
**MEASUREMENT OF INTERNAL EFFICIENCY IN THE SCHOOL SYSTEM: FOCUS
ON SOME SELECTED COLLEGES OF EDUCATION IN NIGERIA.**

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ABSTRACT: *The study examined measurement of internal efficiency in the school system: Focus on some selected Colleges of Education in Nigeria. This study adopted the ex-post facto research design. The population for this study comprised all the 70 public Colleges of Education in existence between 2012/2013 and 2015/2016 in Nigeria. There were 21 federal and 49 states owned Colleges of Education located in all the six geo-political zones of the country. The sample for this study comprises students of fifteen Colleges of Education. The respondents will be all the 203 heads of departments drawn from these fifteen (15) Colleges of Education in three geo-political Zones. The three geo-political zones of Nigeria. The sample technique involved multi-stage, stratified random and purposive samplings. An inventory was used to collect data on number of students that progressed to higher level, number of stagnation, dropout and graduate outputs in each department in the Colleges of Education sampled within the selected sessions. Inventory titled “Measurement of Internal Efficiency of Colleges of Education inventory” (MIECOEI) was used to collect data from the respondents. The instrument was subjected to screening by experts in Educational Management and Test and Measurement in order to meet the face, construct and content validity. The inventory was administered through the help of the research assistants who distributed all the copies of the inventory to the heads of the departments in the Colleges of Education. In analyzing the data collected for the study, descriptive statistics such as percentages mean and cohort analysis were used to analyse the research questions. The findings of this research showed that there were increase in the rates of stagnation and dropout but increase in progression rate as students moved to higher classes and that the internal efficiency of the Colleges of Education was low. Based on the findings, it was concluded that there was low internal efficiency in the sampled Colleges of Education in Nigeria. It was therefore recommended that efforts should be made to maintain the increased in the progression rates within the first two academic sessions so that the increase in the rates of dropout and stagnation in the third year and among those that spent extra year (s) in the Colleges of Education would be reduced.*

KEYWORDS: measurement, internal efficiency, cohort, progressive, stagnation, flow rate

INTRODUCTION

The inability to identify the rate of wastage in the Nigerian tertiary institutions has been described as worrisome by the society. Many students have backlog of courses being repeated. Common observations have shown high rate of dropout from the system for various reasons such as death, financial deficiency, ill health, failure e.t.c. Only few progress to the next level. Many get themselves moving to higher class in spite of backlogs of carryover courses. The level of internal efficiency of our Colleges of Education is becoming questionable. The time the students entered the institutions is what is of concern without thinking of when they ought to graduate. It is a common observation that most students spend four or maximum five years for a course of three years. Some even failed-out after spending the maximum five years. Those students on stagnation have to reseat the affected courses which always lead to inconveniencies for such students, lecturers and College managements. Some students do not have it in their minds that they have limited years to spend in the Colleges of Education until they have spent five maximum years without passing all the stipulated courses.

Based on the above, the problem of this study therefore centers on how to measure internal efficiency of the College of Education system in Nigeria.

Research Question

In addressing this problem, the following questions were raised.

- I. What are the Progression for 2012/2013 to 2015/2016 cohorts in Colleges of Education in Nigeria?
- II. What is the stagnation rate for 2012/2013 to 2015/2016 cohorts in Colleges of Education in Nigeria?
- III. What is the dropout rate for 2012/2013 to 2015/2016 cohorts in Colleges of Education in Nigeria?
- IV. Are 2012/2013 to 2015/2016 cohorts in the Colleges Education internally efficient?

LITERATURE REVIEW

Internal efficiency of educational system is the relationship between the inputs resources; human and materials and output/graduated. Durosaro (1985) referred to internal efficiency as the extent of the educational system ability to minimize cost and reduce wastage resulting from repetition, dropout and failure. Adepoju (2000) confirmed that internal efficiency is the ability of the educational system to minimize cost, wastage and ultimately increase output. Ayodele (2000) and Adu (2010) defined internal efficiency as the extent to which the School System is able to produce the maximum output with the minimum input and reduce wastage in forms of dropout and repetition within the system.

