

Aptitude Test as Determinant of Academic Achievement of Special and Neurotypical Learners' Aptitudinal Display in Nigerian Inclusive Classrooms

¹*Bolanle Titilayo SEGILOLA*

segilola.bolanle@lcu.edu.ng or btys70@yahoo.co.uk

+234 802 717 8577

&

²*Kehinde Oladele LATEEF*

lateefkehindedr@gmail.com

+234 803 042 2573

^{1,2}*Lead City University, Ibadan, Oyo State*

Abstract

Sustainable Development Goal 4 emphasises equitable learning opportunities for all learners, regardless of ability or condition. Ensuring equal classroom participation is for developing learners' skills, self-esteem, and competencies needed for future employability. This study compared the learning aptitude of special learners-Autism Spectrum Disorder (ASD), Attention Deficit Disorder (ADD), and Attention Deficit Hyperactivity Disorder (ADHD)-with neurotypical learners in classroom activities across five states, including the Federal Capital Territory, Abuja. The comparison was guided by socio-emotional and metacognition theories for neurotypical learners and integrated behaviour management and constructivist theories for special learners. The study examined differences in academic achievement and gender between Special Educational Needs and Disabilities (SEN-D) learners and neurotypical learners using academic aptitude support strategies. An experimental design was adopted, involving 66 special learners and 77 neurotypical learners selected through multi-stage sampling. Data were collected using an academic aptitude test with a reliability coefficient of $r = 0.781$. Four hypotheses were tested at the 0.05 significance level, and independent t-tests were used to compare mean differences in academic achievement. Findings revealed significant difference in neurotypical learners' academic achievement across gender for both pretest and posttest scores ($P = 0.001 < 0.05$), resulting in rejection of the null hypotheses. In contrast, special learners' mean scores indicated no significant gender-based differences ($P = 0.228$ pretest; $P = 0.215$ posttest > 0.05), leading to acceptance of the null hypotheses. The study concluded that academic achievement improved for both groups and recommended integrating aptitude-based activities for special learners to foster inclusive learning practices.

Keywords: Aptitude Test, Special Learners, Neurotypical Learners, Academic Achievement

Word Count: 249

Introduction

The disability and development report on the discrimination act against persons with disability, besides its prohibition act, also pointed out the aim of inclusive practices as stated by the Sustainable Development Goals (SDG) for persons with disabilities. This report identified that the Secretary-General of the United Nations António Guterres (2020), called the consciousness of all concerned professionals to the realisation and the achievement of the set goals regarding the need for inclusive practices in all professional sectors. The crux of concern identified being the need for professionals to embrace the realities in the fact that the 2030 agenda for Sustainable Development can only be achieved with the full involvement of all without prejudice (NCPWD 2018). This plan is aimed at attaining the world's order for peace and prosperity for all, including the people living with disabilities. Such upholding inclusion not just as moral imperative but as practical necessity for all nations, including Nigeria (United Nations, 2016). This statement invoked the reset of priorities and restructure in the Nigerian education system, especially in the areas of the entire learning structure from cradle to career.

Despite various forms of advocacies for the practice of inclusion in all facets of life operations, it is evident that the persons living with disabilities are still faced with one form of set back or another. For instance, in the classification and identification of the various types of disabilities, the only recognised categories are; visual, hearing, physically, intellectual and recently added is the communication impairment (My Guide Nigeria, 2022 “Wikipedia,” 2024). These group of persons in the education sector are referred to as Special Education Need and Disabilities (SEN-D) or Special learners. The school setting for instances, are only able to recognise the persons with disabilities as those who struggle with receiving information that fit into the learning space and the school's structure or the school system. This information is embedded in the levels of instructions, strategies, activities and engagement that they required for learning. During classroom activities or learning for instance, there had been difficulty in the levels of impact made, as a result of the fact that the some of these special learners are categorised as single entity (intellectual disabilities). Where the category of intellectually impaired learners consists of more than one cases or conditions, with varied characteristics traits, that should be considered separately, in other for learning to be effective. More to these are the levels of attention needed, participation, behavioural concerns and social acceptance in the school system. These group of learners, struggle with social balancing among their neurotypical peers and even with some school leaders, who are not specially trained to teach or relate with them. These and many others are factors inhibiting effective interaction and learning outcome among the various categories of learners in inclusion school (Olufosoye, Olayemi and Oladimeji, 2014).

