement of Learners with Autism Spectrum Disorder

Gender	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Male	48.092	1.074	45.942	50.242
Female	50.383	2.148	46.082	54.684

Source: Field Survey, 2025

Table 4.2.1d shows that female participants had a higher posttest mean score (50.383) than their male (48.092) counterparts. This implied that gender had a better responsive effect on

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academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. However, female gender shows better reponsiveness in this regards.

$H_0$3: There will be no significant main effect of location of residence on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools.

Table 4.2.1e: Analysis of Covariance of Main Effect of Location of Residence on Academic Achievement of Learners with Autism Spectrum Disorder

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11121.156[a]	2	5560.578	108.855	0.000	0.793
Intercept	923.983	1	923.983	18.088	0.000	0.241
Pretest	10633.947	1	10633.947	208.173	0.000	0.785
Location of Residence	291.864	1	291.864	5.714	0.020	0.091
Error	2911.694	57	51.082			
Total	155459.000	60				
Corrected Total	14032.850	59				

Source: Field Survey, 2025

Table 4.2.1e shows that there is a significant main effect of location of residence on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools ($F_{(1,57)}$=0.5.714, p<0.05, η^2=0.091). The null hypothesis was therefore rejected. This implies that location of residence had significant effect on Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools. Also, the eta square value of 0.091 shows medium scale contributing effect size of 9.1%.

Table 4.2.1f: Estimated Marginal Means of Location of Residence on Academic Achievement of Learners with Autism Spectrum Disorder

Location of Residence	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Urban	50.170	1.145	47.878	52.463
Sub-urban	45.54	1.561	42.415	48.666

Source: Field Survey, 2025

Table 4.2.1f shows that participants who were schooling in urban areas had a higher posttest mean score (50.170) than their counterparts in sub-urban areas (45.540) counterparts. This

implied that location of residence had a better effect on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. Thus ASD learners who are schooling in urban areas achieved better in their academics than their counterparts in sub-urban areas.

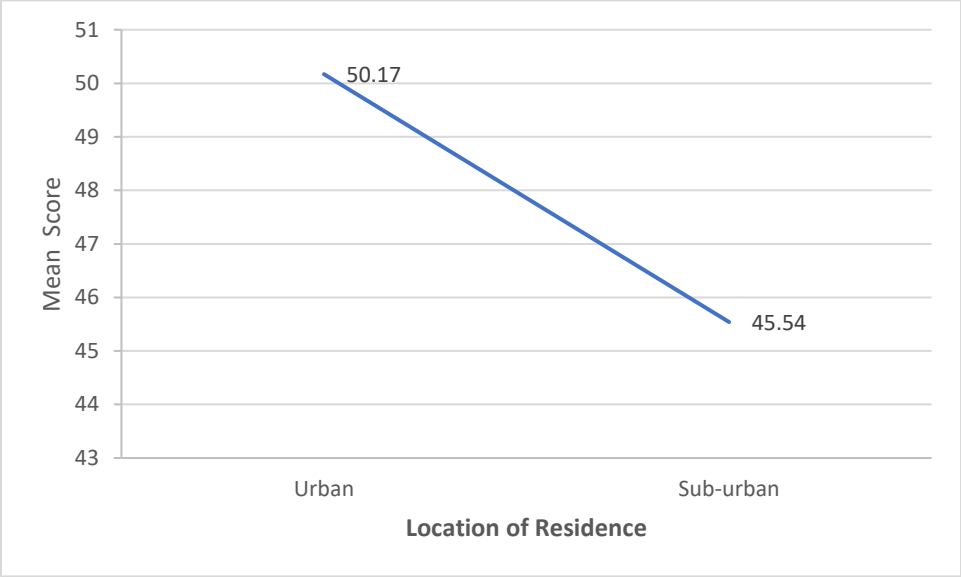

Figure 4.2: Chart Showing of Estimated Marginal Means of Location of Residence

This figure reveals that participants who were schooling in urban areas had a higher posttest mean score (50.170) than their counterparts in sub-urban areas (45.540) counterparts. This implied that location of residence had a better effect on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools; who were schooling in urban areas than their counterparts in sub-urban areas.

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$H_0$4: There will be no significant main effect of socio-economic status on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools.

Table 4.2.1g: Analysis of Covariance of Main Effect of Socio-economic Status on Academic Achievement of Learners with Autism Spectrum Disorder

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10919.029	3	3639.676	65.457	0.000	0.778
Intercept	1008.031	1	1008.031	18.129	0.000	0.245
Pretest	10312.116	1	10312.116	185.457	0.000	0.768
Socio-economic Status	89.737	2	44.868	0.807	0.451	0.028
Error	3113.821	56	55.604			
Total	155459.000	60				
Corrected Total	14032.850	59				

Source: Field Survey, 2025

Table 4.2.1g shows that there is no significant main effect of socio-economic status on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools ($F_{(2,56)}$=0.807, p>0.05, η^2=0.028). The null hypothesis is therefore accepted. This implies that socio-economic status has no significant effect on Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools. Also, the eta square value of 0.028 shows a larger scale contributing effect size of 2.8%.

Table 4.2.1h: Estimated Marginal Means of Socio-economic Status on Academic Achievement of Learners with Autism Spectrum Disorder

Socio-economic Status	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Low	46.507	1.942	42.617	50.397
Medium	49.586	1.463	46.656	52.517
High	48.745	1.717	45.305	52.185

Source: Field Survey, 2025

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Table 4.2.1h shows that participants who had medium socio-economic status background had a higher posttest mean score (49.586) than their counterparts with high (48.745) and low (46.507) socio-economic status respectively. This implied that socio-economic status background had a better effect on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools; who had medium socio-economic status background than their counterparts with high and low socio-economic status respectively.

$H_0$5: There will be no significant interaction effect of AFLAT strategies and gender on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools.

Table 4.2.1i: Analysis of Covariance of Interaction Effect of AFLAT Strategies and Gender on Academic Achievement of Learners with Autism Spectrum Disorder

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11717.371	4	2929.343	69.581	0.000	0.835
Intercept	488.727	1	488.727	11.609	0.001	0.174
Pretest	11013.383	1	11013.383	261.603	0.000	0.826
Treatment	611.980	1	611.980	14.536	0.000	0.209
Gender	20.896	1	20.896	.496	0.484	0.009
Treatment * Gender	10.476	1	10.476	.249	0.620	0.005
Error	2315.479	55	42.100			
Total	155459.000	60				
Corrected Total	14032.850	59				

Source: Field Survey, 2025

Table 4.2.1i shows that there is no significant interaction effect of AFLAT strategies (treatment) and gender on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools ($F_{(1,55)}$=0.249, p>0.05, η^2=0.005). The null hypothesis was therefore accepted. This implies that the treatment (AFLAT strategies) and gender had no

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significant interaction effect on Autism Spectrum Disorder of learners' academic achievement in Nigerian inclusive schools. Also, the eta square value of 0.249 shows larger contributing effect size of 24.9%.

Table 4.2.1j: Estimated Marginal Means of AFLAT Strategies and Gender on Academic Achievement of Learners with Autism Spectrum Disorder

Treatment	Gender	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Treatment (AFLAT)	Male	50.116	1.082	47.948	52.284
	Female	53.048	2.179	48.681	57.415
Control (Conventional Strategies)	Male	41.997	1.873	38.243	45.750
	Female	42.478	3.789	34.885	50.071

Source: Field Survey, 2025

Table 4.2.1j shows that female participants in the treatment group had a higher mean score (53.048) than their male (50.116) counterparts. This implies that the interaction of treatment and gender had a better effect on academic achievement of female learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools than their female counterparts. In the control group, the female participants had a higher mean score (42.478) than their male (41.997) counterparts. This implies that the interaction of treatment and gender have better effect on academic achievement of female learners with Autism Spectrum Disorder in Nigerian inclusive schools in the control group than their male counterparts.

The overall comparison shows that female participants in treatment group had the highest mean score (53.048), followed by male participants in treatment group with a mean score of 50.116, while the male participants in control group had the least mean score (41.997). It implies that the interaction of treatment and gender had better effect on academic achievement of female

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learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools, than their male counterparts in the same group; and other participants in the control group respectively.

$H_0$6: There will be no significant interaction effect of AFLAT strategies and location of residence on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools.

Table 4.2.1k: Analysis of Covariance of Interaction Effect of AFLAT Strategies and Location of Residence on Academic Achievement of Learners with Autism Spectrum Disorder

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11764.799	4	2941.200	71.324	0.000	0.838
Intercept	544.547	1	544.547	13.205	0.001	0.194
Pretest	10628.641	1	10628.641	257.743	0.000	0.824
Location of Residence (LoR)	30.035	1	30.035	0.728	0.397	0.013
Treatment	607.839	1	607.839	14.740	0.000	0.211
LoR * Treatment	33.994	1	33.994	0.824	0.368	0.015
Error	2268.051	55	41.237			
Total	155459.000	60				
Corrected Total	14032.850	59				

Source: Field Survey, 2025

Table 4.2.1k shows that that there is no significant interaction effect of AFLAT strategies (treatment) and location of residence on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools ($F_{(1,55)}$=0.824, p>0.05, η^2=0.015). The null hypothesis was therefore accepted. This implies that the treatment (AFLAT strategies) and location of residence had no significant interaction effect on Autism Spectrum Disorder of learners' academic achievement in Nigerian inclusive schools. The eta square value of 0.015 shows contributing effect size of 1.5%.

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Table 4.2.1l: Estimated Marginal Means of AFLAT Strategies and Location of Residence on Academic Achievement of Learners with Autism Spectrum Disorder

Treatment	Location of Residence	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Treatment (AFLAT strategies)	Urban	51.639	1.119	49.396	53.881
	Sub-Urban	48.082	1.871	44.333	51.832
Control (Conventional Strategies)	Urban	42.053	2.622	36.798	47.308
	Sub-Urban	42.180	2.151	37.870	46.491

Source: Field Survey, 2025

Table 4.2.1l shows that participants who are in urban areas in the treatment group has a higher mean score (51.639) than their counterparts in sub-urban areas (48.082). This implies that the interaction of treatment and location of residence has a better effect on academic achievement of urban learners with Autism Spectrum Disorder who are exposed to AFLAT strategies in Nigerian inclusive schools than their sub-urban counterparts. In the control group, the participants who are in sub-urban areas had a higher mean score (42.180) than their counterparts in urban areas (42.053). This implies that the interaction of treatment and location of residence has better effect on academic achievement of sub-urban learners with Autism Spectrum Disorder who are exposed to AFLAT strategies in Nigerian inclusive schools than their urban counterparts.