Adu, (2010) stated that an internally efficient educational system is one which turns out graduates without wasting any student year. Ileuma (2017) described Internal Efficiency as the relationship

between learning achievements (output) and the corresponding inputs used to create them. The indicators of internal efficiency are wastage rate and graduation rate. Also, Longe and Durosaro (1988) and Pitan (2012) described internal efficiency as the extent of the ability of educational systems to minimize costs and reduce wastage resulting from repetitions, dropouts and failures. Ileuma, (2017) opined that internal efficiency of education can be measured through the use of cohort analysis which will show the students' flow pattern through the educational cycle as it will show the promotion rate, repetition rate and drop-out rate. Many complete at a very high cost in terms of financial and time implications when one weighs the time spent for this level of education by each student in terms of student year (Ayodele, Adaralegbe & Adeleke, 2015) and. As Abdulkareem, Fasasi and Akinnubi (2011) noted, the question of internal efficiency is ultimately linked to the issue of resource allocation and utilization.

To measure internal efficiency of educational system, one has to determine the inputs into the process, the output produced with such educational inputs and the ratios between the educational inputs and outputs (Afolabi 2006 and Adu, (2010). This can be represented mathematically thus:

$$Et = \frac{Ot}{X_{1t}}$$

Where O_t = educational output(s) in time t,

X_{1t} = input in time t, $I = 1, 2, 3, n$

E_t = Internal efficiency of the educational system

In some situations, policy makers may be more interested in assessing the efficiency level of some inputs utilized in the education process. For instance, it is possible to assess the contribution of labour (teachers) or capital (building) to the output produced. When measuring the level of efficiency of the education system, it is important to identify what an education output is, and what an education input is. Nyikana (1982) stated that the measurement of efficiency of the school system involves such questions as what are the outputs from education and what are the inputs into education? The outputs of the educational system are graduated students. It can also be measured by cohort analysis of the educational system.

To measure the achievement of students we need to subject them to examinations which may be conducted by external agencies or internal bodies. It has therefore been suggested that a better measure of the output of educational system is that one which takes academic achievement into account. The measurement of educational output through academic performance of school is important and this helps to identify the level of quality of the schools (Samuelson, 1998).

Adu and Adigun (2021) revealed that the norm of the Colleges of Education concerning successful and unsuccessful students is mathematically stated as: $y = 3 + x$

Where y is number of years and x ranging between 0 and 2

When $x = 0$, then $y = 3$ years which is normal years. But when $x = 1$.

And 2, $y = 4$ and 5 years which is abnormal years regarded as stagnation. When $x > 2$ that is dropout.

The maximum year to be spent in College of Education is five years. Students spend these years but unable to meet up with the requirements, they have to failed out (Adu, 2010). This issue is related to the theoretical work which this work was based on.

Theoretical Framework

The theoretical Framework for this study is the Students Flow Model. The students flow model is a tracking tool developed in which data for students per each session are extracted from the students' enrolment database and are merged with current enrolment database for each subsequent session. Enrolment, retention and graduation rates are tracked for all students in each cohort by class level. The student flow model includes retention rates by colleges that show the number of students in each department initially as well as during subsequent points in time as students progressed in the following session. The needed information as well as additional detail concerning the number of students moving into and out of each College is contained in a separate printed report known as the College Migration Report, which is distributed to college deans, heads of departments and the Provost office each session.

UNESCO (1981) identified three ways of using cohort methods for measuring students' wastage. They are the true cohort, apparent cohort and the reconstructed cohort. The use of each depends on the data collected. The true cohort method involves going through the school records to observe the flow of students through the grades in the past years recording the drop-out, repetition and progression rates. It also involves the longitudinal study in monitoring the progress of the selected cohort. Reconstructed cohort method employs successive year –class enrolment and repeaters for a given full cycle of cohorts. The dropouts, stagnation and progression rates are thus obtained. The data on enrolment by grade for two consecutive years and that of stagnations by grade from the first to second year will indicate the three main flow rates of progression, stagnation and drop-out. The apparent cohort method gives a rough estimate of wastage. The study does not include stagnations. In The Colleges of Education, the enrolment in the first year is compared to those of successive years and if there is any decrease, it means wastage. It assumes those students have either progressed or have dropped out of the school system therefore it gives approximate estimate of drop-outs. This method is appropriate in countries practicing automatic promotion. Ayodele (2008) and Adu (2010) contented that apparent cohort method adopted cross-sectional year-class data, which involves the enrolment in successive classes in successive years on class-wise enrolment. Apparent cohort is adopted for this research since there is no specific data for repetition (stagnation) in Colleges of Education.

In Colleges of Education, dropout and stagnation are regarded as wastage. These can be measured using student flow model or cohort analysis. Adebayo (2004) agreed that wastage (which is the reciprocal of internal efficiency) in education is measured using the cohort analysis. The exact number of those who start school in the same year do not complete together in the final year. An intake into the school system is faced with options which are to proceed to the next higher class, repeat (stagnate) the same class in the following year or dropout. The student can also be

unsuccessful due to poor performance (Adesina, 1983). The flow of students is used to calculate the wastage rates which are the reciprocal of internal efficiency.

