Construction and validation of differential aptitude test for secondary school students in the Southwest Nigeria

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Abstract
Allocation of Senior Secondary School one (SSS1) students into various subject areas (science, arts and commercial) after Junior Secondary School education in Nigeria are usually based on their performance in Junior Secondary School Certificate examinations. However, the appropriate tests needed for guidance and counselling services in determining the differential abilities of the students for appropriate allocation to subject areas is Differential Aptitude Test (DAT). This study, therefore, dealt with construction and validation of DAT for SSS1 students in Nigeria. The DAT has 62 items with six different segments which are: spelling (SP), verbal reasoning (VR), Numerical Reasoning (NR), Comprehension (CO), Mechanical Knowledge (MK), Abstract Reasoning (AR) and Spatial Ability (SA). The items in DAT have discriminating power of 0.39 and above and difficulty indices between 0.39 and 0.69. The construct validity coefficient of DAT ranges from 0.77 to 0.83 and the reliability coefficients were between 0.50 and 0.79 while the overall reliability of the DAT was 0.74. The findings of the study showed that DAT is valid and reliable to measure the differential abilities of Senior Secondary School students. It was, therefore, recommended that DAT should be used by school guidance counsellor for allocating senior secondary school students to subject combinations since it would show clearly different areas of abilities that related to their career potentialities.

Keywords: *Differential Aptitude Test, Construction, Validation, Secondary School one, aptitudinal disposition*

Introduction

In Nigeria, after Junior Secondary School education, students are faced with the challenge of choosing from the available different subject areas (Arts, Science and Commercial) at the senior secondary school level. These chosen subject areas usually determine the future careers of the students.

In view of numerous careers that are available, career selection is one of the major decisions an individual will have to make in life. At the senior secondary school one (SSS1) class when students are to choose the subject areas which would determine their possible future career, it has been observed that career selection are usually done directly or indirectly on behalf of the students by their parents/guardians, mentors and school guidance counsellors without testing the differential abilities of the students to know their innate abilities in order to find out where they could excel in life.

According to Eyo and Edet (2011), choosing an appropriate career is a difficult decision that every student must face and outcome of such decision would determine the kind of life the students will live in future. A wrong decision on career choice could haunt the person for the rest of his or her life and this could make an individual to be miserable, dejected, frustrated and depressed. It is therefore necessary to determine individual differential abilities to know his/her innate abilities in order to choose a career in which he/she has aptitude to cope with and succeed in life. The essence of inclusion of guidance and couselling into school system especially at the secondary school level is to address the ignorance among students on their choices of career and personality maladjustment. Poor performance of students might not be unconnected with the fact that their aptitudinal disposition were not assessed before allocating them to subject areas but on prestige attached to the future career. Omofonmwan,

Oluwatosin and Silverline (2016) also submitted that SSS1 students were not aware of the prerequisites for the courses they intended to study until after they were admitted for the programme of study which could be responsible for the poor performance of students.

Despite the sensitive role of school guidance counsellor in ensuring that students are properly guided and counselled on the choice of their future career, majority of these guidance counsellors do not keep abreast of things themselves with the use of psychometric tests like differential aptitude tests and their appropriate use to guide the students in their choice of careers, if at all such differential aptitude tests are readily available to them. What is common in our secondary schools on career choice is to organize career talks/seminars for the students.

An aptitude test is an instrument used to measure and determine an individual's ability to acquire future training in some specific set of skills. According to Kagan (2019), an aptitude test is used to determine an individual's propensity to succeed in a given activity, and that, aptitude tests assume that individuals have inherent strengths and weaknesses with natural inclination towards success or failure in a specific area based on their innate characteristics while differential aptitude test is a multiple aptitude battery designed to measure ability to learn or succeed in a certain area (Wang, 2011).

According to Mankar and Chavan (2013), general aptitude tests are not such powerful to help in screening candidates for all jobs and, therefore, differential aptitude test (DAT) battery follows the theory that different individuals have varying levels of interest and intelligence in different areas of endeavours. Hence, differential aptitude tests (DAT) are the latest method of the career aptitude tests.

Differential Aptitude Test (DAT) makes it possible to measure different kinds of aptitude in an individual separately. DAT usually covers several areas like spelling, verbal reasoning, numerical reasoning, comprehension, mechanical knowledge and spatial ability. The worthiness of DAT can be viewed under technical and practical criteria. Technical criteria include items, standardization, objectivity, reliability and validity. While practical criteria include economy, purpose, acceptability, adequacy and usability (Kolawole,2010).