The overall comparison shows that participants who are in urban areas in the treatment group has the highest mean score (51.639), followed their counterparts in sub-urban areas in the treatment group with a mean score of 48.082, while the participants in urban areas in control group had the least mean score (42.053). It implies that the interaction of treatment and location of residence have better effect on academic achievement of urban learners with Autism

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Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools, than their counterparts in sub-urban areas the same group; and other participants in the control group respectively.

$H_0$7: There will be no significant interaction effect of AFLAT strategies and socio-economic status on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools.

Table 4.2.1m: Analysis of Covariance of Interaction Effect of AFLAT Strategies and Socio-economic Status on Academic Achievement of Learners with Autism Spectrum Disorder

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11817.718	6	1969.620	47.126	0.000	0.842
Intercept	586.141	1	586.141	14.024	0.000	0.209
Pretest	10484.318	1	10484.318	250.851	0.000	0.826
Treatment	753.008	1	753.008	18.017	0.000	0.254
Socio-economic Status (SES)	80.479	2	40.240	0.963	0.388	0.035
Treatment * SES	21.751	2	10.875	0.260	0.772	0.010
Error	2215.132	53	41.795			
Total	155459.000	60				
Corrected Total	14032.850	59				

Source: Field Survey, 2025

Table 4.2.1m shows that there is no significant interaction effect of AFLAT strategies (treatment) and socio-economic status on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools ($F_{(2,53)}$=0.260, p>0.05, η^2=0.010). The null hypothesis was therefore accepted. This implies that the treatment (AFLAT strategies) and socio-economic status have no significant interaction effect on Autism Spectrum Disorder of learners' academic achievement in Nigerian inclusive schools. The eta square value of 0.015 shows the contributing effect size of 1.0%.

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Table 4.2.1n: Estimated Marginal Means of AFLAT Strategies and Socio-economic Status on Academic Achievement of Learners with Autism Spectrum Disorder

Treatment	Socio-economic status	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Treatment (AFLAT)	Low	48.059	1.884	44.281	51.837
	Medium	50.834	1.378	48.069	53.598
	High	53.261	1.955	49.340	57.182
Control (Conventional Strategies)	Low	40.503	3.733	33.015	47.991
	Medium	42.687	3.241	36.185	49.188
	High	42.478	2.288	37.889	47.068

Source: Field Survey, 2025

Table 4.2.1n shows that participants who have high socio-economic status background in the treatment group has a higher mean score (53.261) than their counterparts with medium (50.834) and low (48.059) socio-economic status respectively. This implies that the interaction of treatment and socio-economic status have better effect on academic achievement of learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools than their counterparts who had medium and low socio-economic status respectively. In the control group, the participants who have medium socio-economic status background had a higher mean score (42.687) than their counterparts with high (42.478) and low (40.503) socio-economic status respectively. This implies that the interaction of treatment and socio-economic status have better effect on academic achievement of learners with Autism Spectrum Disorder. The overall comparison shows that that participants who have high socio-economic status background in the treatment group has a highest mean score (53.261), followed by their counterparts in the treatment group with medium socio-economic status background having mean score of 50.834; while those in the low (40.503) socio-economic status in the control group has the least mean score. It implies that the interaction of treatment and socio-economic

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status have better effect on academic achievement of participants who have high socio-economic status background in the treatment group than their counterparts in the same group; and other participants in the control group respectively.

4.3 Discussion of Findings

The findings of this study on socio-demographic characteristics of the participants revealed that most of the participants are males, while only a few are females. This finding on gender indicates that over three quarter of the participants are males of which their female counterpart is less than one quarter. This shows that more male than female is observed with Autism Spectrum Disorder in Nigeria. This result aligns with the prevalence cases recorded in previous studies, which showed that male cases are more prevalent than female cases[1]. A recently concluded study in the University of Calabar revealed a prevalence of ASD at 1.6% of 1806 children who are ages 2 – 10 years, with neurological disorders. Out of this, the ratio of male to female is 3:1 indicating that more males are affected by ASD[2]. Regarding the geographical location, it was established that over half of the participants are sampled from North-central, a few are sampled from South-west, and a few were equally from South-south, while the least is from South-east. This indicated that, substantial number of the participants are from North-central. Moreover, the finding revealed that almost two third of the participants attend inclusive school in urban areas, over one third of the participants are from sub-urban areas. This indicated that, considerable number of the participants attend inclusive schools in urban areas. With regards to the socio-economic status, this finding revealed that less than half of the participants fall within the medium level socio-economic status background, almost one third fall within high level, while one quarter fall with low level socio-economic status background.

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This implied that, a sizable number of the participants are within medium level socio-economic status background in this study. Additionally, the result revealed that three quarter of the participants are sampled for experimental group, while one quarter were in control group. This means that, most of the participants are exposed to Academic Functional Learning Aptitude Test-Strategies, while a few were exposed to Conventional Strategies.

The finding of this study in hypothesis one revealed that there is a significant main effect of AFLAT strategies on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. This implies that the treatment (AFLAT strategies) was effective on Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools. Also, the eta square value of 0.258 shows the contributing effect size of 25.8%. The implication of this finding is that academic functional learning aptitude test strategies and procedures that are applied during the teaching-learning processes of Autism Spectrum Disorder learners had significant impact on such participants[3]. It was further established in this study that participants exposed to AFLAT Strategies (treatment group) had higher post-test ^{mean} score on the Achievement of Learners with Autism Spectrum Disorder in Nigerian inclusive schools; than their participants in the control group with a reduced post-test mean score. This means that participants exposed to AFLAT Strategies (treatment group) performed better than those in the control group. It implied that AFLAT Strategies proved to be effective method that improved Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools. The outcome of this study is in line with the principles of perceptual organisation of learning concepts, as it should and applicable to teaching-learning strategies in Gestalt theory[4]. In order to achieve effectiveness in each ASD learner's outcome, it is important to determine their levels of perceptual attainment and how they are performing at this level, which lies in the way

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the mind works. Some of the elements of these principles includes; good forms of language or instructions, figure clarifications/alignment with objects, concept's similarity, proximity in information given, closure and continuity[5].

In hypothesis two the finding of the study revealed that there was no significant main effect of gender on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. This implied that gender had no significant effect on Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools, when AFLAT procedural strategies are applied. Also, the eta square value of 0.016 shows the contributing effect size of 1.6%. The implication of this is that the biological sex of the participants had no strong impact on the academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools, given this intervention. It implies that both male and female ASD learners have equal recipient aptitude when AFLAT strategies are applied during teaching-learning process. On the other hand, the outcome of this study on the main effect of gender, revealed that female participants had a higher posttest mean score than their male counterparts. This implied that gender had a better effect on academic achievement of female learners with Autism Spectrum Disorder in Nigerian inclusive schools. The outcome is in line with a comparative empirical study between the male and female cognitive functioning levels[6]. The female ASD learners are observed to be more sociable, with better poise for interaction. This disposition is attributed the the brain connectivity posure in the female referred to as cortical thinning – a decrease in the thickness of the cerebral cortex, which is the outer layer of the brain that is responsible for higher level of cognition[6]. During the application of AFLAT strategies, it was observed that the female ASD learners engaged better in motor-skills

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activities. They also connected better with puzzle integration. However, there were evidence of behavioural misconduct in the female as well.

The finding of this study in hypothesis three revealed that there was a significant main effect in the location of residence of learners with Autism Spectrum Disorder in Nigerian inclusive schools on their academic achievement. This implies that location of residence had significant effect on Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools. Also, the eta square value of 0.091 shows the contributing effect size of 9.1%[7]. On the other hand, the finding of this study further established that participants who are schooling in urban areas have higher posttest mean score than their counterparts in sub-urban areas counterparts. This implied that location of residence had a better effect on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools, for participants who are in urban inclusive schools than their counterparts in sub-urban areas. The location of residence impacted the learning of ASD learners in this study, which was due to factors such as parental awareness about the condition, resources available for home-front continuation of what was learnt in school and infrastructural amenities that are available for the child's exposure, especially at home[9].

The finding of this study, in hypothesis four revealed that, there was no significant main effect of socio-economic status on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. This implies that socio-economic status had no significant effect on Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools. Also, the eta square value of 0.028 shows the contributing effect size of 2.8%[7]. Moreover, it was revealed that the participants who had medium socio-economic status background had a higher posttest mean score than their counterparts with high and low socio-economic status

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respectively. This implied that socio-economic status background had a better effect on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools; who had medium socio-economic status background than their counterparts with high and low socio-economic status respectively. This result aligns with the prevalence studies conducted in south-western part of Nigeria, where the parents of the participants are observed to be interested in their ASD children's wellness[10]. They strove to provide the necessary available support for their children. These group of parents were sampled from the middle socio-economics status locality. The parents encountered in this study displayed the same poise and readiness in support for their ASD's all-round achievement. They were open to accessing the information that could help them assist their ASD child's learning. They were also receptive in conducting the procedures provided to achieve better learning outcome.

On the contrary the outcome of this study is not in line with the finding of a previous work which established that educational level of parent had significant effect on ASD learner's performance. This is evident through the outcome of the two studies presented. In this study, it is established that socio-economic status had no significant main effect on academic achievement of learners with Autism Spectrum Disorder in Nigerian. While educational level as a social factor had effect on students' performance in the previous study[11]. On the other hand, the outcome of this present study was not in line with the outcome of a previous study which established that socio-economic position had effect on academic performance. In this previous study, the learners with higher-socio-economic status performed better academically than those with low socio-economic status[12].

In hypothesis five, the finding of this study revealed that there was no significant interaction effect of AFLAT strategies (treatment) and gender on academic achievement of learners with

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Autism Spectrum Disorder in Nigerian inclusive schools. This implies that the treatment (AFLAT strategies) and gender had no significant interaction effect on Autism Spectrum Disorder of learners' academic achievement in Nigerian inclusive schools. Also, the eta square value of 0.249 shows the contributing effect size of 24.9%[8]. It implied that the combination of AFLAT strategies (treatment) and gender had no significant impact on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools.