It is observed that education is input-output in nature. The students that enrolled in year one are expected to move to higher class in the following year. But some may not move (stagnant) while some may drop out of the system as a result of different variables ranging from school-based to community-based variables. If the variables are not well adequate or utilized there will be high number of stagnations or dropouts. In a situation by which these variables are adequate and well utilized there will be progression rate at all stages hence the internal efficiency will be high. This will lead to high number of outputs. The outputs are the products i.e. the graduates who have acquired appropriate values, skills, competence and knowledge. The higher the number of graduate output, the more the internal efficiency. This is indicated in figure i

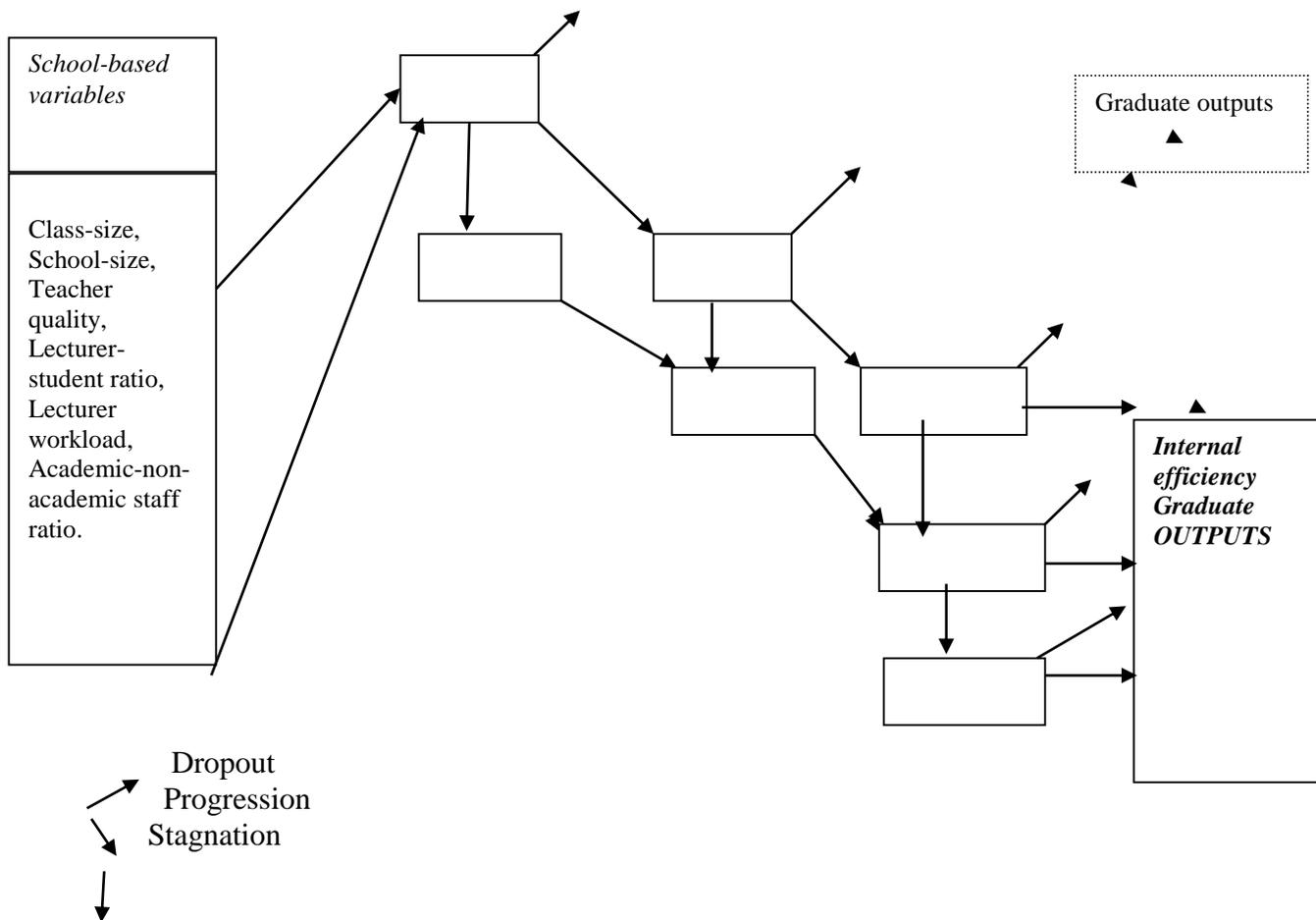


Figure I: *Students flow model.*

Source: Adapted from Ayodele, (2000) and Adu, (2010)

