
Comparative Study of the Learning Styles of Science and Arts Students in Secondary Schools in Anambra State

By

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Abstract

The study compared the learning style of science and arts student in senior secondary schools in Anambra State. There is different learning among students and it has effect on the achievement and performance. The purpose of the study is to investigate which learning style the sampled most commonly use, to determine the influence of gender and location on students learning styles. Learning styles the method of learning particular to an individual that is personnel to allow that individual to learn best. There are many theories of learning style but the researcher concentrated on the Kolb's learning style theory. Three null hypotheses were tested at 0.05 level of significant while all the students in Anambra State constituted the populations; one thousand two hundred (1200) students were sampled from the state schools. The result showed that the science students prefer convergent and accommodation learning style, while the arts students prefer divergent and assimilative learning style. Some recommendations were made.

Introduction

Educational researchers have been asking questions as to whether students' progress could be positively associated with their specific learning styles or not. There is no doubt schools among other things, were established to prepare young people for different roles in the society and these roles are usually inculcated in them through the process of learning.

Science is a process of learning about physical universe by applying the principles of scientific method which makes empirical observation, proposing hypothesis to explain those observations and testing those hypotheses in valid and reliable ways. (Okafor 2003). Science in senior secondary school includes Biology, Chemistry, Physics, Computer Science, and Agricultural Science. Arts subject studied include Language, History, Literature, Economics, and so on. Arts subject place greater emphasis on imagination and creative ability more than on technical and practical skills needed in sciences (Hornby, 2005). There has been a continuous search for teaching approaches that are learners oriented and that will enhance meaningful learning. According to Vester (2007), learning is a change in behaviour as

a result of experience. Learning occupies a very great significant position in the life of individuals, right from birth till death, and experience has shown however, that it is the extent to which individual is able to acquire learning that he is able to develop his potential and consequently, his well being (Okonye 1998).

Students differ in the way they learn, as well as in the way they look (Lefrancois, 2006). The emphasis on individual differences gave way to experimental learning style theory. According to Deing (2004) learning style refers to way in which each person begins to concentrate, process, internalize and remember new difficult content.

Sinatra (1982), traced back the origin of learning style to the 5th century during the time of physicians hypocrites and he divided the personality type into four such as: Melancholic, Sanguine, Phlegmatic and Choleric. But the modern psychologist has continued to divide the learning style through their theories, hence we have Gardner multiple intelligence theory, Dunn and Dunn learning style theory. McCarthy's 4-MAT system/model; Jung and Meyers-Briggs Type indicator (MBTI) model; Kolb's experimental learning style theory to mention but a few. Concentrating on Kolb's experimental learning style theory, the theory sets out four distinct learning styles which are based on a four stages of learning cycle made up of concrete experience, reflective observation, abstract conceptualization, and active experimentation (AE) which refer to learning from feeling, watching, listening, thinking and doing. The identified preferred styles of learning are based on the orientation of the learner which has certain features. The learning styles inventory (LSI) identified the four learning style types as:

1. **Convergent learning style (thinking):-** This refers to individual problems solving, session making and practical application of ideas. They are controlled by expression of emotion and prefer idealist with technical tasks and problems rather than social and interpersonal issues.
2. **Divergent learning style (feelings):-** This performs well in brain storming sessions. They are imaginative and feeling-oriented. They are sensitive, emotional, understand people and recognize problems.
3. **Assimilative learning style (watching):-** This uses inductive reasoning and creates theoretical models. They are more concerned with judging ideas by theoretical precession and not by practical value.
4. **Accommodating learning style (Doing):-** This is involved in new experience an often carries out plants. They rely on personal feedback, feeling as mode of perception, and learn kinesthetically and prefer teamwork. They look for opportunities to take risks and often adapt to changing immediate circumstances. Learning styles in summary are individual's best ways of assimilating, remembering an organizing information as a result of interaction between the environment and the nature.

