Strategies For Reducing Mass Failure Among Chemistry Students In Secondary Schools In Onitsha North Local Government Area In Anambra State

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Abstract
The study investigated the strategies for reducing mass failure among Chemistry students in secondary schools in Onitsha North Local Government Area of Anambra State. The study adopted descriptive survey research design. Four research questions guided the study. The population of the study comprises 1632 SS III Chemistry students in all the public secondary schools in Onitsha North Local Government Area, Onitsha Education Zone. The sample consists of 102 SS III chemistry students. Purposive sampling was used for the study. The instrument for data collection was structured questionnaire developed by the researchers. Also, the instrument was validated by three experts and the reliability of the instrument was obtained using Cronbach alpha reliability which gave a reliability index of 0.88. Data collected were analyzed using mean and standard deviation to answer the research questions. The findings of the study revealed the following: teachers' qualification helps in reducing mass failure of students in Chemistry to a high extent. Adequate and well-equipped classroom reduces mass failure of students in Chemistry, technology helps in reducing mass failure of students in Chemistry, adequate funding of the school system reduces mass failure of students in Chemistry to a high extent. Based on the findings, it was recommended that attention should be given to qualified teachers to handle the teaching of Chemistry and government should provide more teaching-learning facilities in schools.

Introduction

Science is a systematic study of nature through observation and experimentation, leading to the accumulation of an organized body of knowledge useful for solving human problems. Science is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. The study of science helps to answer questions on what, why and how of natural phenomena and the knowledge gained from science can be utilized logically and rationally to solve man's problems (Ezeano, 2013). Akpan (2008) opined that science contributes to the quality of life in such areas as health, nutrition, agriculture, transportation, material and energy production, and industrial development. He further stated that it ensures that the air we breathe, and the water we drink are life sustaining, and not vectors of disease and decay. Akpan finally concluded that if science and technology form the bedrock of sustainable development, that this revelation should constitute a beacon to our nation, so that science education must be given prominence in Nigerian schools. The importance of science in our society made the Federal Government of Nigeria to introduce science subjects in the nation's secondary school curriculum of which Chemistry is one of such subjects

Chemistry occupies a strategic place in the educational system of most countries of the world including Nigeria. Chemistry is a branch of science which deals with the study of matter, interaction between matter and the study of the interactions (Njelita, Egolum & Ezeokeke, 2014). Chemistry is one of the branches of pure science,

it deals with the study of matter, its structure, composition, properties and the changes it undergoes (Ojokuku, 2012). Chemistry is a science springing from the principles of physics with its applications in other sciences such as life-sciences, engineering, technology, earth sciences and medicine (Abanikannda, 2016). Achimugu (2016) pointed out that Chemistry is concerned with identifying common materials around us and then turning them into more useful products, and Chemistry plays an important role in influencing the rate of economic and technological development. Perhaps, from these assertions it is inferable that Chemistry can exert a dominant and decisive influence on the life of individuals in the areas of industry, agriculture, infrastructure as well as in the developmental effort of a nation. Emphasizing the importance of Chemistry in nation building, Achimugu, (2016) stressed that the economic strength of any country is predicated on the quality and quantity of chemical industries in that country. Its significance is underscored by the fact that no day passes without a chemical activity taking place in a typical home anywhere in the world. This implies that everybody is doing Chemistry, either through direct consumption of its product or being directly involved in the practice of Chemistry. Chemistry is a powerful tool for converting natural resources such as agriculturally based materials into products of industrial and economic importance. Therefore, through the application of Chemistry we increase agricultural production, improve the health of our people, develop new sources of energy and utilize petrol and natural gas.

Chemistry graduates are engaged across the globe in rewarding careers in pharmaceutical, metallurgical firms, commercial laboratories, scientific research institutes, forensic scientists in the criminal justice system, universities, health services, food processing, petroleum and petro-chemical industry, biotechnology, toxicology, hazardous waste management, manufacturing industry, mining and extractive industry, medical technology, agriculture and forestry (Ababio, 2013). This assertion is justified by Igboanugo (2013), who stated that Chemistry helps to ensure continuous availability of students in medicine, pharmacy, dentistry, food science, agriculture, engineering, science education, environmental education, etc. Oloruntegbe and Oduntuyi (2008) averred that a student who is deficient in Chemistry, and has good grades in other science subjects will hardly be able to offer any course in the faculties of science, medicine and engineering in the universities.