Spelling measures how an individual can spell confusing, tricky but common English words. The ability to spell is a basic skill necessary in many academic and vocational pursuits. According to Ocal and Enhri (2017) spelling, grammar and punctuation jointly predict written composition and comprehension achievement but spelling was the major predictor. Johnson (2013), also attested to great value of spelling in students. Students that have difficulties in reading fluently and invariably would negatively affect comprehension ability of the students due to incessant stumbling over unknown words.

Verbal reasoning measures ability to see relationship among words. The verbal reasoning may be useful to predict success in Language speaking related courses as well as in occupations where accurate communication is important.

Numerical reasoning measures the ability to perform mathematical and computation skills. Numerical reasoning is important for success in courses that are based on use of figures such as engineering and science-based disciplines. According to Wang (2011), numerical ability involved ability to know number series, number facility and number memory.

Mechanical knowledge measures the ability of the testees to understand basic mechanical principles of machinery, tools and motions. It has to do with manipulation and assembly of objects. Good ability in mechanical reasoning is an indication of a person to learn how to operate complex devices which has to do with discipline such as engineering, physics and so on.

Abstract reasoning is a non-verbal measure of reasoning ability that assesses how well an

individual can reason on geometric shapes or pattern. It is measured by test in geometric series in which the elements change according to a given rule. Abstract reasoning measures individual's logical, analytical and conceptual skills. Abstract reasoning skill is necessary in a career that requires the ability to see relationship among objects and analysis of dynamic changes such as engineering and sciences.

Spatial ability has to do with block designs such as disciplines that relates to architecture and engineering. Combinations of these related abilities are required to achieve success in related careers.

Therefore, the performance of individual in different tests that relates to a particular career should be a signal that such an individual would have innate capabilities to succeed in such a career.

Wang (1993) reported that there was moderate correlation between verbal Aptitude, Spelling, Mechanical Aptitude, Numerical Aptitude and Spatial Aptitude. Ahmad, Kharial and Aznial (2006) agreed with Petro, Vukia and Mildred (2014) that there was a high correlation between Spatial Aptitude and Mechanical Aptitude but Spatial Aptitude could not be used to successfully predict Abstract reasoning abilities in students. In the same vein, Lowerie, Logan and Ramful (2016) stressed that high correlation existed between Spatial and Numerical abilities. Ocal and Ehri (2017) and Ronnerberg and Torrance (2017) opined that there was a high correlation between Spelling and Verbal Aptitude and this predict scores of students in Composition and Comprehension tests but Datta and Roy (2015) revealed that there was high correlation between Abstract and Spatial abilities.

Angela, Maria, Belen and Angel (2013) reported that educational aptitudes that are highly related to the academic performance of students in health related courses are Verbal Reasoning (VR), Numerical Ability (NA), Abstract Reasoning (AR) and Speed & Accuracy (S&A). The aptitudes that are highly related to the academic success in social communication studies are verbal Reasoning (VR) and Abstract Reasoning (AR). The aptitudes that are highly related to better academic performance in study of Law are verbal Reasoning, (VR), Language (L), Spelling (SP), Abstract Reasoning (AR), Speed & Accuracy (S&A), Numerical ability (NA) and Mechanical Knowledge (MK).

Angela, et al (2013) further stated that the aptitudes that are highly related to successful performance of the students in the engineering courses are Spatial Reasoning (SR), Spelling (SP), Abstract Reasoning (AR), Numerical Ability (NA) and Speed & Accuracy (S&A). The aptitudes that are highly related to the better academic performance of the students in Business courses are Verbal Reasoning (VR), Language (L), Spelling (SP) and Abstract Reasoning (AR), Numerical Ability (NA) and Speed & Accuracy (S&A).

Statement of the Problem

Allocation of Senior Secondary School one (SSS1) students into various subject areas (Art, Commercial and Science) in Nigeria after Junior Secondary School education are usually done by parents, school's guidance counsellors and other relevant education stakeholders without considering the aptitudinal dispositions of the students.

Career counseling, especially at secondary school level is fundamental to the students' success in their chosen career but this could only be achieved by making wise choice of subjects' combination which will translate to wise choice of career in order to maximize their potentials.