Statement of the problem: The problem of this study is the different models of learning among students and the effect it has on the individual's achievement and performance. If we know that students learn differently, and we treat all the same,

have we achieved educational equality or inequality? Are we being effective? These are the questions the researcher intends to consider.

Purpose of the study: The purpose of this study is to:

1. Investigate which learning styles do the sample students most commonly use
2. Determine the influence of gender on students learning styles
3. Determine the influence of location on students learning styles.
4. Compare the learning styles of sciences and arts students.

Significance of the study: The result of the learning styles of science and Arts students in senior secondary schools in Anambra State will be a revelation of the learning styles of students in our schools of which the teachers are the mediating factors. The study will help the teachers to know that learning styles that will suit the various learning. The findings will also aid teachers to design their instruction method to connect with student's learning styles, using various combinations of experiences, reflections, conceptualization and experimentation. These findings will help to reduce the mismatch between the learning styles of a student and the teaching styles of teachers. The learning styles will help the teacher to know the operations and approaches to learning to develop better teaching strategies.

Research Questions

The following research questions were formulated to guide the study:

1. What are the preferred learning styles of Sciences and Arts students in secondary schools?
2. To what extent does gender affect the learning style preference of Science and Arts students in senior secondary school?
3. To what extent does location of the school affects the learning style preference of Science and Art students in senior secondary school?

Null Hypothesis: The following null hypotheses were stated and tested at 0.05 level of significance.

HO₁: There is no significant difference between the mean rating of learning styles preference of Science and Arts students.

HO₂: There is no significant difference between the mean rating of learning style preference based on the students gender.

HO₃: There is no significant difference between the mean ratings of learning styles preference based on location of the school.

Scope of the Study

This work was limited to Kolb's learning style inventory (LSI) used by the science students that offer Biology, Chemistry and Physics as well as the Arts

students that offer economics, Government and English Literature subjects in senior secondary school in Anambra State.

Research Design

This is a case of senior secondary schools in Anambra State. It aimed at identifying the learning styles of Science and Arts in the state. The work wants to bring out their similarities and where they differ if there is any difference. This research design was adopted as being appropriate for this study, because it will help to dictate the differences and similarities in learning styles of the Science students with that of Art students.

Area of Study

The study was done in Anambra State. Anambra State is made up of six education zones – Awka, Aniocha, Onitsha, Aguata, Idemili and Otu-ocha. The researcher used only four education zones: Awka, Aniocha, Aguata and Onitsha.

Population and Sampling

The population of the study comprises of all the science and arts students in the senior secondary schools of Anambra State. The sample for the study comprised of one thousand two hundred students selected from the four selected education zones. The four education zones were selected through randomly sampling of which all the education zones were written in a piece of paper and put in bag. By picking and replacement method, that is the researcher picked up a piece of paper from the bag and noted the name of the zone, then put it back to the same bag and picked another pieces until four different zones were picked. All the senior secondary schools in zones selected were used. And all the SS3 students in the selected schools were used.

Instruments for Data Collection

The main instrument for data collection was the questionnaire which was made up of two sections. Section A contains the personal data with five items. Section B is made up of 20 items, this has four points of scales, comprising of (1) disagree (2) strongly disagree, (3) Agree (4) strongly agree, as well as (1) low extent, (2) moderate large extent, (3) large extent, (4) very extent.

Validation of instrument

The written questionnaire was given to one Biology, Chemistry, Physics, Economic, Government and English lecturer as well as one lecturer and measurement and Evaluation in Nwafor Orizu College of Education, Nsugbe for validation. They were requested to evaluate the questionnaire for appropriateness to each of the questions, content coverage, and suitability of language. This they did and their corrections, suggestions and inputs with the researcher's guidelines and directions were implemented. This resulted in the reduction of the 36 items in the final items used.

Reliability of Instrument: The researcher used test-retest method using two schools apart from the sampled schools, coefficient of the two sets of sources were obtained. The result, which was computed using Person Product Moment correlation coefficient, was examined and it indicated that the instrument has the reliability coefficient of 0.87, which shows that it is highly reliable.