It was established in hypothesis five that female participants in the treatment group had a higher mean score than their male counterparts. This implied that the interaction of treatment and gender had a better effect on academic achievement on female learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools than their male counterparts. In the control group, the female participants had a higher mean score than their male counterparts. This implies that the interaction of treatment and gender had a better effect on academic achievement of female learners with Autism Spectrum Disorder in Nigerian inclusive schools in the control group than their male counterparts.

It was further revealed in hypothesis five that the overall comparison shows that female participants in treatment group had the highest mean score, followed by male participants in treatment group, while the male participants in control group had the least mean score. It implied that the interaction of treatment and gender had a better effect on academic achievement of female learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools, than their male counterparts in the same group; and other participants in the control group respectively. This effect could result from the cognitive function of difference in brain form of ASD male (lower cortical thinning). With this defect, ASD males' functioning and engagements in hand-on or motor-perceptual activities are slower

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when compared with ASD female. Such this and other economic ventures had effect on the academic performance and consequently the achievement of males at that level[13].

In hypothesis six, the finding of this study revealed that there was no significant interaction effect of AFLAT strategies (treatment) and location of residence on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. This implies that the treatment (AFLAT strategies) and location of residence had no significant interaction effect on Autism Spectrum Disorder of learners' academic achievement in Nigerian inclusive schools. The eta square value of 0.015 shows the contributing effect size of 1.5%[8].

It is also established in hypothesis six that participants who are in urban areas in the treatment group had a higher mean score than their counterparts in sub-urban areas. This implies that the interaction of treatment and location of residence had a better effect on academic achievement of urban learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools than their sub-urban counterparts. In the control group, the participants who were in sub-urban areas had a higher mean score than their counterparts in urban areas. This implied that the interaction of treatment and location of residence had a better effect on academic achievement of sub-urban learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools performed better than their urban counterparts.

The finding further revealed in hypothesis six in the overall comparison that participants who were in urban areas in the treatment group had the highest mean score, followed their counterparts in sub-urban areas in the treatment group with a mean score of 48.082, while the participants in urban areas in control group had the least mean score. It implies that the interaction of treatment and location of residence had a better effect on academic achievement

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of urban learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools, than their counterparts in sub-urban areas the same group; and other participants in the control group respectively. Though this outcome does not align with previous studies which established that combined group of learners residing in residence halls had higher mean Grade Point Averages (GPA's) than did learners residing at home or off-campus[14.] The likelihood that sub-urban resident ASD learners would perform better was evident during the course of this study. This was because the parents, especially those in the Northcentral engaged their children with vocational activities after school. Similarly, the finding of this present study is not in line with a previous study which established that resident learners who are exposed to campus resources in an urban area had better academic performance than non-resident students[15].

The finding of this study in hypothesis seven revealed that that there was no significant interaction effect of AFLAT strategies (treatment) and socio-economic status on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. The null hypothesis was therefore accepted. This implies that the treatment (AFLAT strategies) and socio-economic status had no significant interaction effect on Autism Spectrum Disorder of learners' academic achievement in Nigerian inclusive schools. The eta square value of 0.015 shows the contributing effect size of 1.0%.

It was further established in hypothesis seven through the estimated marginal mean that participants who had high socio-economic status background in the treatment group had a higher mean score than their counterparts with medium and low socio-economic status respectively. This implies that the interaction of treatment and socio-economic status had a better effect on academic achievement of learners with Autism Spectrum Disorder who were

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exposed to AFLAT strategies in Nigerian inclusive schools than their counterparts who had medium and low socio-economic status respectively. In the control group, the participants who had medium socio-economic status background had a higher mean score than their counterparts with high and low socio-economic status respectively. This implies that the interaction of treatment and socio-economic status had a better effect on academic achievement of learners with Autism Spectrum Disorder.

The overall comparison shows that that participants who had high socio-economic status background in the treatment group had a highest mean score, followed by their counterparts in the treatment group with medium socio-economic status background; while those in the low socio-economic status in the control group had the least mean score. It implied that the interaction of treatment and socio-economic status had a better effect on academic achievement of participants who had high socio-economic status background in the treatment group than their counterparts in the same group; and other participants in the control group respectively.

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Chapter Five

Conclusion

This chapter presents summary of the major research findings and the conclusion of the study. The chapter also presents the recommendation, contribution to knowledge and suggestions for further studies.

5.1 Summary of the Findings:

This study investigated the effect of the procedural strategies in Academic Functional Learning Aptitude Test – AFLAT strategies, on the academic achievement of Autism Spectrum Disorder (ASD) learners in the Nigerian Inclusive Schools. Seven null hypotheses were formulated at 0.05 level of significance. The hypotheses were classified to test the main effect and interaction effect of independent variable on the dependent variable. The study made use of quasi experimental reseach design to test the effect of independent variable (AFLAT strategies) on dependepent variable (Academic Achievement) bearing three moderating variables; gender, location of residence and socio-economic stutus. The study was conducted in four (4) respresentative regions and five (5) states including the Federal Capital Territory (FCT) Abuja in Nigeria. A sample of sixty (60) ASD learners participated in this study. The study was assisted by reseacher assistants, teachers and parents. The instrument used for data collection was a combined AFLAT-tool comprising of Specified Achievement Test (SAT-Guided Assessment in Number Reasoning, Spatial Reasoning, Picture Decoding/Text Reading & Comprehension, Logic, Non-verbal Reasoning, Speech and Routine Linked with Health & Humanities and Academic Aptitude Assessment Report (AAA-R). These instruments were subjected to face and content validity by educators and professionals in SEN-D education. The inter-rater reliability coefficient of test-retest was estimated at 0.781. The data collected were

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analysed using descriptive statistics of frequency and percentage for the demographic data. Analysis of Covariance (ANCOVA) was used to analyse the hypotheses.

The demographic result shows that there were more male participants than female participants. The participants by geographical location revealed that most of the participants are from North-central, followed by South-west, then South-south, and the least from South-eastern part of Nigeria. This indicated that, substantial number of the participants in this study were from North-central region of Nigeria. The study location revealed that participants are attending inclusive school are more in urban areas of the regions, than the participants in sub-urban areas of the regions. The socio-economic status of the participants indicated that the participants are more from medium level socio-economic status background, followed by high level, while those from low level socio-economic status or background are the least, participants in this study. The distribution of study by groups (treatment and control) revealed that more participants were sampled for experimental group, than there were for the control group.

The inferential statistic using ANCOVA revealed the following results for the null hypothesis:

Hypothesis one showed significant main effect of AFLAT strategies on ASD learners' academic achievement in Nigerian inclusive schools, such the null hypothesis was rejected. This result indicated that the treatment (AFLAT strategies) show effective improvement on Autism Spectrum Disorder learners' academic achievement in Nigerian inclusive schools. Also, the eta square showed a large contributing effect. The estimated marginal mean shows that the treatment group had a higher mean than the control group in the post-test on academic achievement of ASD learners. This was an indication of AFLAT strategies' effectiveness in improving ASD learners' academic achievement.

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Hypothesis two showed no significant effect of AFLAT strategies on gender, such the null hypothesis was accepted. The result showed that gender had no significant effect on ASD learners' academic achievement. The eta square revealed a medium scale contributing effect, such the estimated marginal mean reveals that female participants had a higher posttest mean than their male counterparts. This was an indication of better responsive effect on academic achievement of female learners in comparison to male learners.

Hypothesis three showed significant effect of the participants' location on academic achievement, such the null hypothesis was rejected. This indicated that location of residence had significant effect on ASD learners' academic achievement. The eta-square showed medium scale contributing effect, such the estimated marginal mean showed that the participants in urban areas had a higher post-test mean than their counterparts in sub-urban areas counterparts. This was an indication that ASD learners in urban location of residence shows better improvement on academic achievement than those in the sub-urban areas.

Hypothesis four showed that socio-economic status had no significant effect on ASD learners' academic achievement. This was evident in the result; such the null hypothesis was accepted. It was also evident that socio-economic status had no significant effect on ASD learners' academic achievement in this study. The eta square showed a larger scale contributing effect, such the estimated marginal mean for socio-economic status of ASD learners' participants from high, medium and low status as recorded using the post-test mean score showed that participants from medium SES had a highest mean, than those from high and low socio-economic status. Such this study positioned that ASD learners

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who are of medium socio-economic status as better performer and achiever in their academic pursuits.

Hypothesis five showed that there is no significant interaction effect of AFLAT strategies (treatment) and gender (male & female) on academic achievement of ASD learners in inclusive schools, such the null hypothesis of no significant effect was accepted. The eta square value of showed a larger contributing effect, such the estimated marginal means recorded for the two groups (experimental and control) showed that, in the treatment group, the female ASD leaners had a higher mean than their male counterparts. In the control group the female participants also had higher mean than their male in this study. It was evident that the interaction of treatment and gender had better effect on academic achievement of female learners with ASD.

Hypothesis six showed that there is no significant interaction effect of AFLAT strategies (treatment) and location of residence on ASD learners' academic achievement, such the null hypothesis was accepted. The eta square showed medium scale contributing effect. The location of residence was grouped as urban and sub-urban areas and for treatment (AFLAT strategies) and control group. The estimated marginal means for treatment group in urban area showed a higher mean than that of the sub-urban area. This implied that the interaction of treatment and location of residence had better effect on academic achievement of urban learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools than their sub urban counterparts. For the control group, the participants who were in sub-urban areas had a higher mean than their counterparts in urban areas. This implied that the interaction of treatment and location of residence had better effect on academic achievement of sub-urban learners with Autism Spectrum Disorder who were exposed to AFLAT strategies in Nigerian inclusive schools than their urban counterparts. In this study,

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the parents of ASD learners in sub-urban location, exposed their children to vocational skill development activities; such as carpentry, farming, arts and others as after school engagement activities.