This study defines the category of learners listed as intellectually impaired learners as those with Autism Spectrum Disorder (ASD), Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD). While the regular learners are categorised as Neurotypicals (UK SEN-D 2015). When these categories of special learners are compared with their regular learners, who are referred to as neurotypicals in an inclusive school setting, a sharp contract is usually observed in the characteristics features that define their abilities to perform, and effectiveness to attain expected academic achievement in their learning environment. For instance; the school setting recognises the neurotypical learners by their prompt and logical response to instructions, ability to work and participate independently in class activities,

response to behavioural adjustment and compliance with social ethics and interactions within the school as well as outside the school, while the opposite is the case for special learners within the same school setting. Having identified these distinctions between the two groups of learners, it goes further to identify that the learners who are expected to exhibit regular understanding of instructions during learning (the neurotypicals), also exhibit some form of challenges during teaching-learning procedures, in their behaviour and social interaction as well. This then brings us to the need to understand how each learner learns, especially in the state or status that these learners occupy with the inclusive school setting. The quest for understanding the path or approach to adopt for specific learners leads to the understanding of individual's aptitude – this being the natural tendencies that they exhibit, which enhance their learning pattern. These natural tendencies are defined by the presence of obscure traits, which are can only be visible during the practice of a given task (Khan & Khan and Muhammad, 2022). When tasks are given, it is expected that certain traits will be manifested during the act of conducting the practice. These traits accounts for every learner's display of ability or aptitude as the case may be referred.

Over the years, schools have evolved in their approaches of attending to individual learner's needs by introducing a flexible learning support system. This support system is commonly aimed at assisting all learners irrespective of the conditions, to excel academically and in all-round school learning programmes. Research went further to streamline the determination of how these traits that are innate in each learner, can best be explored and measured, in other to enhance the learners' achievement in the school (Setiawati, 2020). The concept of independent functional learning approach using the Academic Functional Learning Aptitude Test (AFLAT) tool was explored in these regards. AFLAT is a psychoanalytic test tool that is developed to determine the learning aptitude of individual learner (Segilola, 2025). It determines the individual learners' ability attainment level, defines the strategic learning approach for individual learner and projects the possible career path for individual learner. AFLAT has three (3) basic components, which are; assessment battery used for psychoanalytic assessment, individualised strategies embedded in a learning plan and the learning support approaches, which forms progressive review and measure of learning achievement. AFLAT is an academic test tool that makes use of performance-based abilities and cognitive-based achievement. It takes the form of observation and measures the technicalities of skills displayed during an activity in specific key required task. It measures the effort exerted and the display sensory latent attributes of the individual learner. It sets specific parameters of measurement based on individual differences, but applies the standard features and measuring approach adopted in academics. These are: cognition (Intelligence Quotient & mental age determinant); adaptive potentials (ability to transform through inferential reasoning), mastery skills displayed, emotional wellness and social wellness. The last two being additional measures observed during team spot. AFLAT measures instructional information that are received during teaching-learning processes, which include the level of information; perception, recall, application, discrimination, diverse use of information (critical approaches applied) and presentation. These parametric features measured using AFLAT are applied for both special learners and neurotypical learners. they are also moderated to suit both categories of learner's understanding. However, the variance in responses and achievement levels are determined by

the factors that are responsible for the display of latent traits that each learner exhibits. These ranges from the rate of information processing, periodic display interval and performance rates.

The major consideration of characteristic features for the learning support of neurotypical learners are; socio-emotional and meta-cognition support. Regular learners are majorly observed to express peer comparison features, which invariably accounts for their emotional pressure or insecurity among their peers. This can act as major source of concerns for teachers during learning support programs. The regular learner is aware of the need to outdo their peers, in other to win their social support, acceptance and gain confidence in their relationship. Socio-emotional features; such as self-awareness, empathy, emotional regulation, conflict resolution (intra and interpersonal resolutions) and developing positive relationship are conflicting achievement level features for the neurotypical learners. The guiding principles that connect these features towards ensuring that learning support is well-understood by the learner, such that will enable the learner engage at his/her maximum potential without feeling inferior makes for effective achievement. (McGraw, 2019). Meta-cognition on the other hand extends supports beyond the basics, as it stretches the regular learner's cognition to infuse critical thinking approaches in the support activities. Cognitive activities will include; understanding the basic concept of task, problem generation and solving techniques, inference projection and presentation skills (Messick, 2024). This would reveal; intellectual connectivity of mind activities as propounded in Gestalt theory of the mind, and general levels of developmental concerns related to behaviour, in special learners (Mungan, 2022). The focus areas for this are; deficiency in meta-cognition that is think-ability connections (usually a simple approach is required), prompt response to stimulus that is visual and auditory seen in arranging activities, corroborative communication pattern shown through gesture and facial expressions and display of stamina and tenacity during physical or performance tasks. These showing the connectivity of the display of information processing in the activities that they are engaged with (Hegarty Hardan and Muller 2021).

