A Study on Students' Achievement and Perception of Integrated Science in Colleges of Education in Nigeria

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Abstract: *The focus of the present study was to find out whether students' make excellent or weak achievements in integrated science in colleges of education in Nigeria. It also focused on whether the students' perceive integrated science tricky or not-difficult. The population of the study comprised of all the students' that study integrated science in colleges of education in Nigeria. The sample consists of a total of 751 integrated science students' of Federal College of Education, Eha-Amufu, Enugu State Nigeria who were selected by purposive sampling technique. The designs of the study were ex-post-facto and survey. The instruments for data collection were Nigeria Certificate in Education (NCE) summary results for integrated science and questionnaire (IPS). The questionnaire instrument was prepared by the researcher and validated by three experts in science education and two experts in measurements and evaluation. Two research questions guided the study. The analytical instrument was mean. The results of the study were that the achievement of students' in integrated science in colleges of education in Nigeria was weak, and the students' perceive integrated science tricky. The researcher recommended, among another, that teachers should employ strategies that would enhance students' achievement in integrated science and, as well, change their negative perception about the subject.*

Key Words: *Study, Perception, Integrated Science, Achievement, College of Education, Tricky.*

I. Introduction

College of education is a tertiary education system in Nigeria that was established by law to train teachers for the basic education level (primary and junior secondary schools). The college of education program is a three-year program that leads to the award of Nigeria Certificate in Education (NCE). Integrated science is one of the courses candidates offer in colleges of education. Students' study integrated science either as a double major or single major course. Graduates of integrated science teach basic science in primary and junior secondary schools in Nigeria. The philosophy behind integrated science in colleges of education in Nigeria is emphasizing the unity of science. As stipulated in the minimum standards for colleges of education [1], integrated science emphasizes those concepts which are common to all of the sciences. The integrated science curriculum for colleges of education is composed of components of chemistry, biology, physics, and as well mathematics and geography. Hence, concepts of chemistry, biology, physics geography, as well as mathematics are built in integrated science and brought together under unified themes and codes.

Achievement, according to [2], is a measure of the level of knowledge and skills students' have attained in a school subject as indicated by marks they made in tests and examinations. In Nigeria, various scholars and teachers of science education describe students' achievement in science as unsatisfactory. In a review study, [3] established that there is no significant achievement of students in chemistry in West African Examination Council (WAEC) examination over the years 2008 to 2012. Also, [4] found out in a study that achievement of students in science is just above average. Similarly, [5] established that the academic achievement of secondary school students' in Fagge Local Government Area of Kano State, Nigeria was poor. Moreover, a good academic achievement is pivotal to students' progress and a good indicator of productivity in the school. Students studying integrated science in colleges of education in Nigeria need satisfactory achievement to assure of graduation and point to the potentialities to making a good basic science teacher. An objective of the study is to find out the state of affairs in students' achievement in integrated science in colleges of education in Nigeria. Nevertheless, after a period of instruction, teachers carry out evaluation to find out the achievements of the learners either by administering tests or examinations. The knowledge of students' achievement helps the teachers to make crucial decisions and take appropriate actions about the teaching-learning process. In the colleges of education in Nigeria, certain systems measure the academic achievements of students'. Ordinary grade, grade point average (GPA), cumulative grade point average (CGPA), as well as raw scores or marks measure students' academic achievement. The GPA measures students' achievement per semester, while the CGPA measures the final or cumulative achievements of students'. The CGPA determine

the classification of the achievements of students' as distinction (D), credit (C), merit (M) or pass (P) in the Nigeria Certification in Education (NCE). Students' with outstanding courses are classified as incomplete result (IR). The classification of students' achievement in the NCE is based on a classification scheme. A summary of results is produced that summarizes the achievement of the students' for six semesters (3 years). In the study, the students' final grades in integrated science in the Nigeria Certification in Education were used to measure students' achievement in integrated science.