A good number of secondary school students and youths in Nigeria have subject combinations in Senior School Certificate Examination (SSCE) and Unified Tertiary Matriculation Examination (UTME) that do not match their aptitudes. The implication is that Nigerian youths of today engage in occupations that do not match their capabilities, they only rely on fate and mother luck to smile on them because it was observed and also confirmed by Olaniyi (2010) that out of the three distinct departments in secondary schools (Arts, Commercial and Science), majority of the

secondary school students usually storm science class leaving commercial, arts and technical classes to be sparsely populated.

Therefore, it is imperative to know students' aptitude for the appropriate allocation to subject areas which usually determine their future careers. It is obvious that Differential Aptitude Test is indispensable in assisting students choosing the appropriate careers. Since DAT makes it possible to measure different kinds of aptitude in an individual separately which could signal the areas where an individual have innate abilities to succeed in life.

This study therefore developed a DAT to measure different inherent abilities and traits embedded in Senior Secondary School Students to enable school guidance counsellors and other relevant education stakeholders allocate students to careers that would match their aptitudinal disposition.

Purpose of the Study

The purpose of the study was to construct and validate a Differential Aptitude Test (DAT) for allocation of Senior Secondary School one (SSS1) students into various subject areas (Arts, Commercial and Science). Specifically the objectives of the study were to:

1. Construct items for the Differential Aptitude Test
2. Carry-out item analysis of DAT which involved difficulty and discriminating indices of the items for selection of the appropriate items
3. Estimate the validity and reliability coefficients of the DAT
4. Examine the performance of the students in the DAT in relation to subject areas.

Research Questions

The following research questions were raised and answered in the study:

1. What are the difficulty and discriminating indices of items in DAT?
2. How valid is the DAT?
3. How reliable is the DAT?

Research Hypothesis

The hypothesis below was formulated and tested for the study:

1. There are no significant differences among the mean scores of the students in Arts, Commercial and Science classes in Numerical ability, verbal Aptitude, Spatial Aptitude, Mechanical Aptitude, Spelling, Comprehension, Mechanical Aptitude and Abstract Reasoning in DAT.

Methodology

The study adopted descriptive research design of survey type. The population of the study consisted of all the SSS1 students in the southwest, Nigeria. A total sample of 816 comprising 388 male and 428 female SSS1 students were randomly selected for the study using multistage sampling procedure and stratified random sampling technique. The research instrument for the study was the 62-item DAT developed by the researchers for use in Nigerian secondary schools. It assessed the aptitude of the testees in seven domains namely; Numerical Aptitude (NA), Verbal Aptitude (VA), Abstract Reasoning (AR), Spatial Aptitude (SA), Mechanical Knowledge (MK), Spelling (SP) and Comprehension (CO),with construct validity coefficients of 0.77, 0.81, 0.79, 0.81, 0.69, 0.70 and 0.83 respectively using convergence method and reliability coefficients of 0.43, 0.79, 0.63, 0.60, 0.57, 0.50, 0.63, and 0.50 respectively using Cronbach's Alpha while overall reliability of DAT was 0.74. The items in DAT have discriminating power of 0.39 and above, and also with difficulty levels between 0.39 and 0.69. The Lawshe's Content validity ratio was employed to increase the content validity and only items with values between 0.60 and above were selected. The construct validity was ensured through convergence method and validity coefficients of 0.70 and above were obtained for the DAT domains. Also, discriminant construct validity method was used and very low validity coefficients ranging from -0.21 to 0.31 were obtained. The data collected were analysed using mean, standard deviation, analysis of

variance (ANOVA), difficulty index (P) and discriminating power (D) formulae.

Procedure for the Construction and Validation of Differential Aptitude Test

Kolawole (2010) steps in construction and selection of standardized items was adapted, seven steps out of nine highlighted steps were considered very relevant to this work. The first steps involved test design which also included stating the purpose of the test; enumeration of the objectives of the test; determination of weightage and construction of blueprint for the test. The determination of weightage and construction of table of specification were inconsequential in construction of either Aptitude test or Differential Aptitude Test (Alnahdi, 2015).The second step is referred to as preliminary format preparation stage which is divided into five important aspects:

(1) It entails writing of 310 items; two seasoned secondary school English Language teachers prepared altogether 105 items in Spelling (50), verbal aptitude (55), and Comprehension (50). Also, two Technical Drawing teachers were invited to construct 50 items in Spatial Aptitude and 50 items in Mechanical Aptitude. The 55 Numerical Aptitude items were constructed by a current SSSI Mathematics teacher under the supervision of the Head of Department. While 50 Abstract Reasoning items were constructed by two test experts.

