

ANALYSIS OF STUDENTS FLOW IN PUBLIC SECONDARY SCHOOLS IN DELTA STATE, NIGERIA

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Abstract

This study examined the major determinants of the trend of students' flow such as promotion, repetition, dropout, survival rates, and the coefficient of internal efficiency of public secondary schools in Delta State between 2009 and 2016. A simple random sampling technique was employed in the selection of 44 schools from the 440 public secondary schools in Delta State. The reliability test result from Cronbach's Alpha and Guttman split-half Coefficient was 0.96 and 0.93 respectively. Data were analyzed using mathematical equations, bar charts, mean and standard deviation. Findings revealed that the trends of average promotion and dropout rates increased through the classes while the repetition rate had an undulating trend. Average repetition rate increased from JSS1 (3.7%) to SS3 (6.3%) as well as the dropout from JSS1 (4.4%) to SS2 (10%). Grand promotion, repetition, and dropout rates were 73.75%, 4.27%, and 21.98% respectively. The survival rate (62.8%), grand mean (3.90), and coefficient of internal efficiency (65%) derived from the school cohorts confirm the large class size, lack of interest in learners and teachers not punctual to school as probable factors influencing students' flow. It was recommended that class size as recommended in the educational policy should be maintained, modern science laboratory and ICT centres should be built, and school environment should be made conducive for learning in order to enhance promotion rate and internal efficiency.

Keywords: Student flow; Class size, Promotion rate; Repetition rate, Drop-out rate

Introduction

Understanding how students' progress through one grade to another during their stay in school, is critical to planning how funding could be allocated and intervention programmes mounted to ensure efficiency in the school system. The Nigerian system of education, especially at the basic education level, has been reported to be facing serious challenges that without reversal from the current trend, and improvement in system efficiency, it is likely that Nigeria will not achieve universal basic education by 2030 (The World Bank, 2020). Indeed, Amiens and Oisamoje (2016) noted that it is pertinent that attention is paid to students' flow from point of entry to that of exit in educational institutions while The World Bank (2020) noted that Nigeria needs a 'system efficiency in terms of student intake, promotion, and transition rates' for the 2030 goal to be realized. Researchers are of the view that there are elements of inefficiency in the Nigerian secondary school system given that gaps exist between expectancy and output (Akinsolu, 2017). This inefficiency accord to Akinsolu (2017) has led to wastages in Nigeria. Ileuma (2014) has noted that substantial resources are needed in the educational sector for its

effectiveness, and therefore, that there is the need that the resources available must be managed optimally. Ayara (2002) emphasized that the effect of education on economic growth in Nigeria has not made much positive impact because educational resources go into privately remunerative but socially unproductive activities. Students' flow is an integral part of flow statistics in education, which gives the vivid and apt description of the dynamics that takes place in a school system in terms of the direction and movement pattern of students' internal transition within a given level of education.

The analysis of students' flow in public secondary schools therefore examines the successive events, which affect the students enrolled into the secondary education in JSS1, trend in promotion, repetition and dropout in the course of teaching and learning in order to arrive at output stage (graduation). The higher the promotion rate the better the output at graduation, while the higher the repetition and dropout rate the higher the wastage rate (Loretholi, 2001). The three basic determinants of student flow were used as yardsticks for measuring student flow in public secondary schools. Promotion rate, is a measure of the percentage of students who passed test or examination in a given class say JSS1 and are promoted to JSS2 in the next academic year to the total number of students who enrolled in JSS1. However, repeaters are students who have remained in the same grade over one year and have used additional resources for the grade in the form of school materials, equipment, library, and teachers' salary. Dropouts are students leaving a school before completion of a given stage of education or some intermediate or non-terminal point in levels of education. However, students flow can be distorted by dropout and repetition rates (educational wastage) thereby reducing the internal efficiency of the school system. Akinsolu (2017) has noted that repetition is a major source of wastages in secondary schools in Nigeria. Students' flow diagram used to derive the students flow ratios, the total number of students-years spent and graduates produced for an educational level. A cohort in education is termed school cohort. It defines a group of students entering the first grade of a given level in the same year but may not necessarily complete or exit the cycle at the same time due to individual experiences in promotion, repetition or dropout. To reconstruct student's flow diagram and to derive the total students-years and graduate through hypothetical cohort is based on stepwise competition (UNESCO, 1998). Wako (1995) opined that one or more years of educational expenditure could have been spent in vain, if a student drops before completing a degree. The possible factors that influences students flow, either positively or negatively includes; the quality if input admitted into the school (students), the school administrative process and environment, teachers' characteristics, curriculum and content, socio-cultural and economic background of learners and the society.