Method of data Collection and Analysis

The instrument was given to the students by the researcher and collected back the same day. The data were analyzed using mean, standard deviation and t-test. The mean rating of 2.50 and above was taken as Agree to the item of the learning style while 2.49 and below was taken as Disagree to the item of the learning style. Also 2.50 and above is considered to be very large extent while below 2.49 is considered as low extent. The hypotheses were tested at 0.05 level of significance using t-test.

Result:

Research Question 1: What are the preferred learning styles of Science and Arts students in secondary schools?

Table 1: Learning styles preference of science and Arts students in Senior Secondary School

		Science students N =800			Arts students N= 400		
S/N	Items	X	SD	Rem	X	SD	Rem
A	Sub-scale one: Convergent learning style:						
1.	I learn better and perform better when I plan study work alone and solve problems by myself.	3.09	0.64	A	3.90	0.70	A
2	Deep thinking of a topic helps me to understand what the topic is like	3.58	0.72	A	1.25	0.57	DA
3.	Detailed study of ideal helps me to understand a topic	3.77	0.48	A	3.58	0.81	A
4.	When I work alone, I remember things easier	3.25	0.89	A	1.49	1.00	DA
5.	I prefer dealing with mathematical aspects than theoretical aspects	3.52	0.70	A	3.14	0.45	A
	Grand mean	3.44	0.69	A	2.66	.71	A
B	Sub-scale Two: divergent learning style						
6.	I prefer theoretical work than	1.57	0.79	DA	3.56	0.73	A

	practical work						
7.	I prefer group study	1.65	0.73	DA	3.21	0.89	A
8.	I learn better and easily by textbooks than listening to lessons	1.65	0.73	DA	3.21	0.89	A
9.	Noise does not affect my learning	3.54	0.62	A	1.89	0.69	DA
10.	I perform well in my question and answer session as learning techniques	3.09	0.62	A	1.89	0.69	DA
C	Sub-scale Three Assimilative style:						
11.	I like judging ideals by theoretical precision and not by practical value	1.58	0.81	DA	3.09	0.84	A
12.	I learn better when I am being taught with large number of students at same time.	0.82	1.50	DA	3.58	0.70	A
13.	I learn faster and better when I see other people perform a task or do something	1.76	1.10	DA	3.59	0.69	A
14.	I prefer reasoning assignment than practical work.	1.68	0.90	DA	3.08	0.69	A
15.	Visual aids facilitate my learning of difficult topics.	3.59	0.69	A	3.25	0.77	A
D	Sub-scale Four accommodative learning style						
16.	I learn better when I am exposed to learn activities	3.65	3.62	A	3.66	0.59	A
17.	Topics involving experiments are easier for me	3.08	0.64	A	1.71	0.83	DA
18.	I can understand new topics and carryout plans by myself	3.08	0.46	A	1.25	0.57	DA
19.	I understand better when I make drawing I take note as I study	3.25	0.77	A	2.90	0.94	A
20.	Assignment and completion of task helps me to understand the topic easily	3.26	0.89	A	1.65	0.91	A
	Grand mean						

Table one shows that the science students prefers convergent learning style while the Art students prefers divergent learning style, the arts students prefers assimilative learning style, while the science student, prefers accommodative learning to learning style more than Arts students.

Research question two: To what extent does gender affect in the learning style preference of science and Arts students in Senior Secondary School?

Table II: Learning style of male and female students of Science and Arts in Secondary School?