(2) Constructed items in each domain were reviewed and edited by teams of experts using Lawshe (1975) Content Validity Ratio. Items that were considered ambiguous, poorly worded and confusing were removed or modified. The results of the reviewed produced 150 items altogether; Spelling (20), Verbal Aptitude (25), Comprehension (20), Spatial Aptitude (20), Mechanical Aptitude (20) and Numerical Aptitude (25) and Mechanical (20)

(3) The reviewed items were arranged in order of difficulty for each domain of DAT.

(4) The DAT therefore was tried out on sample of 1080 senior secondary school one (SSSI) students on a sample in Ekiti, Lagos and Osun States, Nigeria.

(5) The scripts were marked and scored objectively, they were later subjected to item analysis that involved determination of difficulty indices (p) and discriminating power (D), these followed Ebel (1975) rule of thumb.

Step three known as "Final format": At this stage, the final copy of the DAT was produced after a thorough consideration of " P" and "D" values were reached. After the selection of the final items, instructions and time allocated for the test were indicated. One hour and thirty minutes ($1^{1}/_{2}$hours) was allotted to DAT after administration on two groups of representative of sample and the average time used by the two groups was calculated. In the next stage, validity of the DAT was ascertained; the face validity was determined by experts in the field of Tests, Measurement and Evaluation, school counsellors and relevant subject teachers in Senior Secondary School were used. While construct validity was carried out using factor analysis and item total correlation. Step five involved determination of reliability, the internal consistency of each domain of DAT and the overall internal consistency using both Kuder-Richardson 21 and Cronbach's Alpha formulae. The sixth step involved norming, norms were determined in terms of age, class, gender and location.

ITEM	SPELLING		VERBAL		NUMERIC		MECH		ABSTRACT		COMP		SPATIAL	
	P	D	P	D	P	D	P	D	P	D	P	D	P	D
1	0.68	0.46	0.54	0.57	0 .42	0.48	0.42	0.53	0.52	0.41	0.49	0.43	0.45	0.48
2	0.56	0.50	0.49	0.58	0.39	0.39	0.50	0.44	0.58	0.44	0.41	0.39	0.50	0.50
3	0.58	0.50	0.45	0.54	0 .42	0.39	0.40	0.46	0.54	0.56	0.40	0.40	0.47	0.61
4	0.62	0.52	0.47	0.44	0 .46	0.47	0.43	0.53	0.54	0.54	0.42	0.42	0.49	0.49
5	0.62	0.59	0.46	0.46	0.52	0.53	0.41	0.47	0.45	0.56	0.47	0.42	0.44	0.55
6	0.64	0.49	0.58	0.53	0 .51	0.58	0.42	0.47	0 .44	0.50			0.47	0.45
7	0.65	0.42	0.47	0.72	0 .47	0.59	0.40	0.41	0 .45	0.41			0.41	0.39
8			0.53	0.71	0 .40	0.47	0.44	0.47	0.40	0.44			0.43	0.45
9			0.53	0.68	0 .48	0.47	0.41	0.47					0.42	0.58
10			0.55	0.69										
11			0.69	0.53										
12			0.69	0.58										
13			0.69	0.56										
14			0.64	0.53										
15			0.40	0.48										

The last step entails writing of a comprehensive manual for the use of the test; it involves purpose of the test, brief process of standardization, how to administer DAT; how to interpret the scores, sampling, the strengths and weaknesses of the DAT and cautions, all these were carefully carried out. It was later administered on 816 sampled students from three states in southwest, Nigeria.

Results

Research Question 1: What are the difficulty and discriminating indices of Differential Aptitude Test (DAT)?