The concept of students' flow is imperative in the evaluation of the internal efficiency of the school system. The trends in flow are dependent on the inputs introduced in the school, processing unit and the quality and quantity of output produced from the system. The higher the promotion rate the better the quality and quantity of output, which could be achieved only if repetition and dropout rate within the various classes is low. Negligence on the trends of students flow over the years have resulted to grave consequences such as; unachieved educational goals, high repetition and dropout rates, underdevelopment, increased unemployment, shortage of professionals and brain drain (educational wastage). It is in this regard that this paper is designed to investigate student flow with regards to promotion, repetition and dropout rates, survival rate as well as the internal efficiency of the public secondary education in Delta State. The findings and the recommendations of this work, will improve the quality of students' flow output and internal efficient of public secondary schools in Delta State.

Research Questions

1. What is the promotion rate of students in public secondary schools in Delta State?
2. What is the trend of repetition rate in public secondary schools in Delta State?
3. What is the trend in dropout rate in public secondary schools in Delta State?
4. What is the survival rate and coefficient of internal efficiency of the in public secondary schools in Delta State?
5. What factors influences students' flow in public secondary schools in Delta State?

Methodology

The population of the study consists of the 440 public secondary schools in Delta State. The simple random sampling technique used was in the selecting of 44 public schools with respect to senatorial

districts and Local Government Areas respectively giving a simple size of 10% of the total population of schools. The instruments for data collection were checklist and questionnaire, patterned after the modified four-point Likert scale. Experts in educational planning unit in Delta State University, Abraka validated the instruments. The instruments were tested for reliability via Cronbach's Alpha and Guttman Split-half coefficient. The reliability coefficients were 0.97 and 0.94 respectively which revealed that the instruments were reliable. Research instruments were administered to both principals and teachers in the 44 sampled schools. The principals responded to the items in the checklist while 440 teachers responded to items in the questionnaire. Response rates were 86.4% and 93% respectively. Retrieved instruments were analysed using statistical equations, bar charts, mean, standard deviation and percentages. The cut-off points of mean were determined.

Results

Table 1: Enrolment of students in sampled public secondary schools

Year/Class	J SS 1	J SS 2	J SS 3	SS 1	SS 2	SS 3	Total
2009/10	3682	3204	3474	4046	3068	2436	19910
2010/11	4030	3584	3888	3456	3400	2998	18356
2011/12	4582	4388	4260	3534	3854	3326	23944
2012/13	4920	4502	4670	4156	4102	2950	25300
2013/14	5236	5040	4486	4052	3684	3144	25642
2014/15	5960	5718	4924	4812	4590	3768	29772
2015/16	6660	6136	5392	4790	4660	4114	31752
Total	35070	32572	31094	28846	23358	22736	177676

Source: Computed from Fieldwork via Checklist

Table 2: Promoted students in the sampled public secondary schools

Year	From JSS 1 to JSS 2	From JSS 2 to JSS 3	From JSS3 to SS1	From SS1 to SS 2	From SS2 to SS3
2009/2010	3150	3076	3116	3502	2882
2010/2011	3395	3136	3132	2876	2802
2011/2012	2920	3068	3544	3042	3174
2012/2013	4404	3900	4016	3124	3052
2013/2014	4726	4320	3918	3750	3220
2014/2015	5004	4356	4078	3918	4038
2015/2016	5924	5432	4846	4018	4152
Total	29523	27308	26650	24230	23320
Grand Total-----	131031				

Source: Computed from fieldwork

Table 2 above shows the quantitative data of promoted students from JSS 1 to SS 3 from the sampled schools, retrieved from checklist. Promotion rate for the period is the percentage of the students that passed to the total number of students that enrolled for the period. Thus,

$$P_r = 131031/177676 \times 100 = 73.75\%$$

Table 3: Computed Promotion rates from Table 2(in %)