S/ N	Items	Science students N=800						Arts students N = 400					
		Male 350			Female 450			Male 400			Female 300		
		X	SD	Rem	X	SD	Rem	X	SD	Rem	X	SD	Rem
A.	Sub-scale one convergent learning style												
1	I learnt better and performs better when I plan, study, work alone and solve problems by myself	3.21	0.91	VLE	1.21	0.51	LE	3.80	0.20	VLE	1.21	0.54	LE
2.	Deep thinking of a topic helps me to understand what the topics are like	3.58	0.72	VLE	3.25	1.02	VLE	3.80	0.20	LE	3.44	1.02	LE
3.	Detailed study of ideals helps me to understand a topic	3.67	0.61	VLE	1.24	0.62	LE	3.60	0.26	VLE	1.24	0.62	LE
4.	When I work alone, I remember things easier	3.30	0.74	VLE	1.5	0.97	LE	2.64	0.95	VLE	1.55	0.97	LE
5.	I prefer dealing with mathematical aspects of a topic than theoretical aspects	3.30	0.88	VLE	1.48	0.95	LE	3.40	0.82	VLE	1.48	0.95	LE
	Grand mean	3.41	.77	VLE	1.25	.82	LE	1.45	.49	VLE	1.78	.82	LE
B	Sub-scale Two: Divergent Learning Style												
6.	I refer theoretical work than practical work	1.45	0.93	LE	3.56	0.73	VLE	3.00	0.63	VLE	3.56	0.73	VLE
7.	I prefer group study	1.74	0.69	VLE	3.21	0.89	VLE	2.00	0.77	LE	3.21	0.89	VLE
8.	I learn better and easily by textbooks than listening to lessons.	1.70	0.98	VLE	3.49	0.71	VLE	1.20	0.36	LE	3.49	0.71	VLE
9.	Noise does not affect my learning	3.08	0.56	VLE	1.94	0.69	LE	2.05	0.60	LE	1.94	0.69	VLE
10	I perform well in question and answer session as learning technique	3.13	0.56	VLE	3.04	0.63	VLE	2.40	0.66	LE	3.04	0.63	VLE

	Grand mean	2.22	.74	LE	3.05	.73	VLE	2.13	.60	LE	3.05	.73	VLE
11	I like judging ideals by theoretical precision and not by practical value.	1.57	1.00	LE	3.68	3.38	VLE	3.70	0.22	VLE	3.68	0.38	VLE
12	I learn better when I'm being taught with a large number of students at the same time	1.81	0.87	LE	3.73	0.57	VLE	3.31	0.42	VLE	3.73	0.57	VLE
13	I learn faster and better when I see other people perform a task or do something	3.29	0.77	VLE	3.22	0.89	VLE	3.60	0.26	VLE	3.22	0.89	VLE
14	I prefer reasoning assignment than practical work	3.60	0.62	VLE	3.39	0.69	VLE	2.0	0.79	LE	3.39	0.57	VLE
15	Visual aids facilitates my learning of difficult topics	3.12	1.02	VLE	3.57	1.11	VLE	2.68	0.82	VLE	3.57	0.73	VLE
	Grand mean	2.68	.86	VLE	3.52	.73	VLE	.14	.50	VLE	3.52	.63	VLE
D	Sub-scale Four Accommodative Learning Style												
16	I learn better when I see or when I am exposed to learning activities	3.56	0.62	VLE	3.53	0.73	VLE	1.56	0.87	LE	3.53	0.73	VLE
17	Topics involving experiments are easier for me	3.13	0.66	VLE	1.79	0.85	LE	3.48	0.58	VLE	1.79	0.85	LE
18	I can understand new topics and carryout plans by myself.	3.69	0.85	VLE	1.48	0.79	LE	3.40	0.76	VLE	1.48	0.79	LE
19	I understand better when I make drawing I take note as I study	3.79	0.55	VLE	3.35	0.73	VLE	3.56	0.58	VLE	3.35	0.73	VLE
20	Assignment and completion of tasks helps me to understand the topics easily	3.05	0.80	VLE	1.32	0.82	LE	3.48	0.71	VLE	1.32	0.82	LE
	Grand mean	3.44	.70	VLE	2.29	.78	LE	3.10	0.70	VLE	2.29	.78	LE

Data in 2 above shows that male students prefer convergent learning style to a very large extent while the female students prefer the convergent to low extent. The male students prefer divergent learning style to a low extent while the female students prefer divergent learning style to a very large extent. Also female and male students prefer assimilative learning style to very large extent, but the male students prefer accommodative learning style to a very large extent while the female students prefer to low extent.