Table 1: Difficulty and Discriminating Indices for DAT Items

The Table 1 above showed that the difficulty indices for seven items in Spelling Aptitude were 0.68, 0.56, 0.58, 0.62, 0.62, 0.64 and 0.65 with corresponding discriminating power of 0.46, 0.50, 0.50, 0.52, 0.59, 0.49 and 0.42. In the same vein, Verbal Aptitude had difficulty indices ranging from 0.40 to 0.69 and discriminating power ranging from 0.44 to 0.68. The difficulty index and discriminating power of numerical aptitude commenced at 0.39 and ended at 0.48 and 0.59 respectively. Similarly, difficulty indices of Mechanical Aptitude, Abstract and Comprehension began at 0.40 and ended at 0.50, 0.58 and 0.49 respectively. Discriminating power for Mechanical Aptitude and Abstract started with 0.41 and ended with 0.53 and 0.56 respectively, while that of Comprehension started with 0.39 and ended with 0.43. In Spatial Aptitude, difficulty indices range from 0.41 to 0.49 and discriminating power ranging from 0.39 to 0.61

The rule of thumb by Ebel (1975) says that difficulty indices between 0.91 and above are considered to be too easy, 0.76 – 0.90 are easy, 0.26 – 0.75 are optimum, while those between 0.11 – 0.25 are difficult and those between 0.10 and below are very difficult. Also Ebel (1975) described discriminating indices of items with 0.39 and above as very good, those between0.30 – 0.39 as good, while items with values between 0.20 – 0.29 as fair, and those with values between 0.09 – 0.19 as poor.

Therefore, items with difficulty indices between 0.39 and 0.69 at the same time discriminating power of 0.39 and above were selected.

Research Question 2: How valid is the DAT.

Table 2: Item-total correlation values of validity co-efficient for Differential Aptitude Test

Items	r(i)(T-i)		Items	r(i)(T-i)		Items	r(i)(T-i)		Items	r(i)(T-i)		Items	r(i)(T-i)		Items	r(i)(T-i)
SA1	.302		CO3	.180		MK1	.370		NR3	.224		VR5	.216		SP1	.277
SA2	.285		CO4	.223		MK2	.122		NR4	.271		VR6	.486		SP2	.310
SA3	.291		CO5	.171		MK3	.650		NR5	.277		VR7	.426		SP3	.268
SA4	.291		AB1	.130		MK4	.127		NR6	.121		VR8	.365		SP4	.640
SA5	.257		AB2	.256		MK5	.125		NR7	.121		VR9	.419		SP5	.333
SA6	.215		AB 3	.290		MK6	.121		NR8	.290		VR10	.339		SP6	.411
SA7	.159		AB4	.180		MK7	122		NR9	.185		VR11	.417		SP7	.185
SA8	.300		AB5	.640		MK8	.123		VR1	.303		VR12	.387			
SA9	.297		AB6	.123		MK9	.590		VR2	.234		VR13	.436			
CO1	.188		AB7	.126		NR1	.223		VR3	.373		VR14	0.60			
CO2	.171		AB8	.480		NR2	.151		VR4	.271		VR15	.269			

Table 2 shows the item-total correlation values of validity co-efficient for Differential Aptitude Test. The item validity coefficient of DAT varies from 0.121 to 0.65. The values on the Table 2 were found to be valid according to Stephanie (2018), that the ideal range of average inter-item correlation is 0.12 to 0.50; if less than 0.12 the items are not well correlated and do not measure the same construct or idea; when more than 0.50 it indicates that the items are so close and well correlated. Therefore, this clearly showed that items in DAT were meaningfully related and contributed to the construct being measured.

Research Question 3: How reliable is the DAT?

Table 3: Kuder-Richardson (Kr21) and Cronbach Alpha (**α**) Showing DAT Reliability

Domains	**Mean**	**Variance**	**Std. Dev.**	**No of Items**	**? pq**	**Kr_{21}**	**A**
DAT	29.14	74.18	8.612	62	12.637	0.847	0.826
Spelling Aptitude	4.069	2.623	1.623	7	1.6367	0.440	0.490
Verbal Aptitude	8.158	10.934	3.307	15	2.9629	0.781	0.750
Numerical Aptitude	3.787	3.537	1.880	9	2.2117	0.422	0.449
MechanicalKnowledge	3.598	2.729	1.652	9	2.1925	0.221	0.278
Abstract	3.887	2.468	1.571	8	1.9714	0.229	0.355
Comprehension	2.175	1.465	1.210	5	1.2245	0.205	0.309
Spatial Aptitude	4.070	4.327	2.080	9	1.9357	0.622	0.574

N = 816

Table 3 indicates that the reliability of the DAT was determined using both Kuder-Richardson (KR_{21}) and Cronbach's Alpha (α). High values of 0.847 and 0.826 respectively were obtained. The reliability coefficients using KR21 and Cronbach's Alpha for spelling Aptitude, Verbal Aptitude, Numerical Aptitude, Mechanical Aptitude, Abstract Reasoning, Comprehension and Spatial Aptitude were 0.440 and 0.490, 0.781 and 0.750, 0.422 and 0.449,0.221 and 0.278,0.229 and 0.355,0.205 and 0.309, 0.622 and 0.574 respectively.