Hypothesis seven showed that there is no significant interaction effect of AFLAT strategies (treatment) and socio-economic status on academic achievement of ASD learners in Nigerian inclusive schools. This was evident in the result, such the null hypothesis was accepted. The eta square showed minimal contributing effect, such the estimated marginal means grouped socio-economic status here as low, medium and high status for both treatment and control group. Such the result showed that in the treatment group; participants who are from high socio-economic status or background had a higher mean, it was followed by those who are from the medium status, while ASD participant in the low status had the least mean respectively. In the control group; ASD participants from medium SES had the higher mean, followed closely by ASD participants from high SES status and the low status had the least mean respectively. This study, established that the interaction of treatment and socio-economic status had better effect on academic achievement of ASD participants who have high socio-economic status or background in the treatment group than their counterparts in the same group; and other participants in the control group respectively.

5.2 Conclusion

This study revealed that AFLAT-strategies were relevant academic aptitude improvement procedural strategies for aiding the achievement of Autism Spectrum Disorder learners who attend inclusive schools in Nigeria. On the basis of the findings, this study concluded:

That there was a significant main effect of AFLAT strategies on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. The study further

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established that there was no significant main effect of gender on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. It was confirmed that there was a significant main effect of location of residence on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. Conclusion was drawn from the fact that there was no significant main effect of socio-economic status on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools.

It was further concluded that there was no significant interaction effect of AFLAT strategies (treatment) and gender on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. It was affirmed that there was no significant interaction effect of AFLAT strategies (treatment) and location of residence on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools. This study established that there was no significant interaction effect of AFLAT strategies (treatment) and socio-economic status on academic achievement of learners with Autism Spectrum Disorder in Nigerian inclusive schools.

The results were evident that there were main effect and interaction effect of AFLAT strategies on ASD learner's academic achievement in various capabilities, status and exposure. These were further revealed in the magnitude of variance shown in AFLAT strategies (eta-square contributing effect size) and estimated marginal means for each of the moderating variables (gender, location of residence and socio-economic status) that were subjected to test in this study in the represented geographical areas in Nigeria. In addition to the results, it was further observed that female ASD participants are better respondents than the male ASD participants. This was attributed to the motor skill and socio-interaction cognition that the female ASD learners displayed, during the study. Despite, not observing maximum logical response from

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some of the female ASD's learner's engagement with AFLAT strategies, there were evident observations that showed progressive improvement in the learning process of this category of learners.

Another observation was evident in the extent of readiness shown by educators in the study-schools, and with the parents of the participants. Some of the educators participated fully in the training's sections and indivdualised-sessions that were set in place for them, while other did not. They were consumed with the conventional strategies, such that they were not ready to accept the changes that they had observed with AFLAT strategies. The parents were also eager to receive information that would enhance their understanding about their children's condition. This led to a request for one-on-one session with the researcher, who had discussions with individual parent about their child's learning progress.

The core purpose of Academic Functional Learning Aptitude Test (AFLAT) strategies is to identify ASD learners' academic and aptitude potentials. This was aimed at enhancing the functionality of ASD learners in inclusive schools. It was also observed that most ASD learners who had been initially neglected by their teachers over the sessions, were beginning to show progressive improvement in social, behaviour and academic learnings. It was further observed during the cause of this study that ASD cases from south-eastern region exhibited more cognitive potentials than ASD cases from the other regions. The parents, who had shown signs of desperate need and solutions for their children's progress among their peers are beginning to gain confidence in the procedures of AFLAT strategies, because of the immediate evident progress that they had observed in their children's learning within the six weeks of the study. Educators, who participated in this study had gained insights on how to support ASD learners and learners who have other SEN-D conditions. All these were achieved, despite the fact that

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there were no equipped facilities in the schools that support inclusive learning. More still, the scheme of work or content of study were not drawn in consideration of the learners with impairment. AFLAT strategies and procedures improvised learning strategies with available resources that were on each school's facilities to accomplish the progress recorded, which in actual fact can be better where the structural facilities, systems of operation and pedagogical features support inclusive learning.

In conclusion, AFLAT-strategies has shown immediate progressive relevance in improving the learning performance and consequently the achievement of ASD learners in inclusive schools. It had also expanded the levels of information that is required for accessing the long-awaited teaching-learning procedural knowledge that educators in inclusive schools that is required for effective and functional learning outcome of autism spectrum disorder learners and other learners with special learning conditions.

5.3 Recommendations

The learners who live with special learning conditions, especially autism spectrum disorder, have been side-tracked over the years in various schools, especially in the inclusive schools. The concept of inclusion was propounded in other to ensure equity for all humans irrespective of their conditions – social, psychological, emotional, academics, physical, geographical and backgrounds that these divergent individuals may have. The focus of individuals in this study is the neuro-divergent individual with Autism Spectrum disorder, who attend inclusive schools in Nigeria. This group of learners have been identified to exhibit aptitude that have remarkable functionality in various sectors in the economic spheres of life. Such the need to explore the learning pattern of ASD learners. This is so as to ensure that the categories of learner are seen

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as relevant individuals to the growth and development of the Nigerian economic and society at large. In view of this, the following recommendations are expressed in this study:

i. The functionality of academic procedures should be explored using AFLAT-strategies for all learners irrespective of the learning conditions.

ii. The procedural guideline for inclusive education and special education needs should explore and adopt AFLAT procedures as standardised approach for teaching-learning curriculum of study.

iii. AFLAT- strategies should be used as standard teaching-learning procedures for both academic (cognition), extra-academic (vocational -aptitude) and mastery skills using hand-on procedures with affective (soft-skills) application.

iv. Policymakers and curriculum developers should seek to explore the magnitude of these strategies, so as to infuse same into the Nigerian Curriculum study plan.

v. Various cases of impaired conditions that are categorised as intellectual disabilities should be explored and treated separately through research studies, using AFLAT strategies with the unique interventions for maximum functionalities of these unique cases.

vi. Stakeholders in the medical, education and social inclusion sectors should engage the procedures of AFLAT- all-round learning strategies and development. Life begins with the medical institutions, the family-which is the initial social inclusion agent that engages the responsibility of moulding social values in the individual, and the education sector, which is the agent responsible for nurturing structured career path in the individual. AFLAT strategies engages the infusion

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of these sectors in other to breed individuals who are relevant agent of economic change in the Nigerian marketplace.

5.4 Contribution to Knowledge:

This study contributes to knowledge with findings that records progressive evidence of better all-round improvement in the academic aptitude functioning of ASD learners in inclusive schools in Nigeria. It addresses the grey areas, as well as supporting areas in existing literature with focus on the main and interaction effect of AFLAT strategies on academic achievement of ASD learners by exploring the functioning skills and its application. The following are specific contributions that this study has provided to knowledge:

1. The study established that the treatment (AFLAT strategies) had main effect on the academic achievement of ASD learners in the Nigerian inclusive schools. This implied that AFLAT strategies showed effective improvement on the academic achievement of learners with ASD in Nigerian inclusive schools. The study provided a structured learning path in the areas of adopting flexible curriculum operation for ASD learners in inclusive schools.
2. The study established that gender had no main effect on ASD learner's academic achievement. This implied that gender is better recipient of the treatment of AFLAT strategies. It provided seamless structured pattern for meeting the individual gender's learning needs, especially in the areas of academics and aptitude improvement.
3. The study established that location of residence had main effect on ASD learners in urban areas. AFLAT strategies exposed the need to infuse technological innovations in teaching-learning procedures in other to improve ASD learner's functionality and achievement outcome.

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4. The study established that socio-economic status had no main effect on ASD learner's academic achievement. The study positioned that ASD from the medium socio-economic status performed better when AFLAT strategies were applied to the teaching-learning procedure.
5. The study established no interaction effect between gender and AFLAT strategies on the academic achievement of ASD learners in Nigerian inclusive schools. It exposed the principles of individualised and differentiated structures in inclusive practices, thereby creating more room for individual gender to adapt to the interventions raised for the learning functionality.
6. The study established no interaction effect between location of residence and AFLAT strategies on the academic achievement of ASD learners in Nigerian inclusive schools. This showed that the interaction of AFLAT strategies showed better performance on ASD learner's academic achievement, especially with learners in urban location.
7. The study established no interaction effect between socio-economic status and AFLAT strategies on the academic achievement of ASD learners in Nigerian inclusive schools. It revealed that the interaction of AFLAT strategies showed better effect on the performance on ASD learner's academic achievement, in higher socioeconomic status. This study exposed the need for social and economic structures to considered as relevant factors for academic improvement of ASD learners in inclusive schools.

Other contributions revealed in this study has exposed the aligning connection in the area of all-round individual development linked by the medical, education and social inclusion agencies, who are relevant contributors required to build the health, psychological and social wellbeing of the individual ASD learners in readiness for their functionality in the job market.

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Furthermore, this study has provided additional information in the area of AFLAT treatment strategies for solving the problems of SEN-D practices in the Nigerian inclusive schools.

5.5 Suggestions for Further Studies

Based on the findings and conclusion in this study, and in addition to the fact that this study covers specified area of needs, the study suggests that AFLAT strategies can be replicated among special learning conditions that are identified by the National Association of Persons with Disability (NAPWD) in Nigeria. It also suggests that the regions and states that are not covered in this study, can be explored using a replication of this study. The application of AFLAT strategies in teaching-learning procedures can also be studied for neurotypical learners in inclusive schools, so as to enhance the learning functionality of this category of learners as well. There is an essential need to develop framework for cost and benefit evaluation study of AFLAT for full implementation in the education industry and in relative functioning sectors, other researchers can begin to explore these areas of study for teaching learning improvement in Nigerian inclusive schools.