Research Question Three

To what extent does location of the schools affects the learning styles preference of Science and Arts students in Senior Secondary Schools?

Table III: Learning styles of Urban and Rural students of Chemistry and Arts in Senior School.

S/ N	Items	Urban students N= 900						Rural students N = 300					
		Science			Arts			Science			Arts		
		X	SD	Rem	X	SD	Rem	X	SD	Rem	X	SD	Rem
A.	Sub-scale one convergent learning style												
1	I learnt better and performs better when I plan, study, work alone and solve problems by myself	2.99	0.58	VLE	1.92	0.73	LE	2.50	1.13	VLE	2.20	1.16	LE
2.	Deep thinking of a topic helps me to understand what the topics are like	3.44	1.03	VLE	1.28	0.48	LE	2.80	1.08	VLE	2.10	0.68	LE
3.	Detailed study of ideals helps me to understand a topic	3.88	3.52	VLE	3.28	1.85	LE	2.90	1.13	VLE	2.62	0.91	LE
4.	When I work alone, I remember things easier.	3.30	0.74	VLE	1.55	0.97	LE	2.64	0.95	VLE	1.55	0.97	LE
5.	I prefer dealing with mathematical aspects of a topic than theoretical aspects	3.94	1.69	VLE	2.64	1.72	VLE	2.70	1.23	VLE	390	1.29	VLE
	Grand mean	3.51	.91	VLE	2.13	1.15	LE	2.71	1.00	VLE	2.46	1.00	LE
B	Sub-scale Two: Divergent Learning Style												
6.	I refer theoretical work than practical work	1.62	0.79	LE	3.67	0.93	VLE	3.10	0.98	VLE	2.90	1.08	VLE
7.	I prefer group study	3.26	0.89	VLE	3.08	0.64	VLE	3.84	1.59	VLE	2.80	0.70	VLE
8.	I learn better and easily by textbooks than listening to lessons	2.25	0.68	LE	3.49	0.71	VLE	2.48	1.59	LE	3.02	0.64	VLE
9.	Noise does not affect my learning	3.04	0.42	VLE	2.48	0.69	LE	3.88	0.79	VLE	3.54	1.03	VLE
10	I perform well in question and answer session as learning technique	3.41	0.81	VLE	3.49	0.29	VLE	2.40	0.66	LE	3.04	0.63	VLE
	Grand mean	2.72	.72	VLE	3.24	.65	VLE	3.14	1.12	VLE	3.06	.82	VLE
C	Sub-scale Three Assimilative Learning												
11	I like judging ideals by theoretical	2.09	1.10	LE	2.64	0.89	VLE	3.70	0.22	VLE	3.68	0.38	VLE

	precision and not by practical value												
12	I learn better when I'm being taught with a large number of students at the same time	3.16	0.79	VLE	3.88	0.83	VLE	3.31	0.40	VLE	3.73	0.57	VLE
13	I learn faster and better when I see other people perform a task or do something	1.86	1.05	LE	3.19	0.92	LE	1.81	0.87	LE	3.22	0.89	AVLE
14	I prefer reasoning assignment than practical work	2.68	0.68	VLE	3.08	0.64	VLE	2.56	0.66	VLE	3.39	0.82	VLE
15	Visual aids facilitates my learning of difficult topics	3.59	0.69	VLE	3.25	0.77	VLE	2.68	0.99	VLE	3.57	0.71	VLE
	Grand mean	2.64	.90	VLE	3.21	.81	VLE	2.81	.63	VLE	3.52	.67	VLE
D	Sub-scale Four Accommodative Learning Style												
16	I learn better when I see or when I am exposed to learning activities	3.54	0.72	VLE	3.46	0.442	VLE	3.53	0.73	VLE	3.56	0.62	VLE
17	Topics involving experiments are easier for me	3.02	0.64	VLE	1.79	0.83	LE	3.48	0.58	VLE	1.79	0.85	LE
18	I can understand new topics and carryout plans by myself	3.59	0.85	VLE	1.48	0.79	VLE	3.40	0.76	VLE	1.48	0.79	LE
19	I understand better when I make drawing I take note as I study	3.79	0.55	VLE	3.35	0.73	VLE	3.56	0.58	VLE	3.35	0.73	VLE
20	Assignment and completion of tasks helps me to understand the topics easily	3.04	0.82	VLE	3.48	0.71	VLE	3.04	0.63	VLE	2.40	0.66	VLE
	Grand mean	3.40	.72	VLE	2.71	.53	VLE	3.40	.60	VLE	2.52	.73	VLE