There is a need to revisit our Chemistry in terms of curriculum content, teaching and practice, integrating Chemistry into everyday living, nature and society, directing it to achieve a functional Chemistry for the good of the individual and the society at large. In spite of the roles of Chemistry in national development, evidence in literature (Adewumi & Monisola, 2013, Ezechukwu &Ukozor, 2016) shows there is consistent poor achievement in Chemistry in public examinations conducted by West African Examinations Council (WAEC). Evidence from the West African Examinations Council (WAEC) has consistently reflected poor achievement in Chemistry (WAEC chief examiner's report for 2016, 2017, 2018, 2019, 2020 and 2021). The poor achievement in Chemistry in the SSCE has been attributed to so many factors, among which include poor teaching strategies used by Chemistry teachers in teaching Chemistry which is predominantly lecture method (Adebanjo, 2019; Raji, 2017; Ukoh &Adewale; 2014) which does not give room for active learning but only help passivity of the learner.

In education, examination is a measure of academic achievement and performance (Adewale, 2014). When a student's academic performance falls below the expected standard, failure is said to have occurred. Mass failure is a situation when failure in examination is recorded by a larger percentage of the students that participated in an examination. Bolu-Steve, Adegoke&Biobaku (2013) observed that the high rates of failure noticed yearly in public examinations are only a symptom of a pervasive national failure syndrome. They pointed out that

despite the investment on secondary school education in Nigeria students are not still performing well. Kpolovie, Ololube &Ekwebelem (2021) carried out research on the performance of secondary school students in WAEC and NECO from 2016 to 2020 and discovered that the students were not performing as expected.

There are many factors that could lead to mass failure. Hansel (2012) found out that the causes of massive examination failure in WAEC included non-availability of textbooks, environments being too noisy and not convenient for learning and inadequate preparation among others. Students' persistent mass failure in SSCE Chemistry has been attributed to many factors among which are the many Chemistry topics which research has identified to be difficult for students to learn. Some of the topics which have persistently proved to be difficult at secondary school level include Nuclear Chemistry (NC), equilibrium reactions, chemical energetic/thermodynamics, chemical kinetics, electrochemistry, chemical equations, the mole concept, solubility of substances, among others (Chief Examiner's Reports, West African Examinations Council (WAEC), 2010, 2011, 2012, and 2013).

Since education is a complex process based on mutual interaction of many factors, examination failure is known to be based on different and versatile reasons. According to researches carried out in this context, the reasons for failure are explained with not only characteristics related to family and school, but also individual characteristics of student, school resources and Institutional environment which are also known to affect educational outcomes. However, regardless of its reason, an individual's failure in developing his/her behaviours is a great loss for family, country and humanity. In this respect, better success line for each school is not an option but an obligation (Oluremi, 2013). Stakeholders have continued to trade blames on the causes of mass failure of students in general, public or even private examinations. Some shifted the blame on government, some on parents, some on society and students themselves with the teachers having lion share of the blame. As accusations and counter-accusations on who to blame on the mass failure of students will persist, the fact remains that all the stakeholders have roles to play in solving the problem of abysmal failure of students in examinations. Nevertheless, there is need to identify the major causes of the problem with a view to providing lasting solutions.

In a nut shell, mass failure of students in examinations could be traced to several factors that can be compartmentalized into the domains of parents, students, teachers, schools, government, and society. In other words, causes of mass failure of students in examinations are multi-dimensional in nature, which can be traced down to the teachers, students, parents and government. Parents play significant roles in the education of their children and wards. Apart from the fact that they pay school fees and other levies, they buy textbooks, uniforms and other materials required by their children and wards, they are expected to supervise their academic works and give them good moral training. They are also expected to visit schools from time to time to find out how their children and wards are behaving with a view to take corrective measures where and when necessary. However, failure of parents to play these roles could negatively affect the academic performance of the students. The importance of teachers in the success of the students in examination cannot be overemphasized. The quantity and quality of instructional delivery by the teacher will, to a large extent, determine the academic performance of the students. That is why; poor academic performance or failure of students is largely blamed on the teachers who are regarded as the custodian of knowledge, skills and values required by the students to excel in various aspects of life.

Considerable research evidences abound to show that students are sometimes responsible for their failure in examinations. Students' factors of examination failure are, Poor study habits,

psychological adjustment problems, Lack of interest and joy in teachers' teaching, Learning disability, Low cognitive ability, Gender prematurity, Medical (health) problems, Problems with time management. The school system has its own share of the blame for poor academic performance of students. The causes of examination failure traceable to the doorsteps of the school are: Large class size (recommended NUC student: teacher ratio exceeded), Limited teaching materials, Problems with learning environment. Government plays crucial roles in the management of educational system in terms of policy formulation, programme's implementation, funding, administration, and supervision among others. The extent to which government is committed to these roles could make or mar the educational system. Based on these articulated factors, the study seeks to access the strategies for reducing mass failure of secondary school students in Chemistry.