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Appendix I
Figures

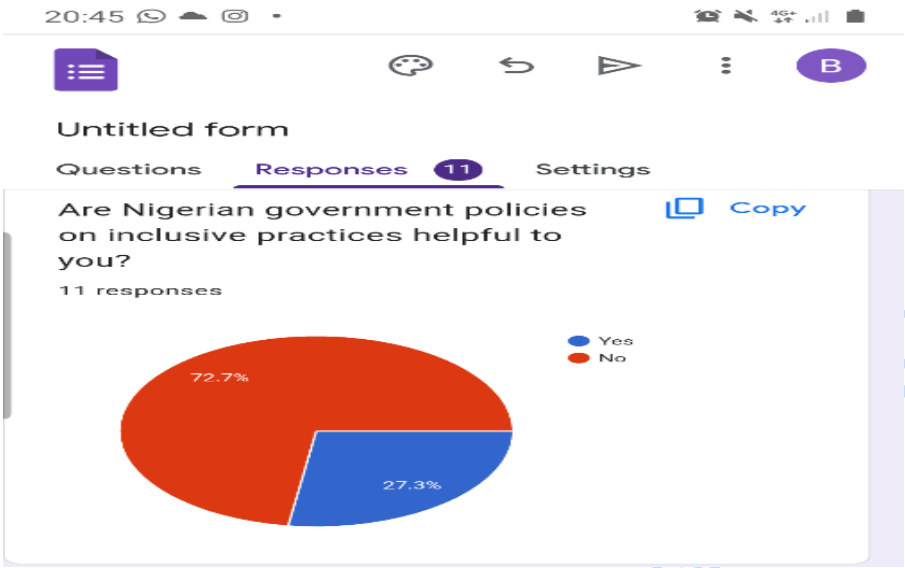

Figure 1.1a: Response Ratings about Nigeria Government Policies on Inclusive Practices

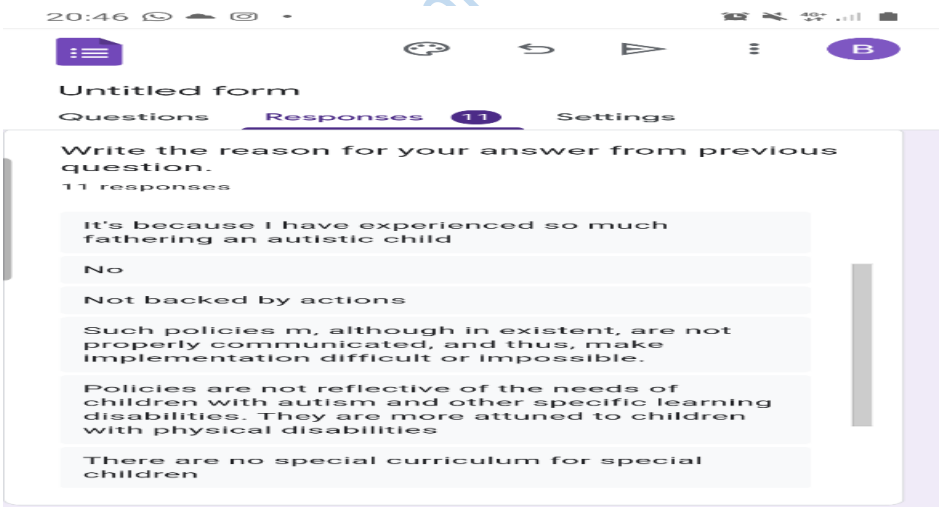

Figure 1.1b: Response Ratings about Nigeria Government Policies on Inclusive Practices

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Appendix II
Tables

Table 2.1.7: Strategies and Key Activities to Adopt in the Practice of Inclusion

UNESCO Endorsed Standard 2017
Strategy 5 Improving institutional support for inclusive teaching i.e. make teaching interesting, more effective and efficient to enhance learning. (Targets 1 and 7) Key Activities • Establishment of allowances for teachers and caregivers taking on significant extra duties to promote inclusion, based on a set of criteria. • Regular promotion of teachers/facilitators and supporting staff members. • Employment of other service providers for special needs learners. • Creating Teacher/learners' ratio that is result oriented. • Recruitment of relevant personnel including: counsellors, care givers, audiologists, sign language teachers and interpreters, social workers, low vision experts, psychologists, physiotherapists, etc. • Adapt teaching methods and local languages peculiar to the environment to enhance teaching and learning. • Provide appropriate specialized facilities to address identified learning difficulties. • Establish functional Guidance and Counselling Units in all schools.

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- Earmark flexible extra time and appropriate methods for testing and examining children who have difficulty accessing standard tests.
- Provision of appropriate musical and laboratory facilities/materials to support teaching and learning.
- Provision of basic instructional materials for children with disabilities e.g. Braille materials for learner with visual impairment, hearing aid, magnifiers, large print materials, assistive technology/devices etc.
- Provision of school/home support especially for learners with severe and multiple disabilities

Focus for Consideration:

The teaching-learning strategies in inclusive setting require the teacher, facilitators, caregivers and parents to adopt skills and competence in the techniques/approach required for passing instructions or monitoring the routines set for the learners. The techniques should factor in the fact that the learners are unique in their learning abilities, such teaching-learning instructions must explore very simple, flexible and prompt linking of concepts that will enable the learners understand the lessons' targets (objectives of the teacher and the learners' personal target).

It is important for this strategy to explore avenues by which the teachers can acquire and master skills in teaching strategies, activities development and item constructions in such a way that the learners will be engaged with creative and quick prompt self-activities within the lesson.

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For teaching-learning to be efficient and effective, the teachers should be engaged with the technicalities involved in passing instructions to the learners in such a way that they can identify and link the concepts to their daily life experience. More still the teaching- learning outcome should be effective enough to ensure that the learners can performance the listed objectives, independently, irrespective of their physical or psychological abilities.

Strategy 6 **Adaptation of Curriculum and Resource materials.**

(Target 3 and 5)

Key Activities

- Regular review and update of existing curriculum and associated assessments to incorporate Inclusive Education at all levels
- Support research, development and distribution of reviewed Curriculum and Resource Materials to end users
- Encourage improvisation and creative development of resource materials in schools by teachers and students

Focus for Consideration:

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In this era of mid-21st century, technological development is rapidly advancing, with updated information and evolution of concepts. Virtually all areas of learning have continuous evolution of concepts.

Such, curriculum should be updated to include the following:

- Scheme of work
- Tasks to achieve in each lesson.
- Tasks to performance
- The expected learning outcome or required achievement for a given lesson.

Strategy 7 Rehabilitating and Upgrading Special Schools to Serve as Resource Centres. (Target 7 and 1)

Key Activities

- Expand the inclusive status of special schools by accommodating a wide range of learners, including learners without disabilities
- Provision of teaching and learning equipment in special schools to support in-service practical training for regular teachers/facilitators.
- Encourage special schools/resource centres to collaborate and partner with mainstream schools
- Organise training for teachers in the mainstream schools in close cooperation with teachers in the special schools

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- Teachers from the special school reach out to provide support to teachers in the mainstream schools through, e.g. peer learning, follow up workshops, sharing lesson learnt and knowledge gained

Focus for Consideration:

When considering the rehabilitation and upgrading of special schools and centres to become mainstream schools, it is important for this to take the following into consideration:

- School's structural facilities
- School's utilities and teaching-learning equipment.
- Teachers' continuous profession development.
- Teaching-learning procedural strategies.
- Required learning resources.

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Appendix III
Specified Achievement Test (SAT)
(Guided Assessment)
(Lower Functioning)

DATE OF ASSESSMENT: _____

TIME OF ASSESSMENT: _____

CHILD'S AGE: _____

GENDER: _____

FIRST NAME	
MIDDLE NAME	
SURNAME	

READ THESE INSTRUCTIONS FIRST:

Write your names in the spaces at the top of this page.
Write in dark blue or black pen for upper grade and clear HB pencil for lower grade.

ANSWER ALL QUESTIONS.

Read all subject instructions before you answer.
Ensure you read over your work when you are done.
The number of score for each question is given in brackets [ ] at the end of each question.

TOTAL SCORE	Assessor	Checker	Evaluator
	Score	**Score**	**Score**
	Sign	**Sign**	**Sign**

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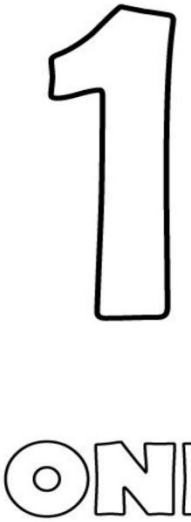
Number Reasoning

Use your finger to identify the numbers:

Colour 1 red **Colour 2 blue** **Colour 3 green**



ONE





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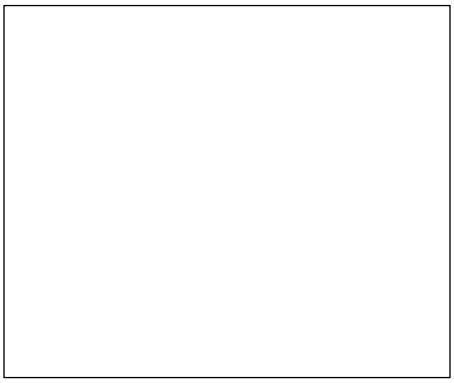
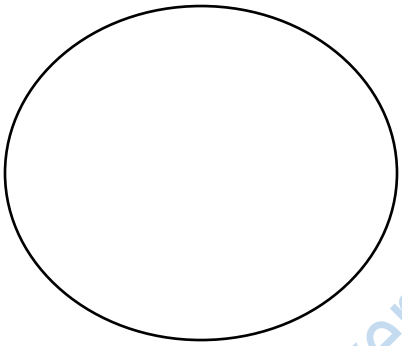
Spatial Reasoning:

Colour in the part of the shapes





Practical (outdoor) Activities:

2. Identify, point to or bring: objects which have any of the shapes above.

3. Building activities using blocks, and links with numbers 1 – 7

4. Walk on a straight line.

5. Pick an object and put on a mat.

6. Identify plain shapes on the field/classroom.

7. Lead your teacher to the field (or any location chosen by the assessor).

8. Pick school material off the shelf (show how to work with the material.

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Picture Reading:





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Routine Links (Meals):

Put a circle around four (4) healthy food that you can eat for breakfast:







ice cream





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Specified Achievement Test (SAT)
(Guided Assessment)
(Higher Functioning)

DATE OF ASSESSMENT: _____

TIME OF ASSESSMENT: _____

CHILD'S AGE: _____

GENDER: _____

FIRST NAME	
MIDDLE NAME	
SURNAME	

READ THESE INSTRUCTIONS FIRST:

Write your names in the spaces at the top of this page.
Write in dark blue or black pen for upper grade and clear HB pencil for lower grade.

ANSWER ALL QUESTIONS.

Read all subject instructions before you answer.
Ensure you read over your work when you are done.
The number of score for each question is given in brackets [ ] at the end of each question.