The learning support approaches adopted by academic functional learning for both special and neurotypical learners in an inclusive classroom is a blend and integration widely designed learning theories. These are applied by flexible discretions with an understanding of individual's ability to take to a given instruction as well as act on the information received. While special learners adopt the principles of integrated behaviour management and constructivism by building on concrete information based on previous knowledge, developing self-regulated support through soft skills enhancement such as planning, organisation, attention and memory. It also acts on the provision of hands-on experiential information that can be used to form new information and guided learning resources for expressive understanding of information in other to further strength learning and academic achievement.

The neurotypical learners on the other hand is supported by cognitivist and constructivist principles, which define the internalisation of information processing by making abstracts connection with real-life situations. It also explains the act of meaningful engagement with relevant life activities that provide choices in order to maintain interest and motivation. Further to these, is the ability to manage thoughts through reflections on experiences, and the ability to manoeuvre actions and apply learning to life situations, either guided or unguided (Nwanchukwu, Chukwuma, Wei & Ikechukwu, 2024).

In classroom learning ratings, the learner's gender plays significant role when determining the functional level of aptitude displayed by each learner. Studies revealed that the gender's functionality are influenced by biological factors; which include the difference in physiological influence between the male and female hormones and the structure of the brain. Further to this, the prevalence factors reveal that more male are diagnosed with special conditions than female, (Lagunju, Bella-Awusah, Tolulope & Omigbodun, 2022), another factor is socio-cultural difference, which plays vital role in social norm cognition. The brain connectivity also indicates difference between male and female coordination of neurones and the activities, which may contribute to the pattern of cognition. These factors explain the functioning aptitude of both special and neurotypical learners in diverse compositions. For neurotypical learners, the factors are prominent and enhanced by different features in male and female. While female shows strong aptitude in verbal, motor skills, use of language and perceptual speed, male on the other hand shows better aptitude in visual-spatial tasks, such as mental acts, visualisation and application of logic in mathematics reasoning (Williams, Coppolino & Perreault, 2021). For special learners, female had been observed to be stronger at social interaction and display motor skills, which is closely similar to their neurotypical peers. While the male special learners are stronger with perceptual task, logical reasoning and number application, with little or no evidence of socio-interaction (Supekar, 2022).

Statement of the Problem

The problem identified in this study is to compare the difference in the academic achievement of special and neurotypical learner's aptitudinal display during an inclusive classroom activities. This is necessary in order to bridge the gap that exist in the aptitudinal display, while performing academic tasks, and attain a closely knitted achievement grades (where possible) between the two groups of learners.

Aim and Objectives of th Study

The aim of this study is to determine the difference that exist between special and neurotypical learner's aptitudinal display, so as to enhance the academic achievement of the two categories of learners in an inclusive classroom setting.

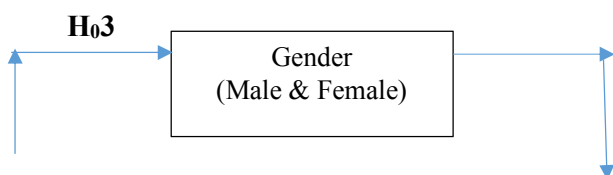
The objectives raised are to:

- iv. Determine the difference between the pretest score and the posttest scores of neurotypical learner's academic achievement.
- v. Determine the difference between the pretest score and the posttest scores of special learner's academic achievement.
- vi. Determine the difference between neurotypical learner's gender and academic achievement using aptitude test.
- vii. Determine the difference between special learner's gender and academic achievement using aptitude test.