Figure 1 shows students flow model in which students are enrolled in year one. Ayodele (2000) revealed that student inputs are the actual enrolments in year one which process through teaching and learning. There are variables (inputs) that may affect the effective teaching and learning within the school community. These variables are regarded as school variables. The complex and interacting influence of the identified variables on the conversion process will determine the students flow. Experience has shown that a defective input and process will affect the smooth flow of students in the system. This is observed to affect the quantity of the output.

The stagnations and dropouts constitute wastage in the education system. As indicated in the diagram, the wastage (stagnations and dropouts) can be increased if the inputs are deficient. There is need for extra efforts to reprocess those that stagnate while the dropout is out of the system. Both stagnation and dropout can occur at any level after first year as indicated by arrows. It is observed that if the influencing variables are favourable, there will be easy process; hence there will be increase in the qualities and quantities of outputs. The internal efficiency of the Colleges is determined by the rate of its outputs.

METHODOLOGY

This study adopted a descriptive research design of survey type. The population for this study comprised all the 70 Colleges of Education in existence between 2012/2013 and 2016/2017 in Nigeria. These Colleges of Education were owned by both the federal and state governments in Nigeria. There were 21 federal and 49 states owned Colleges of Education located in all the six geo-political zones of the country. The sample for this study comprised fifteen Colleges of Education. The respondents were all 203 heads of departments drawn from these 15 Colleges of Education in three geo-political Zones. Five departments were selected from each College of Education. The three geo-political zones are; South-West, south-East and North-Central. Sample of the population was drawn in such a way that every member of the population had a statistical chance of being selected. The sample technique involved multi-stage, stratified random and purposive samplings. An inventory was used to collect data for the study. The inventory titled "Measurement of Internal Efficiency of Colleges of Education inventory" (MIECOEI) which consisted of two sections (one and two). Section one was demographic, it sought information on background characteristics of the College of Education, the department, state located and the proprietor (state of Federal Government) of the College. Section two consisted of 7 items (tables) designed to elicit information on number of students enrolled, number that progressed to next level, number of stagnation, number of drop out, number of graduate outputs, number of academic staff by status, qualification experience, specialization and relevance and workload of lecturer. The instrument was subjected to screening by experts in Educational Management and Test and Measurement in order to meet the face, construct and content validity. The instruments were administered through the help of the research assistants who distributed all the copies of the inventory to the heads of the departments to ensure quick return of the instrument. Follow up visits was made to the various Colleges to ensure that copies of the instrument were properly administered. In analysing the data collected for the study, descriptive and inferential statistics

were used. Descriptive statistics such as percentages mean and cohort analysis were used to analyse the general questions. The Inferential statistic used was Pearson Product Moment Correlation Co-efficient. All the hypotheses were tested at 0.05 level of significance. In addition to these, certain formulae cohort analysis was used to compute progression rate, stagnation rate, dropout rate, wastage ratio and internal efficiency.

In addition to these, certain formulae were used in this study to compute progression rate, stagnation rate, dropout rate, wastage ratio and internal efficiency (Adu and Makinde, 2019). The formulae are:

$$\text{Progression rate: } P_g^t = \frac{P_{G+1}}{E_{gt}} \times 100$$

$$\text{Stagnation rate: } S_g^t = \frac{S_G^{t+1}}{E_g^t} \times 100$$

$$\text{Dropout rate: } D_g^t = \frac{E_g^{t+1} \times D_g^{t+1}}{E_g^t} \times 100$$

$$\text{Wastage ratio} = \frac{\text{Actual input} - \text{output ratio}}{\text{Ideal input} - \text{output}}$$

$$\text{Coefficient of efficiency} = \frac{1}{\text{Wastage ratio}} \times 100$$

Note:

- P_g^t = Progression in a particular year.
- P_{G+1} = Progression in the following year
- E_{gt} = Enrolment in a particular year.
- E_g^{t+1} = Enrolment in the following year.
- D_g^{t+1} = Dropout in the following year
- D_g^t = Dropout in a particular year.
- S_g^t = Stagnation in a particular year
- S_G^{t+1} = Stagnation in the following year

RESULTS AND DISCUSSION

Research Question one: What are Progression rates for 2012/2013 to 2015/2016 cohorts in Colleges of Education in Nigeria?