TOTAL SCORE	Assessor	Checker	Evaluator
	Score	**Score**	**Score**
	Sign	**Sign**	**Sign**

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Use the numbers below to answer the questions:

7 0 1 2 3 5 6

1.Which is the biggest number? Write it: _____

2.Which is the smallest number? Write it: _____

3.Rewrite the numbers from the smallest to the biggest.



4. If we write the number in order of reading, which number is missing? _____

5.Look around the classroom:

What is your favourite learning material? _____

Bring 2 of your favourite materials _____ & _____

6.What can you do with the materials? _____

Outdoor Activity:

7.Walk along the line 2 times _____

8.Let jump as we skip 7 times _____

9.What activity can you do? _____

10. Say how many times you which to do this and do it. _____

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Spatial Reasoning:

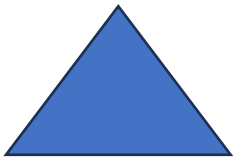
Look at the shapes, say the names of each.



_____



_____



_____



_____

Practical (outdoor) Activities:

2. Identify, point to or bring: objects which have any of the shapes above.

3. Building activities using blocks, and links with numbers 1 – 7

4. Walk on a straight line.

5. Pick an object and put on a mat.

6. Identify plain shapes on the field/classroom.

7. Lead your teacher to the field (or any location chosen by the assessor).

8. Pick school material off the shelf (show how to work with the material.

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Picture/Text Reading & Comprehension:

Read these words:

eyes **legs** **cat**

Identify the picture, read the sentence



It is a _____.



Dogs have 4 _____.



She has 2 _____.

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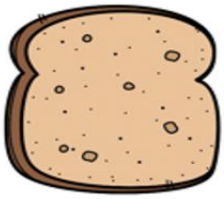
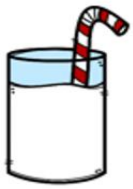
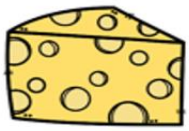
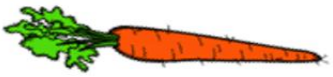
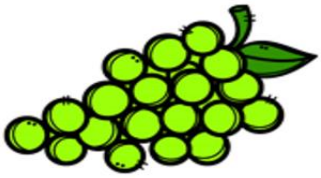
Practical Exercise:

Identify and tell the story connecting the life of busy people (Occupation)

Routine Links (Meals):

Put a circle around four (4) healthy food that you can eat for breakfast:

 wheat bread	 ice cream	 chicken
 corn	 candy	 milk
 cheese	 cotton candy	 carrot
 candy	 yogurt	 gr

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Appendix IV

Academic Aptitude Assessment Report (AAA-R)

(Lower Functioning ASD learner)

Aim: To determine the child's learning aptitude upon exposure to independent learning procedures.

Purpose: To produce an Independent Functional-Learning – (IFL) programme for child's (Individual Practical Display - IPD) Skills.

Date Taken: _____

BIODATA:

NAME: CTIS/NG-RI/SS/001

AGE: _____

GENDER: _____

LOCATION (Urban or suburban): _____

SES (low medium high): _____

CURRENT CLASS: _____

LEVEL OF ASSESSMENT CONDUCTED: _____

PRIMARY LANGUAGE OF COMMUNICATION: _____

PERIOD TAKEN: _____

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S/N	TASK	SPECIFIC OBSERVATION	Scale					Item Total score
			5	4	3	2	1	
	Numeracy skill	Able to count objects.						
		Able to work with required instruction.						
		Held pencil appropriately.						
		Could write 1 & 2						
		Listened carefully to instruction.						
		Could match numbers on puzzles						
		Able to associate colours with objects						
		Shows distinctive colouring pattern.						
		Count knowing the terminal point.						
		Able to initiate owns action using numbers.						
	Spatial Reasoning	Able to hold pen/pencil firmly.						
		Say the name of given shape.						
		Link shape with life object.						
		Associate colours given with shapes						
		Match shapes with puzzles						
		Able to say the name of the shape.						
		Recognises natural colours of objects						
		Able to associate shapes with visible life object.						
		Able to write the first sound of the name of shapes.						
		Recognizes shapes on playground.						
	Picture decoding	Showed patience while studying the picture.						
		Displayed eye movement around the picture areas.						
		Showed prompt understanding of the required.						
		Respond to questions correctly.						
		Displayed nonchalance toward interaction						
		Able to say sentence from the picture viewed						
		Stirred at pictures with no attempt of response.						
		Displayed legible writing skills.						
		Became distracted when options are incorrect.						
		Expressed slight tantrums at any stretch in reasoning						
	Logical activities	Display careful observation while looking at objects						
		Holds pencil firmly.						
		Worked with the aimed of reaching target.						

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		Displayed certainty of purpose aimed getting result.							
		Used colours to achieve the target.							
		Show focus while performing task.							
		Could interact in a sequential approach.							
		Able to identify the connective edges of objects.							
		Able to link next shape in the rolls.							
		Could attend to multiple instructions.							
	Non-verbal reasoning	Sustained steady pattern of eye movement.							
		Showed prompt grasp of required concept.							
		Showed distraction after certain attempts.							
		Gives full attention during activities until when done.							
		Ensured appropriate options are selected.							
		Able to sort and fix code patterns easily.							
		Able to recognise relationship in patterns.							
		Able to recognise visual sequences in patterns.							
		Displayed understanding of the concept.							
		Remembered visual sequence upon first eye contact.							
	Speech	responds to 1-3 words heard from television.							
		Able to response in 3-5 words-sentence.							
		Expressed moral actions in words with peers.							
		Displayed eye contact when interacting with peers.							
		Asked for exits request using verbal interactions.							
		Act consciously in response to situational conditions.							
		Murmurs or hums words audibly.							
		Speaks to express an understanding of instructions.							
		Respond to instructions without speaking.							
		Takes turn during peer interaction in social gathering.							
	Routine Links	Work within specified general instructions in class.							
		Understands actions required for specific task.							
		Operates within the space apportioned in class.							
		Able to link situational action with text required.							
		Able to walk on a straight line as instructed							
		Able to recognise objects relative to life experience.							
		Able to link the instruction with the required task.							
		Able to work independently.							
		Able to work with prompts							

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		Showed limited display of stretched understanding							

Key:

Satisfactory	**5**
Very Good	**4**
Good	**3**
Fair	**2**
Ungraded	**1**

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Academic Aptitude Assessment Report (AAA-R)

(Higher Functioning ASD learner)

Aim: To determine the child's learning aptitude upon exposure to independent learning procedures.

Purpose: To produce an Independent Functional-Learning – (IFL) programme for child's (Individual Practical Display - IPD) Skills.

Date Taken: _____

BIODATA:

NAME: CTIS/NG-RI/SS/003

AGE: _____

GENDER: _____

CURRENT CLASS: _____

LEVEL OF ASSESSMENT CONDUCTED: _____

PRIMARY LANGUAGE OF COMMUNICATION: _____

PERIOD TAKEN: _____

S/N	TASK	SPECIFIC OBSERVATION	Scale					Item Total score
			5	4	3	2	1	
	Numeracy skills (Mathematics/Arithmetic)	Able to say/match single digits						
		Worked with required instructions						
		Wrote number appropriately without assistance.						
		Able to say numbers that are identified in 0 – 7						
		Able to identify missing numbers						
		Able to identify the bigger number of the listed.						
		Able to identify the smaller number of the listed.						
		Wrote numbers in sequentially.						
		Able to numbers with required activities.						
		Able to initiate owns action using numbers.						
	Spatial Reasoning (in text)	Able to hold pen/pencil firmly.						
		Able to count sides of each shape.						
		Able to determine when counting is required.						
		Able to link shape with puzzles.						

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		Able to draw shape.							
		Able to say the name of the shape.							
		Able to identify the difference among the shapes.							
		Able to associate each shape with visible life object.							
		Able to write the names of each shape in words.							
		Able to draw each shape within the space required							
	Picture decoding	Showed patience while studying the picture.							
		Displayed eye movement around the picture areas.							
		Showed prompt understanding of the required.							
		Filled in space for each solution required.							
		Need multiple prompts to complete task.							
		Able to read 3 to 6 words sentences.							
		Say response using 1-3 words.							
		Displayed legible writing skills.							
		Got distracted at intervals.							
		Expressed slight tantrums at stretched intervals.							
	Logical activities	Display careful observation while looking at the field.							
		Made appropriate use of space.							
		Displayed reasoning ability aimed at reaching target.							
		Displayed certainty of purpose aimed getting result.							
		Used drawing to achieve the target.							
		Show focus while performing task.							
		Understands relationship between the visual concepts.							
		Able to identify the connective edges in life objects.							
		Link connective space in hallway							
		Solved problems associated with connective shape.							
	Non-verbal reasoning	Sustained steady pattern of eye movement.							
		Showed prompt grasp of required concept.							
		Showed distraction after certain attempts.							
		Gives full attention during activities until when done.							
		Ensured appropriate options are selected.							
		Able to sort and fix code patterns easily.							