Model of Study:

Independent variables

Dependent variables



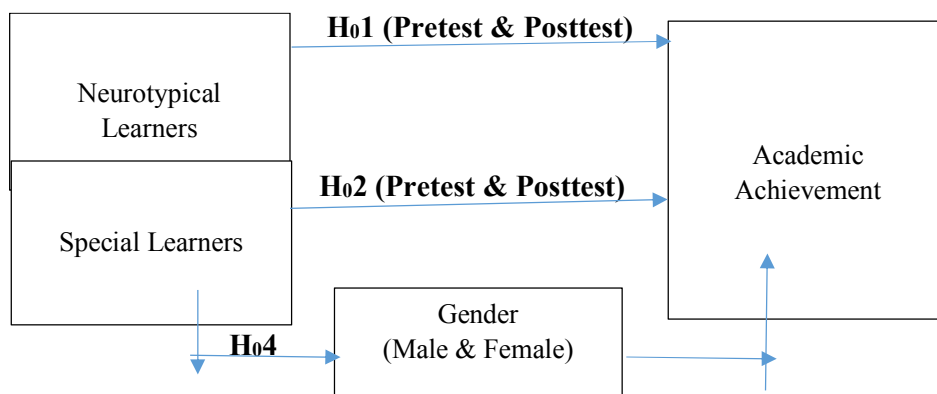


Figure 1: The Model of Comparison between Special and Neurotypical Learners Academic Achievement

Source: Fieldwork, 2023

Hypotheses:

- H₀₁** There will be no significant difference between the pretest score and the posttest scores of neurotypical learners' academic achievement using aptitude test.
- H₀₂** There will be no significant difference between the pretest score and the posttest scores of special learners' academic achievement using aptitude test.
- H₀₃** There will be no significant difference between neurotypical learners' gender and the academic achievement using aptitude.
- H₀₄** There will be no significant difference between special learners' gender and the academic achievement using aptitude.

Methodology

The study design is experimental between two independent variables, single dependent variable and single moderating variable. A total population of one hundred and forty-three (143) learners both special and neurotypicals, in private inclusive schools across four (4) regions (Northern Central, Southsouth, Southeast and Southwest) and five states (Oyo, Enugu, Rivers, Plateau and Federal Capital Territory-FCT Abuja), in Nigeria were sampled. Of the total population, seventy-seven (77) were neurotypical learners, while sixty-six (66) learners comprise of diverse cases of special learners which are Autism Spectrum Disorder (ASD), Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD). Multi-stage sample techniques were used to select the samples. In the first stage, simple random sampling technique was used to select the regions, states and local governments areas in each state. It was also used to select the neurotypical learners, because this group dominated the enrolment records and are ready available. In the second stage, the local government areas were selected using clustered sampling, while purposive sampling technique was used to select the inclusive schools used in each location, due to the fact that inclusive schools were not readily available in most locations.

The third stage, which is the sampling procedure for learners, adopted the convenience sampling technique for special learners due to the limited number of enrolment recorded in each school. Academic aptitude assessment tool, which comprised of achievement tests; using the standardised Items, from selected subjects using the English National Curriculum, and standard academic aptitude ratter, which juxtaposed the expected performance from the academic items that were selected were administered using structured observation technique. The aptitude ratter with 5-point Likert scale was used to collect the data for the aptitude performance displayed by each group of learners during the assessment. The instrument has a reliability coefficient of 0.781, which indicated that the instrument is reliable. This procedure was applied in real-life classrooms, and in various learning locations within the schools, that is; classroom, playground, studios and hallways. Each learner involved in this study, was subjected of series of one-on-one assessment. The learners' aptitude (most proficient performance ability was detected), a special learning plan was suggested, and drawn for each learner and the researcher taught and monitored progress with the teachers, in all the schools involved in this study. The performance ratings for each learner was calculated using the four (4) null hypotheses that were raised at 0.05 level of significance. The data collected were subjected to demographic analysis using frequency and percentage. While the hypotheses were tested using independent t-test analysis, and the results were interpreted.

Results

Demographic Analyse:

The result below are the demographic characteristics of the participants.

Table 1: Distribution of the Participants by Gender (Neurotypical Gender)

Gender	Frequency	Percent (%)
Male	35	45.454
Female	42	54.545
Total	77	99.999

Source: Field Study 2022

The distribution of neurotypical participants shows that there are more female 54.545% than male participants 45.454% in this study.