To answer this question, data on students' enrolments in 2012/2013 to 2016/2016 cohorts and those that moved to 200 level in the following sessions without having carryover course, to 300 level without having carryover course and those that spent extra one and maximum extra two

academic sessions were collected using inventory from the heads of departments of the sampled Colleges of Education. The data were analysed using frequency counts and simple percentages.

The results are presented in table one below:

Table 1: *Progression for 2002/ 2003-2015/2016 sets in Colleges of Education in Nigeria*

	100 level	200 level	%	300 Level	%	Graduated	%	Extra year 1	%	Extra year 2	%
2012/2013	26312	24870	94.52	23884	96.03	10315	43.19	11374	41.62	796	7.00
2013/2014	31627	31542	99.73	31472	99.78	14477	46.00	16295	51.78	978	6.00
2014/2015	28917	27382	94.69	27062	98.83	13724	50.71	13338	49.29	994	7.50
2015/2016	28416	27201	95.72	26815	98.58	16241	60.57	12474	46.52	985	7.90
			96.17		98.31		50.12		47.30		7.10

As indicated in table 1, the average rate of progression in year 1 is 96.17%. It increases to 98.31%, the rate of progression decreased to 50.12% in year three. The average progression rate of 47.30% is recorded among students that spent extra one year but drops to 7.10% among students that spent maximum five years. This results therefore show that the higher the level of the students, the less the progression rate.

The graphical representation of the progression rate is indicated in figure II.

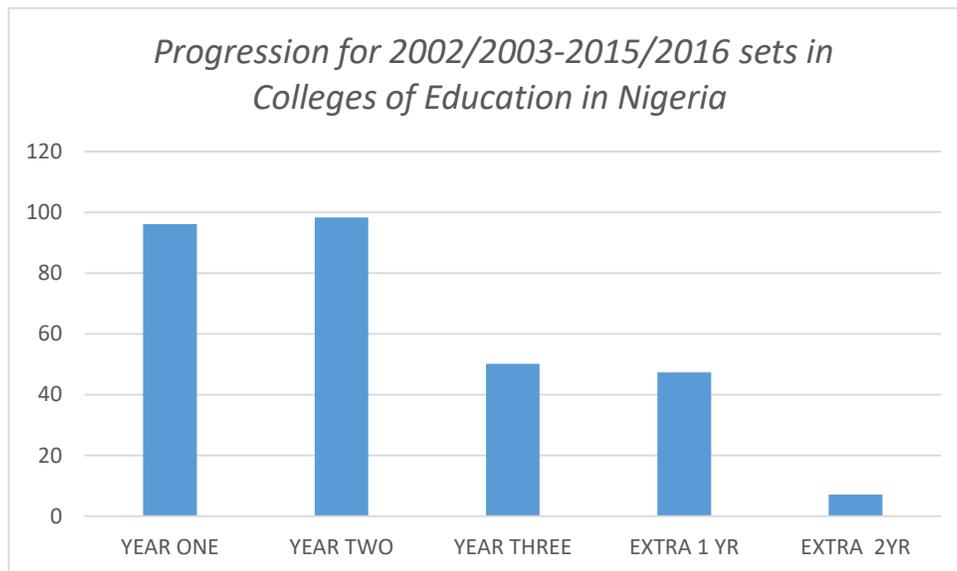


Figure ii: Progression rates for 2012/2013 to 2015/2016 Cohorts in Colleges of Education.

In figure iv, the graph shows downward trend in the rate of progression among students of the Colleges of education. The progression rate was high in year one and two but reduced to 50.12 % in year three and 47.30% indicating more dropouts among those that spent extra one year while at the fifth year the progression rate had a drastic reduction of 7.10 suggesting that those that spent extra year constituted greater number of wastage in the system.

Question 2: What are the rates of stagnation in the Colleges of Education in Nigeria between 2012/2013 and 2015/2016 sessions?

In answering this question, data on the number of students on stagnation in 2012/2013 and 2015/2016 were collected from the heads of academic departments of the sampled Colleges of Education through their responses to the inventory. Data on stagnation of part one to two and part two to three were collected. The data collected were analysed using frequency count, percentages through the use of relevant

The findings are presented in table 2:

Table 2: The students' stagnation rates for 2012/2013 and 2015/2016 sessions in Colleges of Education.