Perception, according to Oxford advanced learners dictionary is an idea, a belief or an image an individual has as a result of how he/she sees or understands something. If two individuals were subjected to the same stimuli the interpretation or attaching meaning to the stimuli will differ. In order words, two students' taught the same concept or concepts will differ in their perception of the concept or concepts. Most students' dare science because they perceive it as difficult or tricky. In a study by [6], senior secondary two (SS 11) students in Rivers State Nigeria perceived physics concepts of equilibrium forces, simple harmonic motion, projectile motion and measurements of heat and waves difficult. In another study, [7] found out that senior secondary two (SS 11) in Imo State, Nigeria perceived chemistry concepts of hydrocarbons and alkanols tricky to learn. [8] found out that junior secondary school students' in Makurdi metropolis find basic science concepts of excretion, cells, and skeleton as well as measurement difficult. Perception influences the meaning, interest and the amount of dedication and effort a student will have for a subject or course. In a nutshell, the achievement and perception of students' in integrated science are of concern to science educators in Nigeria. Perception and achievement have implications in the teaching and learning of basic science in primary and junior secondary schools. In the study, the researcher tried to find out whether students' in colleges of education in Nigeria make excellent or weak achievements in integrated science. The researcher also tried to find out whether the students' perceive integrated science tricky or not-difficult.

II. Material And Methods

Purpose of the study: The purpose of the study was to find out whether students' make excellent or weak achievements in integrated science, and whether the students' hold integrated science tricky or not-difficult.

Research questions: The following questions guided the study:
1.   What is the level of achievements of students' in integrated science in colleges of education in Nigeria?
2.   What is the students' perception of integrated science in colleges of education in Nigeria?

Design of the study: The designs of the study were ex-post-facto and survey. Ex-post-facto was adopted because the researcher collected data from already existing NCE summary of results. The survey design was adopted because the instrument of the questionnaire sought the opinions of respondents.

Area of the study: The researcher carried out the study in the Department of Integrated Science, Federal College of Education, Eha-Amufu, Enugu State Nigeria.

The population of the study: The population of the study consists of all the students' that study integrated science in colleges of education in Nigeria.

Sample and sampling techniques: The sample consists of 751 students' selected by purposive sampling technique. Two-hundred and twenty-five (225) of the sample was current third-year (NCE 3) students'. The third-year students' have learned all the concepts in integrated science contained in the minimum standards for integrated science in contrast to first year (NCE 1) and second year (NCE 2) students'. As such, the NCE 3 students' were most suitable to respond to the questionnaire. A second category of the sample consists of 526 students' that have completed their NCE program, and their final NCE grades determined.

Instruments for data collection

The instruments for data collection were questionnaire, IPS (integrated science students' perception scale) and NCE summary of results for 2017 to 2019 academic periods. The IPS was developed by the researcher and validated by three experts in science education and two experts in measurement and evaluation. The changes the validations recommended were applied in the final copy of the questionnaire. The questionnaire comprised of sections A and B. Section A contained two items of course combination and year of study. The course combination was to ensure that the respondents are in the department of integrated science. The year was also to ensure that the respondents were NCE 3 students'. Section B contained items of science concepts derived from integrated science curriculum for colleges of education in Nigeria. It contains concepts such as photosynthesis, power, acceleration, as well as geometry and solar system. Instructions were given to the respondents on how to respond to the items of the questionnaire. The IPS was developed on a four-point Likert scale of actively tricky (AT), severe (S) and not-tricky (NT), and as well actively not-tricky (ANT). The scales were ranked 4, 3, 2 and 1 respectively. The NCE summary of result contains the name, registration number, marks obtained in each course, and CGPA, as well as the NCE final grade in integrated science for each student. The grades were distinction (D), credit (C), merit (M), or pass (P), and as well incomplete results (IR) for students' with outstanding courses. The NCE summary of results for 2017, 2018 and 2019 constituted the

materials for collecting data on students' achievements in integrated science. The grades of the students' showed in the NCE summary of results measures their achievements in integrated science. The grades D (distinction), C (credit), M (merit) and P (pass), as well as an incomplete result (IR), were ranked 5, 4, 3, 2 and 1 respectively to aid statistical analysis.