Comprehension with five items had the least variance and internal consistency values of 1.465 and 0.205(0.309) respectively. Verbal Aptitude with 15 items had the highest variance of 10.934 with accomplished high value of internal consistency equal to 0.781(0.750).

Both Mechanical Aptitude and Abstract had low values of variance with 3.598 and 3.887 respectively. Spelling Aptitude with seven items and Numerical Aptitude with nine items had moderate internal consistency coefficient of 0.440 (0.490) and 0.421(0.449) respectively. At the same time, the spelling Aptitude had variance of 2.623 and Numerical aptitude had variance of 3.537. After Verbal Aptitude, the Spatial Aptitude had the second high internal consistency coefficient of 0.622(0.574) with variance value of 4.327.

Research Hypothesis 1

There are no significant differences among the mean scores of the students in Arts, Commercial and Science classes in Spelling Aptitude, verbal Aptitude, Numeric Aptitude, Mechanical Aptitude, Abstract Reasoning, Comprehension Aptitude and Spatial Aptitude in DAT.

Table 4: Analysis of Variance Showing the Performance of the Classes in DAT

Variables	Source	Sum of Squares	Df	Mean Square	F	Sig.
Spelling	Between Groups	107.493	2	53.746	21.424*	.000
	Within Groups	2039.526	813	2.509		
	Total	2147.018	815			
Verbal ability	Between Groups	368.359	2	184.179	17.528*	.000
	Within Groups	8532.223	813	10.508		
	Total	8900.582	815			
Numeric	Between Groups	171.421	2	85.710	25.699*	.000
	Within Groups	2711.476	813	3.335		
	Total	2882.897	815			
Mechanical Aptitude	Between Groups	104.922	2	52.461	20.126*	.000
	Within Groups	2119.235	813	2.607		
	Total	2224.157	815			
Abstract	Between Groups	32.219	2	16.110	6.617*	.001
	Within Groups	1979.408	813	2.435		
	Total	2011.627	815			
Comprehension	Between Groups	30.632	2	15.316	10.704*	.000
	Within Groups	1163.308	813	1.431		
	Total	1193.940	815			
Spatial	Between Groups	248.063	2	124.032	30.756*	.000
	Within Groups	3278.671	813	4.033		
	Total	3526.734	815			

*P<0.05

Table 4 shown that F values of Spelling, Verbal Aptitude, Numerical Aptitude, Mechanical Aptitude, Abstract Reasoning, Comprehension and Spatial aptitude were F_c= 21.424, 17.528, 25.699, 20.126, 6.617, 10.704 and 30.756 and significant at 0.05 level of significance. Therefore, all the null hypotheses were rejected, meaning that there were significant differences among the mean scores of three classes in DAT. The implication of these findings was that various classes of the students have peculiar domain(s) or area(s) of DAT in which they were advantaged, and this was expected because class is a significant factor to consider.

Table 5: Scheffe Post-Hoc Analysis of DAT by Class

Variables	**Class**	**1**	**2**	**3**	**N**	**Mean**	**SD**
Spelling	Arts**(1)**		*	*	338	3.9793	1.59083
	Commercial **(2)**			*	128	3.3672	1.54650
	Science **(3)**				350	4.4143	1.59056
Verbal ability	Arts**(1)**			*	338	7.7485	3.27005
	Commercial **(2)**			*	128	7.2031	2.80988
	Science **(3)**				349	8.9054	3.35876
Numerical	Arts**(1)**			*	338	3.4172	1.81502
	Commercial **(2)**			*	128	3.3203	1.72492
	Science **(3)**				350	4.3143	1.87230
Mechanical Aptitude	Arts**(1)**		*	*	338	3.4734	1.60143
	Commercial **(2)**			*	128	2.9453	1.52310
	Science **(3)**				350	3.9571	1.65884
Abstract	Arts**(1)**			*	338	3.7633	1.54177
	Commercial **(2)**			*	128	3.6094	1.72172
	Science **(3)**				350	4.1086	1.51579
Compre	Arts**(1)**		*		338	2.2485	1.17986
	Commercial **(2)**			*	128	1.7266	1.28415
	Science **(3)**				350	2.2686	1.17855
Spatial	Arts**(1)**		*	*	338	3.8166	1.88436
	Commercial **(2)**			*	128	3.1563	2.12757
	Science **(3)**				350	4.6543	2.07811