Session	Year one	Year two	Year three	Extra one Year	Extra two year
2012/2013	2.61	2.10	37.82	18.49	57.21
2013/2014	0.12	0.14	13.99	24.96	58.95
2014/2015	2.08	22.64	17.07	29.20	54.28
2015/2016	2.16	0.50	23.28	28.58	62.41
Average	1.74	6.35	23.04	25.31	58.21

As indicated in table 2, the average rate of stagnation in year 1 was 1.74%. It was increased to 6.35%, the rate of stagnation further increased to 23.04% in year three. The rate of 25.31% was recorded among students that spent extra one year. The highest average stagnation rate of 59.21% was recorded among students that spent maximum five years. This finding shows that there was increase in the stagnation rate as students moved to higher classes

The graphical representation of the stagnation rate is indicated in figure ii.

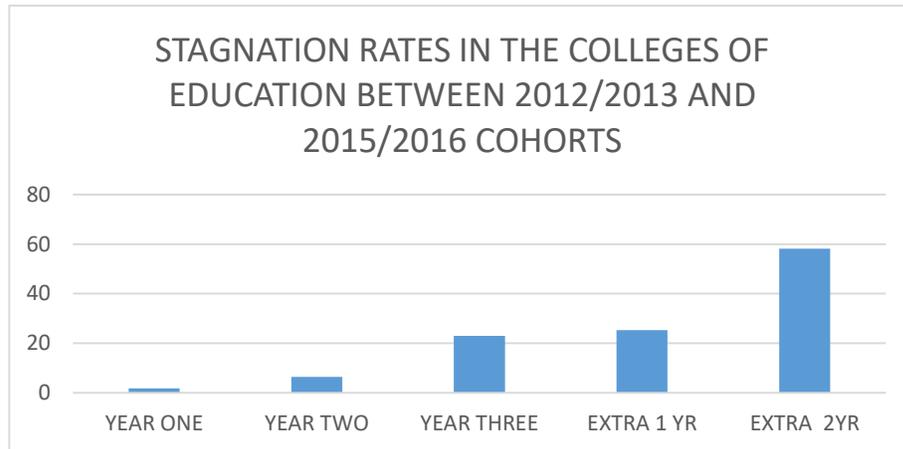


Figure iii: Students stagnation rates for 2012/2013 to 2015/2016 Cohorts

In figure ii, the graph shows an upward movement trend in the stagnation rate of students in the Colleges of Education. The lowest average stagnation rate (1,74%) was recorded for year one while highest stagnation rate (58.21%) was recorded after spending four years. This shows that the higher the level of the class the higher the stagnation rate.

Question 3: What are the rates of drop out in the Colleges of Education in Nigeria between 2012/2013 and 2015/2016 sessions?

In answering this question, data on the number of students that dropped out in 2012/2013 and 2015/2016 were collected from the heads of academic departments of the sampled Colleges of Education through their responses inventory. Data on dropout of students from year one to two, year two to three, and those that spent extra one or two years were collected. The data collected were analysed using frequency count and percentages through the use of relevant formula as indicated in chapter three. The findings are presented in table 3:

Table 3: Dropout rates for 2012/2013 and 2015/2016 Cohorts in Colleges of Education.

Session	Year one	Year two	Year three	Extra one Year	Extra two year
2012/2013	2.87	1.87	20.56	7.02	36.09
2013/2014	0.15	0.08	34.23	34.23	56.79
2014/2015	3.23	26.65	33.64	14.26	31.01
2015/2016	2.12	0.92	16.15	24.90	15.59
Average	2.09	7.38	26.15	20.10	30.66

As indicated in table 3 the average dropout rates were low in all the first two years of study. In year one the average dropout rate was 2.09%. In year two it was 7.38%, it was increased to 26.15% after spending three years but after spending extra one year the average dropout rate rose to 20.10%. It was recorded that 30.66% of those that spent maximum five years dropped out without receiving the certificate. This finding shows that there was increase in the dropout rate as students moved to higher classes. Figure iv shows the graphical representation of the dropout rate in the Colleges.