Perhaps not much attention has been given to the performance of students in secondary school Chemistry subject in recent years. This neglect, no doubt has relegated this Chemistry subject to the background in school certificate secondary examination students' performance has been very poor generally and the increased number of school dropout in the area of study is a clear pointer of the theme. With no iota of hesitation, researches and studies stated that the rate of mass failure in the school certificate examination in general has been deplorable

This makes Stakeholders to continue to trade blames on the causes of mass failure of students in public examinations. Some people shifted the blame on government, students' activities at home, some on parents, some on society and students themselves with the teachers having lion share of the blame. As accusations and counter-accusations on who to blame on the mass failure of students will persist, the fact remains that all the stakeholders have roles to play in solving the problem of abysmal failure of students in public examinations. Nevertheless, there is need to identify the major causes of the problem with a view to providing lasting solutions. It is against this backdrop that this study investigated the strategies for reducing mass failure among Chemistry students in secondary schools in Onitsha North Local Government Area in Anambra State

Research Questions

The following research questions guided the study;

1. To what extent does teachers' qualification help in reducing mass failure among Chemistry students in senior secondary schools?
2. To what extent does adequate and well-equipped classroom reduce mass failure among Chemistry students in senior secondary schools?
3. What is the influence of technology towards reducing mass failure among Chemistry students in senior secondary schools?
4. To what extent does adequate funding of the school system reduce mass failure among Chemistry students in senior secondary schools

Method

The study adopted a descriptive survey research design and was conducted in Onitsha North Local Government Area, Onitsha Education Zone, Anambra State, Nigeria. The population of this study comprises 1632 SSIII Chemistry students in all the sixteen (16) public secondary schools in Onitsha North Local Government Area, Onitsha Education Zone. Random sampling was used for the study and the sample consisted of one hundred and two (102) SSIII Chemistry students in Onitsha North Local Government Area, Onitsha Education Zone, Anambra State. The instrument for data collection was observational rating scale on strategies for reducing mass failure among Chemistry students in secondary schools in Onitsha North Local Government Area in Anambra State. The instrument was validated by three experts; two from Chemistry education unit and one from measurement and evaluation unit,

all in Nwafor Orizu College of Education, Nsugbe. The instrument was trial tested on twenty (20) Chemistry students from Oyi Local Government Area, Ogidi Educational zone. The data obtained was computed using Cronbach Alpha reliability estimate to determine the internal consistency of the instrument and was found to be 0.88 which shows that the instrument is reliable. Data analysis used for answering research questions was mean and standard deviation. Interpretation of the mean scores for research questions are based on number ranges, where 3.50-4.50 implies Very High Extent (VHE), 2.50-3.49 implies High Extent (HE), 1.50-2.49 implies Low Extent (LE), and 0.50-1.49 implies Very Low Extent (VLE). Mean of 2.50 and above (Agreed) while 2.49 and below (Disagreed).

Result

Research Question One

To what extent does teachers' qualification help in reducing mass failure among Chemistry students in senior secondary schools Onitsha North Local Government?

Table 1

Mean and standard deviation on the extent to which teachers' qualification helps in reducing mass failure among Chemistry students **in senior secondary schools.**

S/N	ITEM STATEMENT	X	SD	DEC
1	To what extent do Students who are taught by trained professional teachers perform better than those untrained professional teachers	3.67	0.50	VHE
2	To what extent does mastery of the subject matter reduce mass failure	3.59	0.63	VHE
3	To what extent does teachers' ability to clarify ideas reduces mass failure	3.09	0.65	HE
4	Ability to involve the students in meaningful activities throughout the period of teaching reduces mass failure	3.20	0.51	HE
5	To what extent does frequent monitoring of students' progress through tests, formal and informal, written and oral quizzes reduce mass failure	3.54	0.57	VHE
	CLUSTER MEAN	**3.41**	**0.32**	**HE**

The analysis of the result in Table 1 on mean and standard deviation on the extent to which teachers' qualification helps in reducing mass failure among Chemistry students in senior secondary school. Items 1, 2 and 5 has a mean score of 3.50 and above set as the criterion for very high extent on the influence of teachers' qualification towards reducing mass failure. However, items 3 and 4 has a mean of 3.09 and 3.20 respectively. The cluster mean of 3.41 and standard deviation of 0.32 indicates that the extent to which teachers' qualification helps in reducing mass failure among Chemistry students in senior secondary school is to a high extent.

Research Question Two

To what extent does adequate and well-equipped classroom reduce mass failure among Chemistry students in senior secondary schools?