Year/Class	From JSS 1to JSS 2	From JSS 2 to JSS 3	From JSS 3 to SSS 1	From SS 1 to SS 2	From SS 2 to SS 3
2010/11	92.2	97.9	90.2	84.0	91.3
2010/12	72.5	85.6	91.2	83.2	82.4
2012/13	96.1	88.1	94.3	88.4	79.2
2013/14	96.1	95.6	83.9	90.2	78.5
2014/15	95.6	86.4	90.9	97.7	88.0

2015/16	99.4	95.3	98.4	83.5	90.4
Average	92.0	91.6	91.5	87.7	84.9

Source: Computed from field work

$$\text{Promotion Rate (2010)} = \frac{3395}{3682} \times 100 = 92.2\%$$

Table 4: Number of repeaters in the sampled public secondary schools

Year/classes	JSS1	JSS 2	JSS 3	SS 1	SS 2	SS 3	TOTAL
2009/10	252	108	204	340	38	78	1020
2010/11	236	88	60	204	196	72	856
2011/12	298	334	396	220	164	137	1549
2012/13	110	100	178	142	160	264	954
2013/14	138	110	150	152	172	366	1088
2014/15	140	210	248	168	62	260	1088
2015/16	120	242	102	12	412	140	1028
TOTAL	1294	1192	1338	1238	1204	1317	7583

Source: Computed from fieldwork

From Table 1, 177676 students enrolled in the public secondary school from 2009 -2016 academic sessions. From Table 3, it shows that 7583 students repeated. Repetition rate gives the ratio of repeaters to number of enrolees for a specified class in percentage.

Table 5: Computed Repetition rate from Tables 1 and 4

Years/Class	JSS 1 (%)	JSS 2 (%)	JSS 3 (%)	SS 1 (%)	SS 2 (%)	SS 3 (%)
2010/11	6.4	2.7	1.7	5.0	6.4	3.0
2011/12	7.4	9.3	5.1	6.4	4.8	2.4
2012/13	2.4	2.3	4.2	4.0	4.2	7.9
2013/14	2.8	2.4	3.2	3.2	4.2	12.4
2014/15	2.7	4.2	5.5	5.5	1.7	8.3
2015/16	0.3	4.2	2.1	2.1	9.0	3.7
Average	3.7	4.7	3.7	3.9	4.4	6.3

The repetition rate (R) in JSS1 in year 2010 is computed as the ratio of repeater in JSS1 (2010/11) to enrolment in JSS1 in 2009/2010 multiplied by 100. Thus; R JSS 1(2010) = 236/3682 × 100 = 6.4%

The Grand repetition rate for the period, computed as the percentage of repeaters to the total number of enrolees. Thus,

$$\text{Grand repetition rate} = 7583/177676 \times 100 = 4.27\%$$

Grand repetition rate of 4.27% is an indication of low repetition rate.

Table 6: Computed Dropout rates from Tables 3 and 5 (in %)

Years/Class 1	JSS 1	JSS 2	JSS 3	SS 1	SS 2
2010/11	1.4	0.6	8.1	11.0	2.3
2011/12	20.1	5.1	3.7	10.4	12.8
2012/13	1.5	8.8	1.5	7.6	16.6
2013/14	1.1	2.0	12.9	6.4	17.3
2014/15	1.7	9.4	3.6	0.8	10.3
2015/16	0.3	0.5	0.5	16.3	0.6
Average	4.4	4.4	5.1	8.8	10.0

$$\text{Dropout rate} = 100 - (\text{promotion rate} + \text{repetition rate})$$

$$\text{Therefore, the dropout rate (JSS 1 2010/11)} = 100 - (92.2\% + 6.4\%) = 1.4\%$$

The Grand dropout rate for the period was computed, thus:

$$= 100 - (\text{Promotion rate} + \text{repetition rate}).$$

$$= 100 - (73.75\% + 4.27\%)$$

$$= 22.98\%$$

i) Patterns of Student Flow Ratios

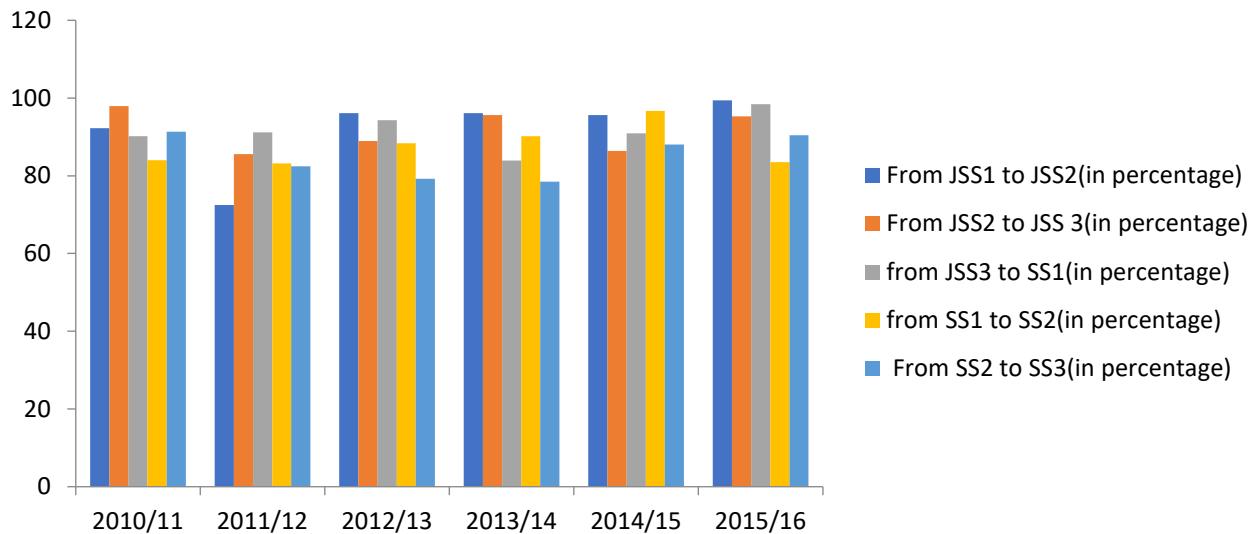


Figure 1: Promotion Rates in Public Secondary Schools Delta State (2009 - 2016)

Figure 1 shows the promotion rates of the sampled public schools in Delta State by years and classes. It was observed that promotion rate to JSS 2 in 2015/2016 has the highest rate with 99.4% and in 2011/2012 has the least rate with 72.5%. Similarly, trends observed across the years indicate that promotion rates fluctuated from JSS 1 to SSS 3.

The peaks of promotion rates were observed in 2010/2011 promotion from JSS 2 to JSS 3, 2011/2012 promotion from JSS 3 to SS1 with 91.2%. The peak rates in promotion from 2012-2014 from JSS 1 to JSS 2 (96.11% and 96.1%) while in 2014/2015 peak rate was found in promotion from SS 1 to SS 2 with 96.7%. However, the earliest school years had the highest promotion rates except to 2010-2012 and 2014/2016 respectively

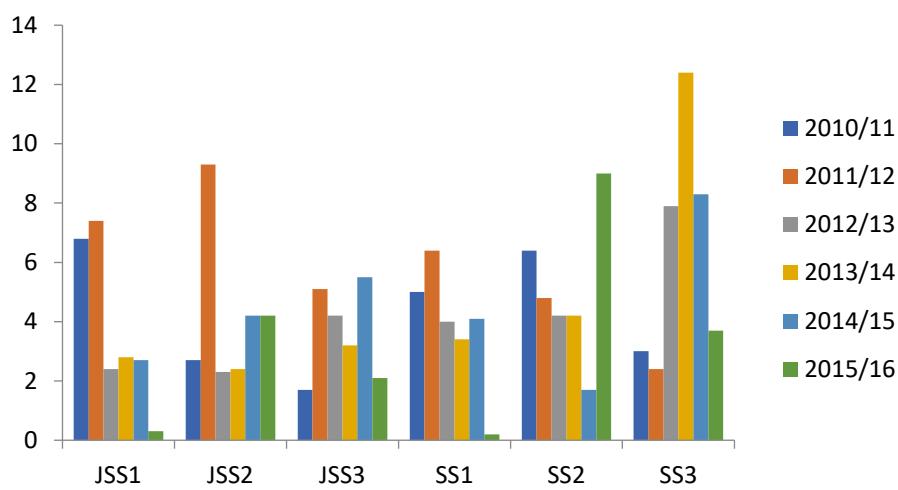


Figure 2: Repetition Rates in Public Secondary Schools (2009 - 2016)

The highest repetition rate was in 2013/2014 in SS 3 and least in 2015/2016 in SSS 1 with 12.4% and 0.2% respectively. Across the classes from JSS1 to SSS 3, through the years (2009-2016), the repetition rate unsteadily decreases and increases, galloping. The repetition rate peaked at JSS 1 and SS 2 in 2010/2011(6.4% & 6.4%). The range between the highest repetition rate (12.4%) and least (0.2%) was

12.4%, which is quite large (12.2%). The overall trend of repetition rate was shown to be almost opposite of what was observed in the analysis of promotion rate trend.