Table 2: Distribution of the Participants by Gender (Special Gender)

Gender	Frequency	Percent (%)
Male	53	80.300
Female	13	19.700
Total	66	100.000

Source: Field Study 2022

The distribution of special participants shows that there are more male 80.300% than female participants 19.700% in this study. An indication that male is prone to special conditions than female.

Hypotheses:

H₀₁ There will be no significant difference between the pretest score and the posttest scores of neurotypical learners' academic achievement using aptitude test.

Table 3: Independent t-test for Neurotypical Learners' Pre-test and Post-test Academic Achievement Scores (Group Statistics)

Neurotypical Gender				
Pretest				
Male	N	Mean	Std Dev.	Std Error Mean
	35	64.274	10.116	1.709
Female	42	72.545	11.131	1.717
Posttest				
Male	N	Mean	Std Dev.	Std Error Mean
	35	66.917	10.031	1.696
Female	42	74.969	10.781	1.664

Homogeneity of Aptitude Test Scores across Pretest and Posttest Academic Achievement for Neurotypical Learners

Levene's test for equality of variance: P-value(2-tailed) 0.001 < 0.05; ($p < 0.05$), such there is no homogeneity of variance. Equal variance not assumed for t-test is considered for the interpretation as follows:

t-test equality of mean						
		t	df	Sig. 2-tailed	Mean diff.	Std error
Pretest	Equal Var. Assumed	-3.383	75	0.001	-8.271	2.445
	<i>Equal Var. Not Assumed</i>	<i>-3.413</i>	<i>74.406</i>	<i>0.001</i>	<i>-8.271</i>	<i>2.424</i>
Posttest	Equal Var.	-3.307	75	0.001	-8.052	2.391

Assumed

Equal Var. -3.390 74.056 0.001 -8.052 2.375
Not Assumed

Source: Field Study 2025

H₀₂ There will be no significant difference between the pretest score and the posttest scores of special learners' academic achievement using aptitude test.

Table 4: Independent t-test for Special Learners' Pre-test and Post-test Academic Achievement Scores (Group Statistics)

Special Gender					
Pretest					
	N	Mean	Std Dev.	Std Error Mean	
Male	53	44.432	15.305	2.102	
Female	13	38.731	14.363	3.984	
Posttest					
	N	Mean	Std Dev.	Std Error Mean	
Male	53	47.471	15.293	2.101	
Female	13	41.623	14.141	3.921	

Homogeneity of Aptitude Test Scores across Pretest and Posttest Academic Achievement for Special Learners

Levene's test for equality of variance: P-value(2-tailed) 0.228_{pretest} & 0.215_{posttest} > 0.05; ($p > 0.05$) ($F_{(2,64)} = 0.10_{pretest}$ & $0.53_{posttest}$, $p > 0.05$), such there is homogeneity of variance. Equal variance assumed for t-test is considered for the interpretation as follows:

t-test equality of mean

		t	df	Sig. 2-tailed	Mean diff.	Std error
<i>Pretest</i>	<i>Equal Var. Assumed</i>	1.217	64	0.228	5.701	4.684

	Equal Var. Not Assumed	1.266	19.270	0.221	5.701	4.504
<i>Posttest</i>	<i>Equal Var. Assumed</i>	<i>1.253</i>	<i>64</i>	<i>0.215</i>	<i>5.849</i>	<i>4.608</i>
	Equal Var. Not Assumed	1.315	19.502	0.204	5.849	4.449

Source: Field Study 2025

H₀₃ There will be no significant difference between neurotypical learners' gender and the academic achievement using aptitude test.

Table 5: Independent t-test of Neurotypical Learners' Gender and Academic Achievement using aptitude test (Group Statistics)

Neurotypical Gender		Mean	Std Dev.	Std Error Mean
Male	N			
	35	66.917	10.031	1.695
Female	42	74.969	10.780	1.664

Homogeneity of Aptitude Test Scores across Gender and Academic Achievement for Neurotypical Learners

Levene's test for equality of variance: P-value(2-tailed) $0.001 < 0.05$; ($p < 0.05$), such there is no homogeneity of variance. Equal variance not assumed for t-test is considered for the interpretation as follows:

		t-test		for	equality	of	mean
		t	df	Sig. (2-tailed)	Mean diff.	Std error diff.	
Post-test							
	Equal Var. Assumed	-3.351	75	0.001	-8.051	2.391	
	<i>Equal Var. Not Assumed</i>	<i>-3.390</i>	<i>74.056</i>	<i>0.001</i>	<i>-8.051</i>	<i>2.375</i>	

Source: Field Study 2025

H₀₄ There will be no significant difference between special learners' gender and the academic achievement using aptitude.