Methods of data collection

The questionnaire instrument, IPS, was randomly distributed to the respondents for the response to the items. Some of the respondents responded to the questionnaire items immediately, while majority responded and returned theirs later. In the end, only fifty (50) responded questionnaires were returned to and collected by the researcher for analysis out of a total of ninety (90) questionnaires randomly distributed. The students' final grades (Distinction, Credit, Merit or Distinction and incomplete results) in integrated science in the NCE summary of results for 2017, 2018 and 2019 were converted to scores. The conversion was done by multiplying the rankings 5, 4, 3, 2, and 1 for distinction, credit, merit, pass and incomplete result respectively by the number of students' that made each category. For example, if eight students' made distinction five was used to multiply eight, which gives a score of forty (40). Consequently, the score for each category (D, C, M, P and IR) for 2017, 2018 and 2019 were determined and the mean achievement scores calculated.

Statistical analysis

The analytic tool was mean.

$$\text{Mean } (\ddot{X}) = \frac{\Sigma fx}{N}$$

Where x = items in the distribution

N= total number of items in the distribution

Σ = summation

f = frequency

To take an unbiased decision about the achievement of the students' the rankings 5, 4, 3, 2 and 1, for D, C, M, P and IR respectively were added and divided by 5 to get the mean of 3.0. The decision rule states as follows:

Decision rule: If the mean is equal to or greater than 3.0, students' achievement in integrated science is excellent, but if it is less than 3.0 students' achievement is weak.

Similarly, the rankings 4, 3, 2, 1, for AT, S, NT and ANT respectively were summed up and divided by 4 to get the mean of 2.50.

Decision rule: if the mean of an item (concept) is equal to or greater than 2.50 the perception is tricky, but if it is less than 2.50 the perception is not-difficult.

The mean of the items in the questionnaire were summed up to get the total mean. The total mean was divided by the number of items to get the grand mean. The decision rule states as follows:

Decision rule: If the grand mean is equal to or greater than 2.50 the students' perception of integrated science is tricky, but if it is less than 2.50 it as not- difficult.

III. Results

Research question 1: What is the level of achievement of students' in integrated science in colleges of education in Nigeria?

Table 1: Summary of students' achievement in integrated science from year 2017 to 2019.

Year	D(5) No	Score	C (4) No	Score	M (3) No	Score	P (2) No	Score	IR (1) No	Score	T S	TNS
2017	8	40	46	184	67	201	28	56	7	7	488	**156**
2018	18	90	58	232	72	216	17	34	60	60	642	**225**
2019	12	60	35	140	33	132	8	16	57	57	348	**145**
Total	38	190	139	556	172	549	53	106	124	124	**1525**	**526**
Mean											**2.90**	

D: distinction; C: credit; M: merit; P: pass; IR: incomplete result; TS: total score; TNS: total number of students.

Table 1 showed that the mean achievement score of the students was 2.90, which is less than 3.0. This suggests that the achievement of students in integrated science is weak.

Research Question 2: What is the students' perception of integrated science in colleges of education in Nigeria?

Table 2: Summary of responses and analysis of students' perception of integrated science in colleges of education in Nigeria.

s/n	Concept	AT (4)	S (3)	NT (2)	ANT (1)	Total score	N	X̌	P
1	Photosynthesis	8	4	6	30	86	50	1.72	NT
2	Combustion	10	8	12	18	106	50	2.12	NT
3	Respiration	11	8	20	9	75	50	1.50	NT
4	Digestive system	29	5	2	12	147	50	2.94	T
5	Circulatory system	26	11	3	8	151	50	3.02	T
6	Nervous system	27	7	9	5	152	50	3.04	T
7	Excretory system	25	8	5	10	144	50	2.88	T
8	Skeletal system	25	6	8	9	143	50	2.86	T
9	chromosomes	23	11	8	7	148	50	2.96	T
10	Ecosystems	25	10	3	10	146	50	2.92	T
11	Force	25	5	10	8	143	50	2.86	T
12	Energy	10	2	12	24	74	50	1.48	NT
13	Power	10	5	24	9	92	50	1.84	NT
14	Sound	26	12	7	3	157	50	3.14	T
15	Acceleration	30	3	8	7	152	50	3.04	T
16	Magnetism	22	8	9	9	139	50	2.78	T
17	Gas laws	25	4	6	6	137	50	2.74	T
18	Vapour pressure	21	10	10	7	141	50	2.82	T
19	Algebra	25	5	9	9	133	50	2.66	T
20	Geometry	25	9	9	5	150	50	3.00	T
21	Trigonometry	26	8	10	4	152	50	3.04	T
22	Earth	23	9	10	6	145	50	2.90	T
23	Rocks	13	10	9	16	116	50	2.32	NT
24	Solar system	29	8	8	3	159	50	3.18	T
25	Deforestation	10	4	6	28	92	50	1.84	NT
26	Desertification	14	6	11	17	113	50	2.26	NT
27	Moon	23	10	11	4	148	50	2.96	T
	Total					3,539		70.79	
	Mean					131.07			
	Grand mean							2.62	