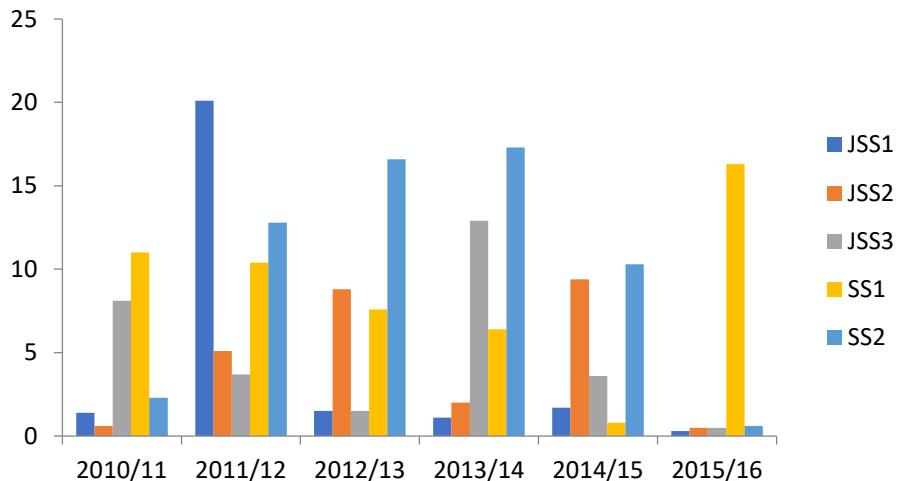


Figure 3: Dropout Rates in Public Secondary Schools Delta State (2009-2016)

The pattern of dropout rate fluctuated quite substantially across the classes from JSS 1 to SS 3 and down the years (2009-2016). The highest dropout rate was in JSS 1 in 2011/2012 and least in 2015/2016 (20.1% and 0.3%). Changes in dropout rate were most evident in SS 2 in three consecutive years, 2012-2015 with rates of 16.6%, 17.3% and 10.3% respectively. Dropouts in SS 1 in 2015/2016 was remarkable with rate of 16.3% while JSS 1 to SS 3 records rates of 0.3%, 0.5%, 0.5%. SS 2 has dropout rate of 0.6%. The changes in dropout rates in JSS 2 and 3 from 2009-2016 are less significant. The average dropout rate steadily increased across the classes in an ascending order, with a tie of 4.4% in JSS 1 and 2.

The Figures on promotion, repetition, and dropout rates above revealed the trends from the multiple bar charts, promotion rates galloped as the level increases. Repetition rates decreased in an ascending order in junior class (JSS) but increased in the senior class (SSS). Dropout rate however, fluctuated through class as level increased.

Table 7: Computed Students flow rates from Tables 3, 5 and 6.

Class/ Flow (%)	JSS1 (%)	JSS2 (%)	JSS3 (%)	SS1 (%)	SS2 (%)	SS3 (%)
Promotion	92.2	85.6	94.3	90.2	88.0	96.3
Repetition	6.4	9.3	4.2	3.4	1.7	3.7
Dropout	1.4	5.1	1.5	6.4	10.3	0

Table 7 were derived from the main diagonal of Tables 3, 5 and 6 respectively. Total number of admitted students into the school cohort was 3682 in 2009/10. Numerical data of repeaters for school cohort was calculated as follows:

$$\text{Repeaters for JSS 1} = 3682 \times 6.4\% = 236$$

$$\text{Dropout for JSS 1} = 1.4\% \times 3682 = 52$$

Students promoted from JSS1 to JSS 2 was calculated

$$\text{Thus, } 3682 - (236 + 52) = 3682 - 288 = 3394$$

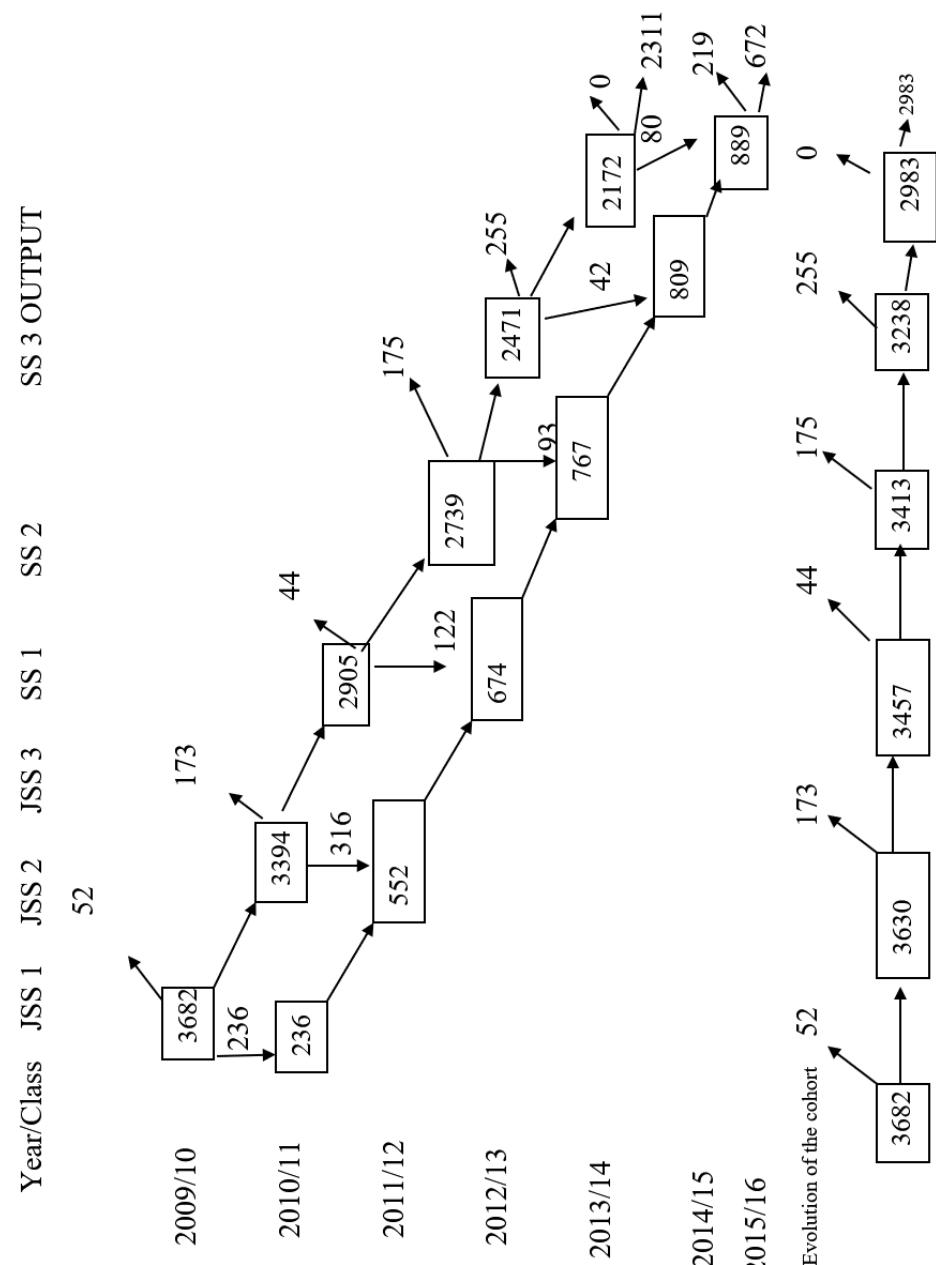
Students promote from JSS 2 to JSS 3 was calculated

$$\text{Thus, } 3394 - (316 + 173)$$

$$= 3394 - 489$$

$$= 29$$

Figure 4: The school cohort from 2009–2016 by class.



Assumptions such as no new student would be admitted into the cycle and no student should repeat a class more than twice are criteria considered in constructing the school cohort diagram. The evolution of the cohort shows the annual output (promoted and repeaters) and dropout. The number of survivors in the cohort is 2311 students (2092+219).