***P<0.05**
N=816

Table 5 reveals that in Spelling, Mechanical Aptitude and Spatial Aptitude tests have the same pattern and the same interpretation could be offered. It was also revealed that there were significant differences in the performance of testees in Arts, commercial and science classes. The Commercial students performed least while Science students performed better than students in Commercial class. Again, there was a significant difference between Commercial and Science classes; it implies that students in Science class performed better than students in Commercial class.

In the same Table 5, Verbal Aptitude, Numerical Aptitude and Abstract reasoning have the same pattern; hence, they could be interpreted in the same manner. The significant differences that existed could be traced to the scores of students in Arts and Science classes and, scores of students in Commercial and Science classes.

In case of Abstract Reasoning, the significant difference could be traced to Arts and Commercial classes and also to Commercial and Science classes.

Discussion

The qualitative aspects of the items were assessed using level of difficulty and discriminating power. The p-value between 0.4 – 0.7 were considered excellent (Alonge, 2005; Kolawole, 2010) although p-value between 0.4 - 0.69 were selected for this study. However, items with p-value of 0.30 - 0.39 were still considered good by Ebel and Fischer (2001), In this study, they were termed good but not selected. In discriminating power, Ebel (1975) gave the rule of the thumb that favoured items with value of 0.4 and above, in this case, only items that fall between 0.39 - 0.99 were selected for validation exercise. This decision was in line with Ebel (1975) rule of thumb. Matlock-Hetzel (1997) opined that any discriminating index (DI) with negative value was not only useless but also reduced the validity of the test; hence, in this case, there was no negative value in the result.

It was discovered that the internal reliability coefficients of DAT subtests were low. This is in conformity with the argument of Wang (1993) that differential aptitude test coefficient is always low within the subtest of DAT. This was also attested to by Adediwura (2012) that; test batteries usually have lower reliabilities than single subject survey tests because of the limited questions sample of each subject area, but in differential aptitude test, each domain is measuring entirely different traits which lowers the co-efficient value further.

It was revealed that the students performed poorly in Mechanical Aptitude, Abstract Reasoning, Comprehension and Spatial Aptitude. This was not unconnected with the fact that aptitudinal disposition of the students were not assessed before allocated to classes, This was stated in the report of Olaniyi (2010) that SSSI students based their choice of class on prestige attached to the future career. Also Omofonmwan, Oluwatosin and Silverline (2016) corroborated it by submitting that SSSI students were not aware of the prerequisites for the courses they intended to study until after they were admitted for the programme of study. This is responsible for poor performance of students in schools.

The study indicated that there were significant differences between the art, commercial and science classes and seven areas tested in DAT. Barmola (2014) also agreed that science and arts students significantly function differently as a result of involvement in subjects like physics, chemistry and mathematics which necessitated analytical processes and logical reasoning. Haolader, Hakim, Kassim and Mubarak is (2017) study also indicated that students with science background performed better in higher institution with their counterpart in the same course but with art background.

Conclusion

The study revealed that the Differential Aptitude Test is valid and reliable to assess the differential aptitude of Senior Secondary School one (SSS I) students. The study also revealed that there were significant differences in the performance of testees in Arts, commercial and science classes. By norm, commercial students have an average score of

40.9% and above in these domains; spelling, verbal reasoning, abstract reasoning and spatial aptitude. Art students have an average score of 47.7% and above in these domain; spelling, verbal reasoning, spatial aptitude and comprehension. While science students have average score of 52.6% and above in all the domains.

Recommendations

Based on the findings of this study, it was recommended that:

1. DAT should be used to measure aptitude of SSSI students before allocating them to areas of study (Science, Commercial and Arts classes) since it has been found to be valid and reliable.
2. DAT could be used freely to measure students' differential aptitude irrespective of their study areas since it would clearly show their differential abilities.
3. Students to be allocated into Commercial class should have average score of 40.9% and above in spelling, verbal reasoning, abstract reasoning and spatial aptitude. Arts students should have average score of 47.7% and above in spelling, verbal reasoning, spatial aptitude and comprehension while science students should have average score of 52.6% and above in all the domains

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