Table 6: Independent t-test of Neurotypical Learners' Gender and Academic Achievement using aptitude test (Group Statistics)

Special Gender				
Male	N	Mean	Std Dev.	Std Error Mean
	53	47.471	15.293	2.101
Female	13	41.623	14.140	3.922

Homogeneity of Aptitude Test Scores across Gender and Academic Achievement for Special Learners

Levene's test for equality of variance: P-value(2-tailed) 0.228_{pretest} & 0.215_{posttest} > 0.05; ($p > 0.05$) ($F_{(2,64)} = 0.10_{pretest}$ & $0.53_{posttest}$, $p > 0.05$), such there is homogeneity of variance. Equal variance assumed for t-test is considered for the interpretation as follows

t-test for equality of mean						
	t	df	Sig. (2-tailed)	Mean diff.	Std error diff.	
<i>Post-test</i>						
Equal Var. Assumed		1.253	64	0.215	5.849	4.668
Equal Var. Not Assumed	1.315	19.502	0.204	5.849	4.449	

Source: Field Study 2025

Discussion of Findings:

The demographic data revealed that there was more female gender (54.5%), than male gender (45.5%), who were available and participated in this study. However, it is contrary to the various categories of special learners air marked in this study, as there are more male (80.3%), than female (19.7%). This result is in agreement with other studies that more male than female

are diagnosed with special conditions (Marland, Nilsson, Larsson, Gillberg, Lubke & Lundstron 2022).

In the inferential statistics, where independent t-test was used to compare the assumptions raised by the mean scores for the achievement test of neurotypical (gender) and special (gender) learners, the result revealed that H_{01} and H_{03} have no homogeneity of variance. These implied that the mean scores are not equally spread across the group, such it indicates a statistically significant difference in the t-test calculated assuming lesser value than t-test critical, thus enabling the rejection of the null hypotheses. The null hypotheses (H_{02} and H_{04}), on the other hand, showed the existence of homogeneity of variance, which implied that the mean scores are equally spread across the group, such a statistically significant difference does not exist in the t-test calculated assuming a greater value than t-critical value, thus enabling the acceptance of the null hypotheses. This result further revealed a better performance scores for the neurotypical female learners than their male counterparts. Likewise, the male special learner performed better than their female counterparts, which is contrary to previous studies' assertions that special female learners perform better than the male learners (Supekar, 2022). On the whole, the result revealed an improvement in the posttest scores for all the groups of learners irrespective of gender, showing an indication of the effectiveness of aptitude test strategies during lesson activities.

Conclusion

This study aimed at determining the difference that exist between special and neurotypical learner's aptitudinal display, so as to enhance the academic achievement of the two categories of learners in an inclusive classroom setting. The result showed a significant difference in the neurotypical learners' achievement scores, likewise in the achievement mean score and gender, thereby leading to the rejection of null hypotheses of no statistically significant differences. The result also revealed a minimal statistically insignificant difference in the achievement scores and achievement mean scores and gender for the special learner, thereby leading to the acceptance of the null hypotheses. The study concludes that despite the minimal insignificance in the special learners' scores, there was an indication of improved academic achievement, in both groups of learners' mean scores when aptitude test strategies were applied during lesson activities in the inclusive schools. It further concludes that gender is not affected by aptitude test strategies since there existed an improvement in the achievement scores on the whole.

Recommendations

The following recommendations are given for application and further improvement of this study:

- i. Academic aptitude assessment should be conducted for neurotypical learners as much as it is for special learners.
- ii. The application of aptitude (ability) tests and strategies should be infused into lesson activities in the classrooms for special learners and neurotypical learners in inclusive classroom.
- iii. The selection of team members for group activities during lesson activities should infuse mixed gender selection. This will eliminate gender biasness and enable flexible participation during activities by both neurotypical and special learners.

- iv. Other studies should be conducted to renew other forms of impairments that are in inclusive schools, but were not considered in this study.

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