Thus; The survival rate (SR) = $P/E \times 100$

$P = 2311$ (successful completers), $E = 3682$ (enrollees in the base year)

$$SR = 2311/3682 \times 100 = 62.8\%$$

The survival rate reveals the percentage of learners who graduated from the school cohort from 2009 – 2016 academic sessions, in public secondary schools in Delta state. Moreover, it can be deduced that 37.2% of the cohort class consisted of students that either exited the system before completion of the cycle or repeaters.

Evaluation of the internal efficiency was computed using Tables 7 and figure 4. Number of dropouts = $52+173+44+175+255+0 = 699$

$$\text{Total output} = 2311+672 = 2983$$

$$\text{Total Dropout + Total Output} = 699+2983=3682$$

Total number of student-years or total input used in the school cohort =

$$JSS 1 = 3682 + 236 = 3918 \text{ student years}$$

$$JSS 2 = 3394+ 552 = 3946 \text{ student years}$$

$$JSS 3 = 2905 + 674 = 3579 \text{ student years}$$

$$SS 1 = 2739+ 767 = 3506 \text{ student years}$$

$$SS 2 = 2471 + 809 = 3280 \text{ student years}$$

$$SS3 = 2172+ 889 = 3061 \text{ student years}$$

$$\text{Total Input Used} = 21290 \text{ student years}$$

$$\text{Actual input - output ratio} = \text{input/output}$$

$$= 21290 \text{ student years}/2311$$

$$= 9.21$$

The above input - output ratio implies that one successful graduate in the secondary school, used 9.21 student years to complete a six-year programme. In an ideal situation, an individual should use 6.0 student years only.

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

$$= 9.21 / 6.0$$

$$= 1.54$$

The wastage rate of 1.54 implies that the level of wastage is high because it is 0.54-point deviation from unity (1).

$$\text{Coefficient of internal efficiency} = \text{Optimum wastage rate} / \text{Actual wastage rate}$$

$$= 1 / \text{Wastage (w)}$$

$$= 1 / 1.54$$

$$= 0.65$$

$$= 65\%$$

The internal efficiency of the system was 65%, being 15% above average.

Table 8: Factors that Influence students' flow.

S/N	VARIABLES	A	D	Mean	SD	Decision
1	Conducive class room condition increases promotion rate	349	60	4.08	1.11	Agreed
2	Students frequent absenteeism to school increases dropout rate	346	63	4.32	0.87	Agreed
3	Lack of interest in learners will increase repetition rate	337	73	4.29	0.91	Agreed

4	Large class size increases repetition rate	287	122	3.84	1.06	Agreed
5	Teachers' punctuality to school reduces repetition rate	289	120	3.78	0.99	Agreed
6	Negative attitude of learners toward school promotes dropout rate	320	89	4.01	0.91	Agreed
7	Increased workload at home increases dropout rate	275	134	3.45	1.07	Agreed
8	Poor community participation in school contribute to increased dropout	235	174	3.42	0.99	Agreed

Grand Mean=3.90

Table 8, shows that all the eight items were regarded as factors influencing students flow in public secondary schools in Delta State. They include; conducive classroom condition increases promotion rate (4.08), students' frequent absenteeism to school due to distance increases dropout rate (4.32), lack of interest in learners' increases repetition rate (4.29), large class size increases repetition rate (3.84), teacher's punctuality to school reduces repetition rate (3.78). Negative attitude of learners toward school work promotes dropout rate (4.01), increased workload at home increases dropout rate (3.45) and poor community participation in school contribute to increased dropout (3.42) are accepted as the factors influencing students flow.

Discussion

The average promotion rates per class, from JSS 1 to JSS2 through to SS3 are 92%, 91.6%, 91.5%, 87.7% and 84.9%. There was a decline in the average promotion rates from JSS 1 to JSS 2 and from JSS 2 to JSS 3 through SS 2 to SS 3 respectively. The average repetition rates from JSS1to JSS2 through to SS3 was 3.7%, 4.7%, 3.7%, 3.9%, 4.4% and 6.3% respectively. The same trend was observed across the session from 2009-2016. This is an indication that as students progress to higher classes, many tend to repeat classes. This finding, in a way, agrees with the findings of Amaonye, Unachukwu and Anachuna (2020). Amaonye, et al (2020) found that though repetition rate in Anambra state is low, that they highest rate was in SS1. This could be explained from the fact that if school tasks are difficult for students, there is the likelihood that they may fail classes and thereafter repeat. Students' success as they move from one class to the other most times depends on their ability to link new tasks with prior knowledge as well as their capacity to find meaning in what they are doing.