AT: actively tricky; S: severe; NT: not tricky; ANT: actively not tricky; X̌: mean; P: perception; N: number of respondents; T: tricky.

As shown in table 2, students find the concepts indicated in items 1-3, 12-13, 23, 25 and 26 not tricky to learn and understand, while they find the concepts indicated in items 4-11, 14-22 and 27difficult to learn and understand. The grand mean was 2.62. Since 2.62 were more significant than 2.50, the researcher concluded that students' in colleges of education in Nigeria perceive integrated science tricky.

IV. Discussion

The result of the study (table 1) suggests that the achievement of students' in integrated science in colleges of education in Nigeria was weak. Academic achievement of students' is affected by some identified factors such as habit, climate, discipline and physical facilities [9], anxiety [10, 11], peer influence and parental involvement [12] as well as other numerous factors. Students' require a friendly environment to study and learn. In the event where the learning environment is not friendly their academic achievement will be affected. In other words, the weak achievement of students' in integrated science observed in the study may be attributed to some challenges beyond their control. The academic achievement of students' is a determinant and indicative of their competencies and abilities. The level of academic achievement of the students' is a measure of the knowledge and skills they have acquired over a period of time. In other words, students' with excellent grades in integrated science are better equipped to teach basic science in primary and junior secondary schools than students with weak grades.

As indicated in table 2, students' in colleges of education in Nigeria perceive integrated science tricky. The students' found digestive system, circulatory system, nervous system among others difficult to learn and understand. They also hold that photosynthesis, combustion and respiration among others are easy to learn and understand. [13] found out in a study that lack of specialists in integrated science is a problem of teaching integrated science in Delta State of Nigeria. Hence, when an unqualified teacher lacking the knowledge and pedagogical competencies handle a subject students' will lose interest in the subject. In consequence, the students' will see the subject difficult as a result of inability to understand what the unqualified and incompetent

teacher teaches. Similarly, lack of practical activities, overloaded content, negative attitudes towards science among students' and getting poor results make students' perceive science tricky. Therefore, the observation that integrated science is tricky can be accounted for by unavoidable factors. Perception is a strong psychological factor that influences students' participation in an academic activity. A student who perceives a course difficult is already defeated psychologically about the course. The student will hate the teacher and the course and he/she will avoid classes or implement any assignments given by the teacher. Consequently, his/her performances in the course will dwindle or emphatically weak. Therefore, the way students' in colleges of education hold integrated science will directly affect their achievement in the course, and potentially affect the teaching and learning of basic science in primary and junior secondary schools in Nigeria.

V.   Conclusion

The results of the study showed that the achievement of students' in integrated science in colleges of education in Nigeria is weak. The students' also perceive integrated science tricky. It, therefore, implies that measures should be taken by teachers and proprietors of colleges of education to stem the observations.

Recommendations
 Based on the findings of the study, the researcher recommends as follows:
▪   Teachers of integrated science in colleges of education in Nigeria should employ strategies that would enhance students' achievement and equally change their negative perception about integrated science.
▪   The proprietors of colleges of education in Nigeria should provide the necessary facilities required for effective teaching and learning of integrated science. Hence, to enhance the standard and quality of teaching integrated science in colleges of education in Nigeria.

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