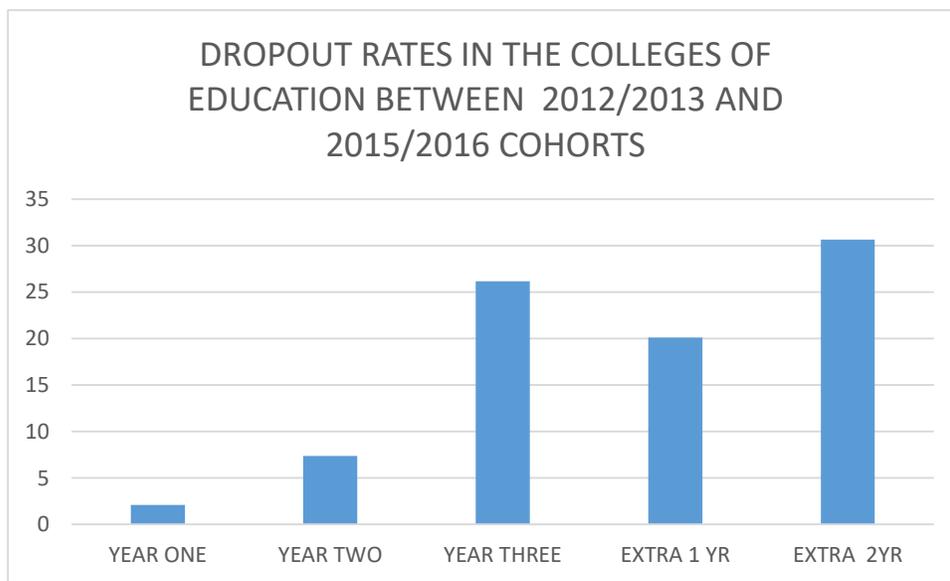


Figure iv: Dropout rates *for 2012/2013 to 2015/2016 sessions* in Colleges of Education.

In figure iv, the graph shows an upward trend in the rate of dropout among students of the Colleges of education. The dropout rate was low in year one and two but increased in year three when it rose to 26.15% indicating more dropouts at the level. However, the dropout increased to 20.10% in fourth year while at the fifth year the dropouts increased rapidly to 30.66% suggesting that those spent extra year constituted greater number of dropouts in the system.

Research Question4: Are 2012/2013 to 2015/2016 cohorts in the Colleges Education internally efficient?

In answering this question, data on the cohorts of the students enrolled in 2012/2013 were collected from the heads of academic departments of Colleges of Education through their responses starting from the session they were admitted to when the cohort was expected to leave the colleges. The data were collected using the responses on inventory. The rates of progressions were calculated through cohort analysis for 2012/2013 set for the three years. Also, data on those that spent four

and five years were collected since students admitted were expected to spend a maximum five year.

The findings are presented using cohort analysis for the set and indicated in figure v