Table 5 shows the average dropout rate from 2009-2016 by class from JSS 1 to SS 2 as follows; 4.4%, 4.4%, 5.1%, 8.8% and 10.0%. The trend of dropout rates escalated with the increase in level. The dropout rates appear to align with the class repetition rates implying that the more students repeat classes, the more they may dropout from school. This finding agrees with the findings of similar studies such as that of Nakpodia (2010). Nakpodia's (2010) findings indicated that school dropout is common in Delta State, Nigeria. Beside internal school factors such as classroom, which may be conducive, school environment and class-size ratio, there may be external factors that were strong enough to cause a drastic increase in dropout through the period but unaccounted for in this study. Factors such as juvenile delinquency among secondary school students can lead to school dropout. Dropout may also occur when a learner is unable to appropriately articulate the learning material. Anyim (2012) stated that dropping out of the schooling system without the expected gratifications is already turning the interest and attention of the youths away from those values on which successful and accomplished life could be built through sound education.

From Figure 4, out of 3682 students admitted into JSS1 in 2009/2010, only 2311students graduated from the school cohort. The survival rate from the school cohort was 62.8%. To improve the survival rate in the school system, there should be improvement in the motivation mechanism of learners (via the use of instructional materials). Survival rate approaching 100% indicates a high

level of retention and low incidence of dropout, but the study reveals a minimal level of retention and relatively more dropouts, due to less focus in the output quality from the system.

The calculated input-output ratio was 9.21, which means that one successful graduate used the 9.21 student year to complete a six-year programme. In an ideal school situation, each successful graduate of the secondary school system is to use 6.0 year only. However, the wastage rate that is the ratio of actual input-output ratio to ideal input-output ratio was 1.54 while the internal efficiency of the school system was the ratio of 1: 1.54, giving a result of 0.65. The coefficient of internal efficiency for the period was 65%. Efficiency simply means the relationship between input introduced into the school system and the output produced via the processing mechanism. The system can be efficient if it produces a maximum output with a given quantity of input. For the effectiveness of efficiency, input is readily expressed in monetary and non-monetary terms, such as teacher's salary, teacher's experience, teacher's –students' ratio, teacher's qualification and per students' expenditure. Wastage in student flow is expressed quantitatively in terms of repetition and dropout while quality of learning is determined by the input and output of the educational system in terms of graduate. Internal efficiency of the public secondary school, evaluates the utilization of the available resources for proper development and betterment of quality and quantity of educational output with drastic reduction of wastage to the barest minimum.

The findings as shown in Table 8 revealed that the eight items are factors influencing students' flow. Large class size, frequent absenteeism by students and negative attitude towards their studies are perceived to constitute factors that impact dropout and repetition rates. Students frequent absenteeism and negative attitude toward study increase dropout rate. This finding agrees with previous studies conducted within and outside Nigeria. For example, Matthew and Israel (2021) found that students' lack of interest and negative attitude towards education increases school dropout. Studies conducted by Yang (2014) and Ileuma (2017) showed that student-teacher's ratio affected the repetition and dropout rates of students. The finding in this study is an indication that both student, teacher, and environmental factors can influence students' flow in school. Problems related to student flow are complex and multifaceted in nature.

Conclusions

The study has revealed that students' flow in public secondary school in Delta State over the years have been influenced by numerous factors that are capable of either increasing or reducing the promotion, repetition, dropout and survival rate. The galloping trends in promotion, repetition rates as well as the increasing trends in dropout corroborates the fact that large class size, students' frequent absenteeism from school, students workload at home, among other factors influence students flow.

Recommendations

Based on the findings of this study the following recommendations are made:

1. The government should periodically reconstruct and renovate the buildings in public secondary schools since the school environment contributes to either low or high secondary schools' dropout and repetition rates.
2. The State government should provide public secondary schools with functional security guards for maximum security in order to reduce truancy among students.
3. The recommended class size of 1:40 should be maintained in public secondary schools with new structures, to accommodate the overflow from the old practice. This will improve promotion rate.
4. The Delta State government should provide recommended textbooks in public secondary schools so that students will not lack resources that will facilitate students' learning.
5. Principals should collaborate with the Parents Teachers Association to boost school-community relationship which will in-turn attract development and learning outcome.

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