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		Recognises immediate relationship between patterns.							
		Able to recognise visual sequences between patterns.							
		Displayed understanding of task.							
		Remembers visual sequence upon first eye contact.							
	Speech	Respond to 1-3 words heard from television.							
		Respond to 3-5 words-sentence.							
		Expressed moral actions in words with peers.							
		Displayed eye contact when interacting with peers.							
		Asked for exits request using verbal interactions.							
		Act consciously in response to situational conditions.							
		Murmurs or hums words audibly.							
		Speaks to express an understanding of instructions.							
		Respond to instructions without speaking.							
		Takes turn during peer interaction.							
	Routine Links	Able to identify healthy meals							
		Able to identify unhealthy meals.							
		Able to combine specified healthy meals.							
		Able to link situational action with text requirement							
		Able to create own dress up sequence choosing from varieties of related objects.							
		Able to recognise objects relative to life experience.							
		Able to link the instruction with the required task.							
		Able to work independently.							
		Able to work with prompts							
		Showed limited display of stretched understanding							

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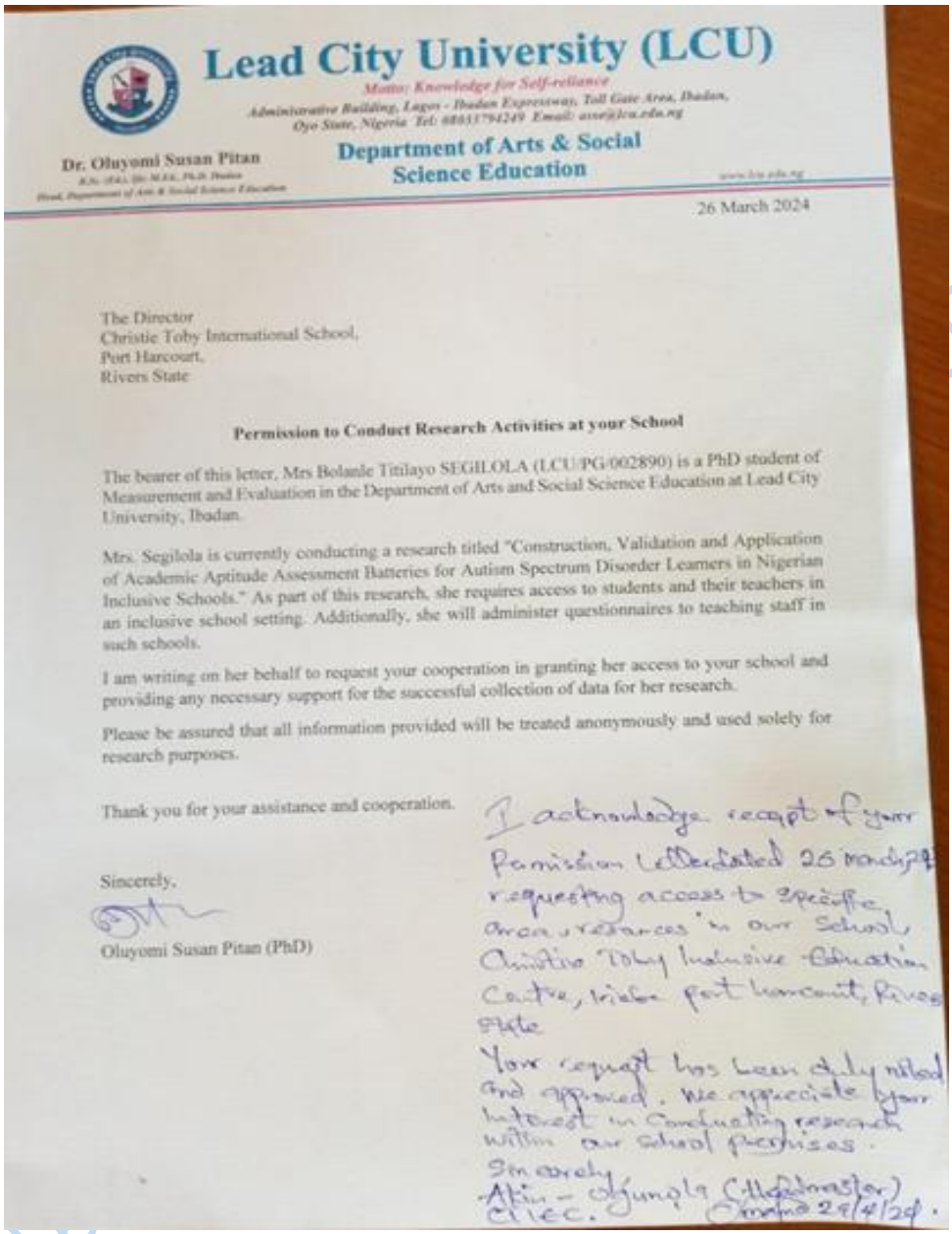
Appendix V

Letters of Approval Obtained



Lead City University (LCU)

Motto: Knowledge for Self-reliance

Administrative Building, Lagos - Ibadan Expressway, Toll Gate Area, Ibadan, Oyo State, Nigeria Tel: 08053794249 Email: asse@lcu.edu.ng

Department of Arts & Social Science Education

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Dr. Oluyomi Susan Pitan
B.Sc. (Ed.), Dr. M.Ed., Ph.D. Ibadan
Head, Department of Arts & Social Science Education

26 March 2024

The Director
Christie Toby International School,
Port Harcourt,
Rivers State

Permission to Conduct Research Activities at your School

The bearer of this letter, Mrs Bolanle Titilayo SEGILOLA (LCU/PG/002890) is a PhD student of Measurement and Evaluation in the Department of Arts and Social Science Education at Lead City University, Ibadan.

Mrs. Segilola is currently conducting a research titled "Construction, Validation and Application of Academic Aptitude Assessment Batteries for Autism Spectrum Disorder Learners in Nigerian Inclusive Schools." As part of this research, she requires access to students and their teachers in an inclusive school setting. Additionally, she will administer questionnaires to teaching staff in such schools.

I am writing on her behalf to request your cooperation in granting her access to your school and providing any necessary support for the successful collection of data for her research.

Please be assured that all information provided will be treated anonymously and used solely for research purposes.

Thank you for your assistance and cooperation.

Sincerely,

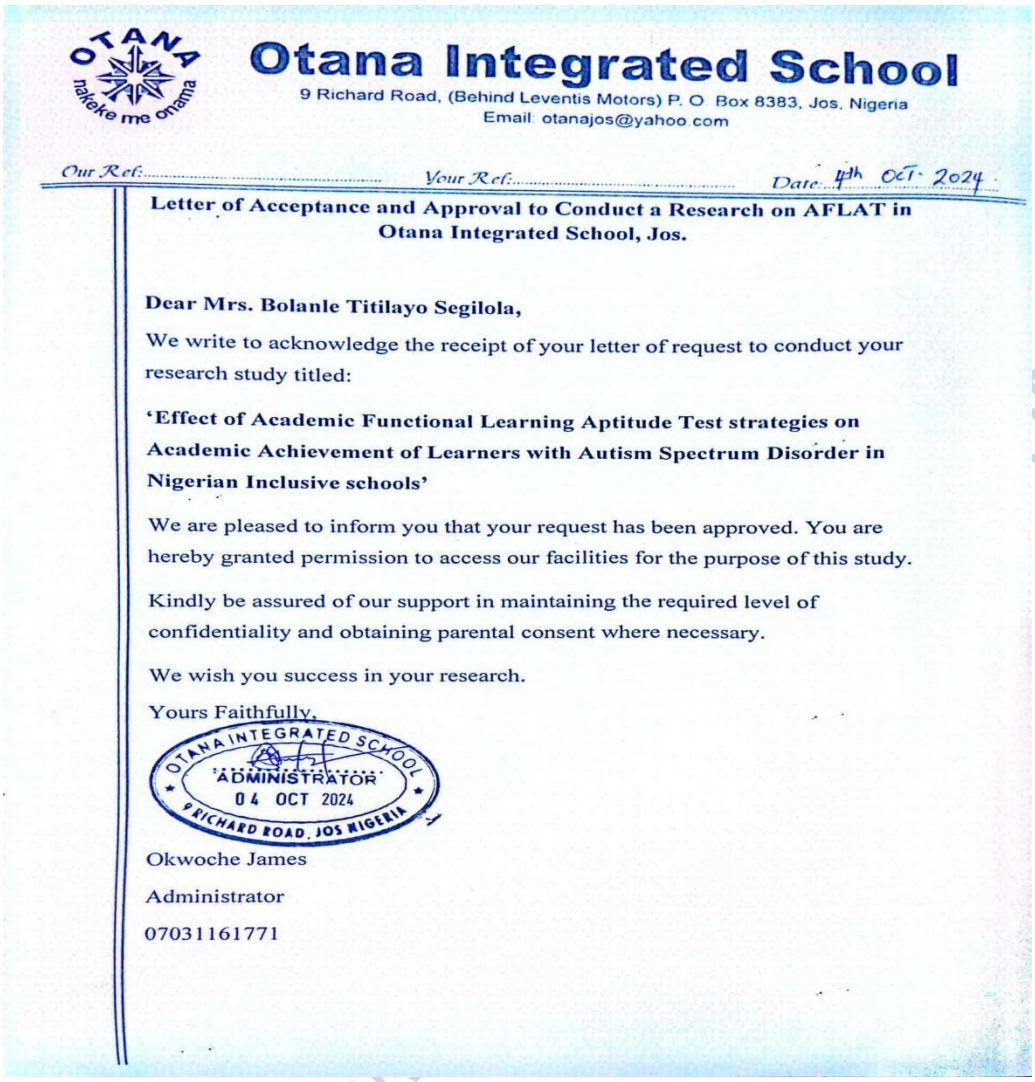
Oluyomi Susan Pitan (PhD)

I acknowledge receipt of your Permission Letter dated 26 March 24 requesting access to specific area, resources in our School, Christie Toby Inclusive Education Centre, Kiebe Port Harcourt, Rivers State

Your request has been duly noted and approved. We appreciate your interest in conducting research within our school premises.

Sincerely
Akin - Ogunola (Headmaster)
CIIEC.
29/4/24.

COPY



Otana Integrated School

9 Richard Road, (Behind Leventis Motors) P. O Box 8383, Jos, Nigeria
Email: otanajos@yahoo.com

Our Ref:..... Your Ref:..... Date: 4th Oct. 2024

Letter of Acceptance and Approval to Conduct a Research on AFLAT in Otana Integrated School, Jos.

Dear Mrs. Bolanle Titilayo Segilola,

We write to acknowledge the receipt of your letter of request to conduct your research study titled:

'Effect of Academic Functional Learning Aptitude Test strategies on Academic Achievement of Learners with Autism Spectrum Disorder in Nigerian Inclusive schools'

We are pleased to inform you that your request has been approved. You are hereby granted permission to access our facilities for the purpose of this study.

Kindly be assured of our support in maintaining the required level of confidentiality and obtaining parental consent where necessary.

We wish you success in your research.