Data in table 3 shows that science students in Urban area prefer convergent learning style to a very large extent (3.51) more than arts students to a low extent (2.13). the rest shows that they prefer them to a very large extent.

Null Hypotheses

HO₁: There is no significant difference in the mean rating of learning style preference of Science and Arts students.

Table 4: t-test of significant difference between two mean scores of science and Arts students of learning style preference.

Source	X	SD	N	DF	t-cal	t-critical	P<0.05
Science	2.71	0.76	800	1198	1.13	1.960	NS
Art	2.60	0.74	400				

Data in table 4 above shows that the t-calculated of 1.13, is less than the t-critical of 1.960 at 0.05 level of significance. This means that the null hypothesis stated is not rejected.

HO₂: There is no significant difference in the mean rating of learning style preference based on the students gender.

Table 5: t-test of the significant difference between male and female students of learning style preference.

Source	X	SD	N	DF	t-cal	t-critical	P<0.05
Male	2.96	0.81	450	1198	0.20	1.960	NS
Female	2.67	0.75	350				

Data in table 5 above shows that the t-calculated is 0.20, which is less than the t-critical value of 1.960 at 0.5 level of significance, this means that the null hypothesis stated above is upheld.

HO₃: There is no significant difference in the mean rating of learning styles preference based on location of the school.

Table: t-test of the significant difference between the learning style of Urban and Rural students in secondary schools.

Source	X	SD	N	DF	t-cal	t-critical	P<0.05
Urban	3.29	.77	900	1.198	1.960	1.960	NS
Rural	3.09	0.90	300				

Table shows that the null hypothesis is accepted since the t-calculated is less than t-critical.

Discussion

Learning style is very important instrument for considering the rate at which students understand things. Science students generally prefer more of convergent and accommodative learning styles because they involve the ability to work out things, deep thinking, and detailed study of ideals, experimental work, and completion of task. They (the science students) show little preference to assimilative and divergent

learning styles. The Arts students prefer divergent and assimilative learning styles with little preferences to convergent and accommodative learning styles because they involve theoretical work, group study, reasoning assignments etc. Presently, in our schools, there exist gender differences in achievement and these have attracted some debate (Nworgu 2005). This paper links it to the learning style of the students. Ugwungwu (2002) proved that there is gender difference in performance of students in science and arts. He maintained that Girls have greater verbal ability than boys and boys have better visual –special ability than girls. This study also proves that male students prefer convergent, assimilative and accommodative learning style to a very large extent; while the female students prefer divergent and assimilative learning style to a very large extent. Furthermore, the female students prefer the convergent and accommodative learning style to low extent; the male students prefer divergent learning style to a low extent.

The gender and location have no influence in learning style of students in secondary schools. The results show that there are no significant differences in the learning style of Science and Arts students, then the school location and gender difference have not affect the learning style of the students. Differences in achievement between urban and rural students are due to differential environment stimulation. The urban school students are said to be exposed to the modern effects and so perform better on the other hand, the students in rural areas have no such experiences (Inomesia E. (1989).

Conclusion and Recommendation

Conclusively, there is a significant effect of someone's course of study of his style of learning. This accepts what Smith (2007) said that people learn in many different ways and that no two people learn in exactly the same way. No particular style is intrinsically better or worse than the other, only different (Bruce 2002). Based on this, the teachers should have a good knowledge of the different learning styles by the students and know the teaching style that will match it, so as to reduce teacher-student style conflict.

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