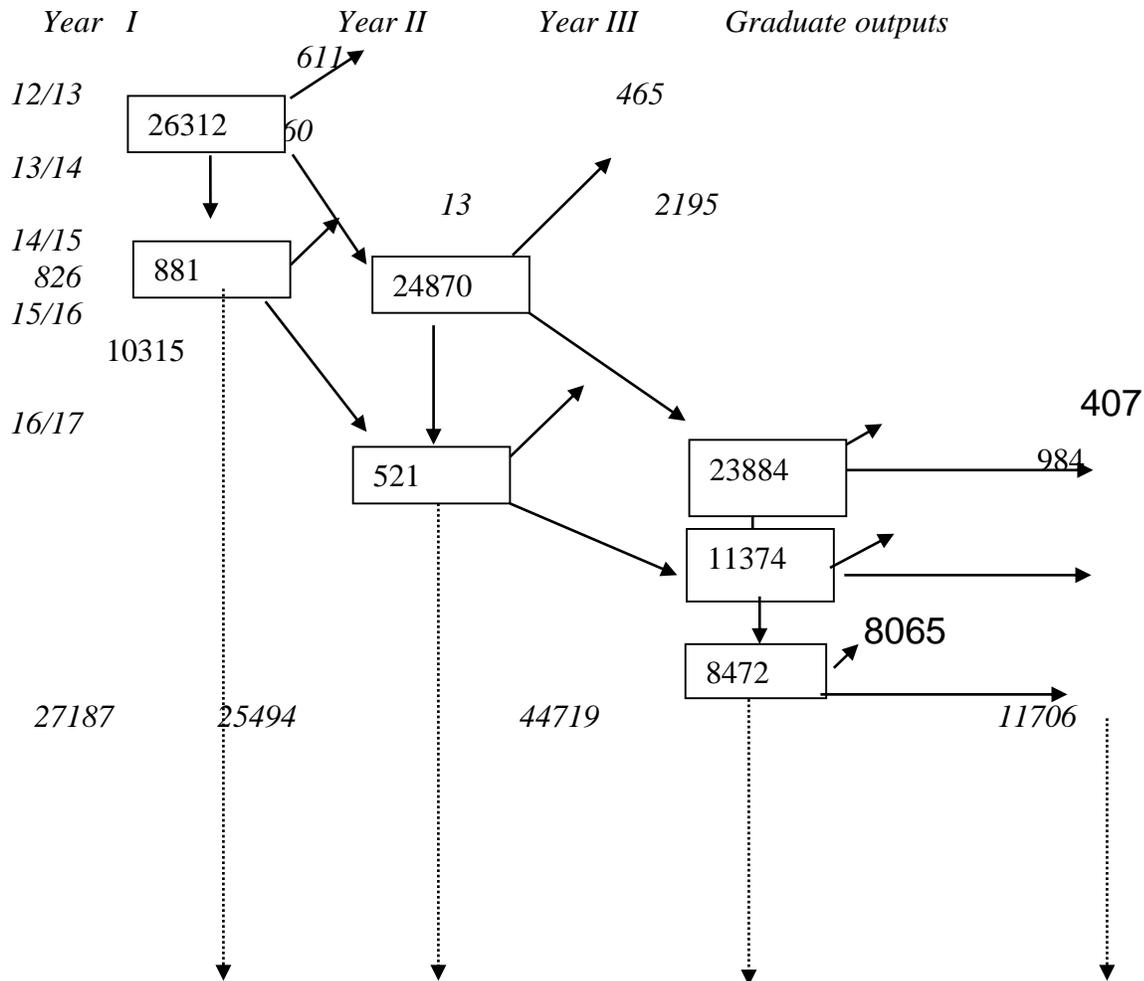


Figure V: Cohort analysis showing the Students flow of 2002/2003 Set in Colleges of Education.

Total drop out = 561+465+2195+52+13+ 826+23+27=4162

Total output=11706

Year i : 26312 + 781+094 =27187

Year ii : 24870 + 521 + 103 = 25494

Year iii : 23884 + 11374+ 9461 = 44719

$$\text{Total inputs} = \sum \text{year I, ii and iii} = 94329$$

$$\text{Total output} = 10315 + 9841 + 407 = 11706$$

$$\text{Actual-output ratio} = \frac{\text{input}}{\text{output}} = \frac{94329}{11706} = 8.06$$

$$\text{Wastage ratio} = \frac{\text{Actual input} - \text{output ratio}}{\text{Ideal input} - \text{output}} = \frac{8.06}{3}$$

$$\text{Wastage ratio} = 2.68$$

$$\text{Co-efficient of internal efficiency} = \frac{1}{2.68} \times 100 = 37.73\%$$

As indicated in the above result, the average years spent by successful completers of Colleges of Education is 8.06 years. In order to determine the level of efficiency, otherwise known as the co-efficient of efficiency, the reciprocal of the wastage ratio was determined. The co-efficient of internal efficiency of was 37.73% which was considered as low. That is, there was low internal efficiency of Colleges of Education for 2012/2013 set.

DISCUSSION

The findings of this study showed that the higher the level of the students, the less the progression rate. The result was at variance to Ali (2006) and Adu and Makinde (2019) who reported that progression rate was higher in year one due to the fact that some did not have interest on the courses for which they were admitted or engaged in certain work. However, the result was in consonant to the report of Adu and Adigun, (2019) that the lowest average progression rate (3.28%) was recorded against students that spent maximum five-year years.

It was also revealed that those that spent extra year constituted greater number of dropouts in the system and there was increase in the dropout rate as students moved to higher classes. This is in support of Koang (2014) that there was increased trend of dropout rate and that of repetition increased of Primary schools in Nuer Zone Of Gambella Regional State. According to Koang three sampled schools Tergol, Mangok, and Puokueth show continuous increasing trend of dropout rate. However, these findings negated the findings of Ize-Iyamu (1992) and Ayodele (2000) who reported that repetition rate was higher in lower classes and the findings of Loxley (1991) and Nyikanna (1992) who reported that the incidence of repetition was high in the higher level of schooling in Nigeria.

It was revealed that the internal efficiency of the sampled Colleges in Nigeria was low. This is in line with Adu, (2014) that revealed there was a low internal efficiency of the Colleges of Education in Nigeria.

CONCLUSION AND RECOMMENDATIONS

Based on the findings, it was concluded that there were increase in the rates of stagnation and dropout but increase in progression rate as students moved to higher classes. Also, the internal efficiency of the Colleges of Education in Nigeria was low. Based on the conclusion, it was recommended that efforts should be made to maintain the increased in the progression rates within the first two academic sessions so that the increase in the rates of dropout and stagnation in the third year and among those that spent extra after year (s) in the Colleges of Education would be reduced. This is necessary in order to improve internal efficiency in the Colleges.

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