Yours Faithfully,

OTANA INTEGRATED SCHOOL
ADMINISTRATOR
04 OCT 2024
9 RICHARD ROAD, JOS NIGERIA

Okwoche James
Administrator
07031161771

Lead City University COPY

Bio-data of Reseacher

Personal Data:

Surname:	Segilola
First name:	Bolanle
Other names:	Titilayo
Date of Birth:	08th August, 1970
Place of Birth:	Lagos State
Nationality:	Nigerian
State of Origin/LGA:	Surulere Central

Education:

Lead City University, Ibadan
2022 – till date: Ph.D. Measurement & Evaluation (in view)
University of Lagos, Akoka
2001 – 2002: Master of Education (Test, Measurement & Evaluation)
CGPA: 4.2 of 5.0
Thesis: "Continuous Assessment and Attitude as Predictors of Chemistry Achievement Scores in Senior Secondary School Certificate Examination In Agege Local Education District, Lagos State."
Lagos State University, Ojo
1989 – 1994: Bachelor of Science (Education) Chemistry
CGPA: 3.33 of 5.0
Thesis: "Continuous Assessment and Aptitude as Determinant of Chemistry Achievement in Senior Secondary School in Ojo Local Education District, Lagos State."
Baptist High School, Jos Plateau State
1982 – 1987: West African Examination Certificate (WAEC)
Joint Admission and Matriculation Board Examination (JAMB)
Federal School of Arts & Science, Lagos.
1988: West African Examination Certificate (WAEC)
& General Certificate of Education (GCE)

St. Teressa's Girls School, Jos Plateau State
1979 – 1982: First School Leaving Certificate
Our Lady of Apostle Primary School, Yaba, Lagos
1976-1979 (transferred in Primary 3)
Bright Star Nursery School, Bariga, Lagos
1973-1975 (Nursery school)

Work Experience:

MOTEB Educational Services, Lagos, Nigeria
2009 -till date: Director of Services
Yaba College of Technology, Yaba Lagos.
Part-Time Lecturer
Lagos State University, Lagos
Part-time Lecturer
Palm springs International School
2003-2007: Head of Academic Studies
Greensprings School, Lagos

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2002-2003: Classroom Teacher

CTC International School, Ikeja, Lagos

1997-2002: Chemistry Teacher (Head of Department)

Total Child Nursery & Primary School, Ilorin, Kwara (National Youth Service Corp (NYSC)

1995 – 1996 Classroom Teacher

Awori College, Ojo Lagos

1993 (Teaching Practice)

Skills and Achievement:

Lead City University Innovation Award: (Top 10 Finalist Outstanding Achievement- AFLAT Tool): 2025

Redeemer International Leadership Academy (Deputy Governor): 2021

Institute of Chartered Accountant of Nigeria (ICAN)
(Prolific Writer Award): 2012

Christ The Cornerstone International School (CTC) (Award of Teaching Excellence): 1999

National Youth Service Corps (NYSC) (Commendation Award): 1997

Science Teacher Association of Nigeria (STAN – Lagos Chapter)

Teachers Registration Council of Nigeria (TRCN)

American Psychological Association (APA-Affiliated Member).

The Teaching Network Foundation (TTNF – Coordinator Lagos).

National Autistic Society UK (NAS-UK- Member)

Association of Educational Researchers & Evaluators (Lagos Chapter)

Other:

Redeemed Christian Church of God – Senior Minister – 2008 – till date

Redeemed Christian Church of God - Sunday School Teacher – 2016 till date

Redeemed Christian Church of God – Mentor, Writer & Editor (Publication Unit) 2024 till date.

Community service government Schools on innovative problem-solving/critical thinking approach to teaching & learning (2019)

Hobbies and Interest:

Team spot, meeting people, Travelling, Reading, Writing and Cooking.

Reference:

Lead City University Ibadan DO NOT COPY

Donald A. ODELEYE (Professor)
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Assistant Director - HRM
Citizenship and Leadership Training Centre, Abuja
Phone: +234 803 910 0943
Email: paulineeni@yahoo.com



Signature

28/07/2025
Date

Lead City University Ibadan DO NOT COPY

Research Photo Views

South-south Region (Rivers State-Port Harcourt)



The Research with the Proprietress and Management Staff of Christy Toby Inclusive School



The Researcher applying individualized and grouped approach of AFLAT strategies in Language Study Lessons

North-central -1 Region (Federal Capital Territory FCT - Abuja)





The Researcher training the teachers in North-central -1 Region on AFLAT strategies (Federal Capital Territory FCT - Abuja)

North-central -2 Region (Plateau State - Jos)



The Research with the Management Staff of Otana Integrated School

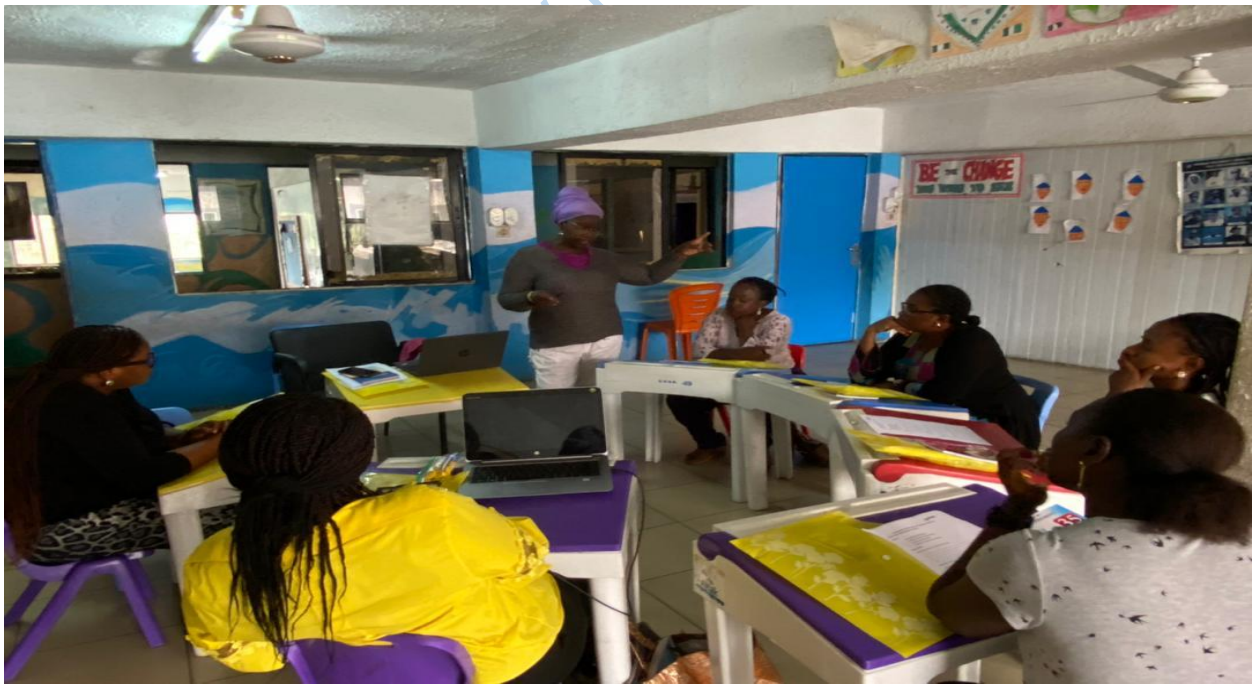


The Researcher and Staff of Otana Integrated School Jos at the end of the 6-weeks field section.

South-west Region (Oyo State)

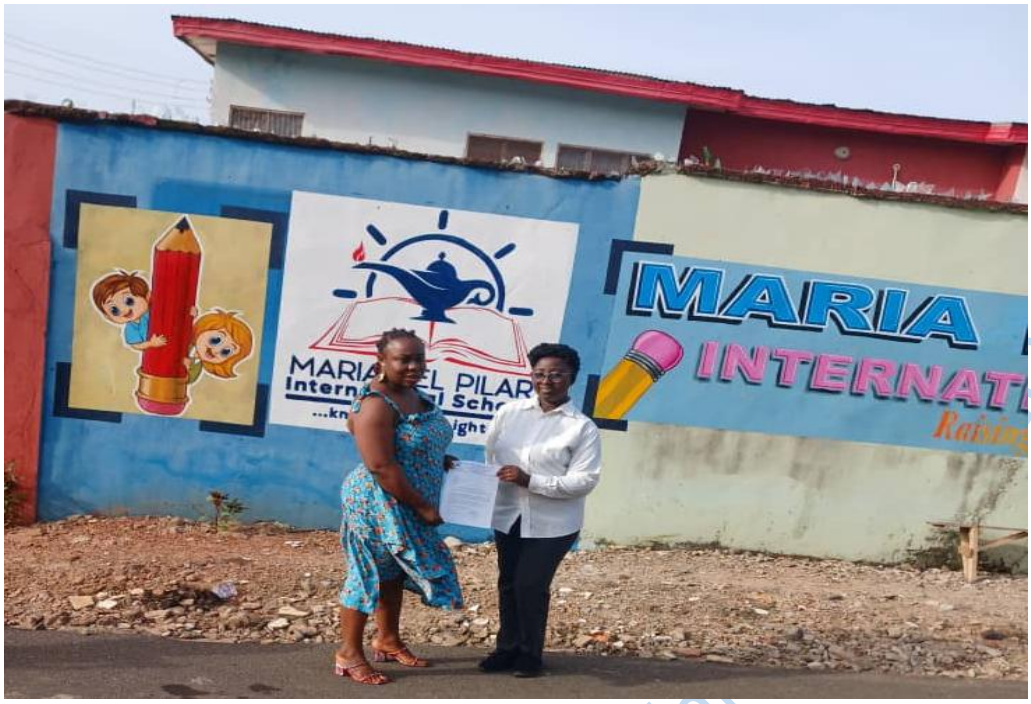


The Researcher and the Management Staff



The south-west teachers and facilitators during AFLAT training

South-east Region (Enugu State)



The Researcher and the SEN-D Coordination of Maria Del Pilar School Enugu



The Researcher with the Proprietress and the Management Staff.



The Researcher and her assistant in South-east Region

Lead City University Ibadan COPY

The University Compliance Certification

This is to certify that this thesis by Bolanle Titilayo SEGILOLA with Matriculation Number; LCU/PG/002890 in the Department of Arts and Social Science Education, Faculty of Education, Lead City University, Ibadan, Oyo State is in full compliance with the approved Umiversity format and style.

Signature 22/08/2025 **Date**

Lead City University Ibadan DO NOT COPY