Table 2

Mean and standard deviation on the extent to which adequate and well-equipped classroom reduces mass failure among Chemistry students in senior secondary schools

S/N	ITEM STATEMENT	X	SD	DEC
1	Adequate provision of infrastructures makes students learn with ease thus bringing about good academic performance	3.16	0.48	HE
2	School facilities when provided will aid teaching learning programme and consequently improve academic achievement of students	2.89	0.67	HE
3	To what extent does poor and inadequate physical facilities, obsolete teaching techniques, overcrowded classrooms lead to poor academic achievement of students	2.83	0.37	HE
4	Facilities form one of the potent factors that contribute to academic performance of students in the school system	3.09	0.69	HE
5	To what extent does unattractive school buildings and overcrowded classrooms contribute to poor academic achievement of the students in secondary school	3.20	0.53	HE
	CLUSTER MEAN	**3.03**	**0.33**	**HE**

The analysis of the result in table 2 on mean and standard deviation on the extent to which adequate and well-equipped classroom reduces mass failure among Chemistry students in senior secondary school. Items 1, 2, 3, 4 and 5 has a mean score of 3.16, 2.89, 2.83, 3.09 and 3.20 respectively set as criterion for high extent to which adequate and well-equipped classroom

reduces mass failure. The cluster mean of 3.03 and standard deviation of 0.33 indicates that the extent to which adequate and well-equipped classroom reduces mass failure among Chemistry students in senior secondary schools in Onitsha North Local Government is to a high extent.

Research Question Three

What is the influence of technology towards reduces mass failure among Chemistry students in senior secondary schools?

Table 3

Mean and standard deviation on the influence of technology towards reducing mass failure among Chemistry students in senior secondary schools

S/N	ITEM STATEMENT	X	SD	DEC
1	The integration of technology help students to gain complex practical ideas	3.10	0.48	Agreed
2	The integration of technology help students to get clear pictures of stories to practical	2.93	0.72	Agreed
3	The integration of technology help students to facilitate thinking	3.41	0.40	Agreed
4	Integration of technology help students to get more examples	3.22	0.59	Agreed
5	Integration of technology help students to reduce number of written languages	3.52	0.71	Agreed
	CLUSTER MEAN	**3.24**	**0.30**	**Agreed**

Result presented in table 3 indicates the mean and standard deviation on the influence of technology towards reducing mass failure among Chemistry students in senior secondary school. The findings showed that item 5 had the higher mean score of 3.52, followed by item 3 with a mean score of 3.41, item 4 had 3.22, item 1, 3.10 and item 2 had 2.93. The cluster mean of 3.24 with a standard deviation of 0.30 was obtained, which implies that the respondents agreed with the item statements on the influence of technology towards reducing mass failure among Chemistry students in senior secondary schools Onitsha North Local Government.

Research Question Four

To what extent does adequate funding of the school system reduce mass failure among Chemistry students in senior secondary schools?

Table 4

Mean and standard deviation on the extent to which adequate funding of the school system reduces mass failure among Chemistry students in senior secondary schools

S/N	ITEM STATEMENT	X	SD	DEC
1	To what extent does proper funding of the school system reduce mass failure	2.57	0.52	HE
2	To what extent does proper funding of the school system lead to high level of staff commitment	3.12	0.51	HE
3	Lack of funding of secondary school could lead to corruption and Embezzlement	2.91	0.71	HE
4	To what extent does proper and adequate funding of the schools' lead to infrastructural development	3.59	0.59	VHE
5	To what extent does proper and adequate funding of the schools' lead reduction in education	3.51	0.61	VHE
	CLUSTER MEAN	**3.14**	**0.28**	**HE**

The analysis of the result in table 4 on mean and standard deviation on the extent to which adequate funding of the school system reduces mass failure among Chemistry students in senior schools in Onitsha North Local government area. Items 4 and 5 has a mean score of 3.59 and 3.51 respectively set as criterion for very high extent. However, items 1, 2 and 3 had a mean score of 2.57, 3.12 and 2.91 respectively set as criterion for high extent. This indicate that the extent to which adequate funding of the school system reduces mass failure of students. The cluster mean of 3.14 and standard deviation of 0.28 indicates that the extent to which adequate funding of the school system reduces mass failure among Chemistry students in senior schools in Onitsha North Local government area is to a high extent.

Discussions of the Findings

The finding of the study revealed that teachers' qualification helps in reducing mass failure among Chemistry students in senior secondary

schools to a high extent. The result of this finding may be due to the fact that the qualities of a qualified teacher include subject-matter knowledge that can be transferred, knowledge of professional and teaching techniques, enthusiasm for teaching, activities that promote meaningful learning, classroom management, individual characteristics, and a mindset toward discipline. Korur and Eryılmaz (2012) believed that teacher's qualification is the first determinant of students' achievement. Adedayo and Owolabi (2021) studied the relationship between teacher qualification and students' performance at the Secondary School level in Nigeria. They found that there was a significant difference in the performance of Secondary School students taught by teachers with high qualifications compared to those taught by teachers with low qualifications. Teacher qualifications have been linked to academic performance (Yasin, 2021). Teachers with high qualifications had strong positive effect on the academic performance of students.

The quality of any education system is a function of the teacher quality within the system. Segun (2016) confirmed that for any meaningful teaching and learning to take place, teacher qualifications need to be very high. Macaulay (2016) affirmed the above assertion by Segun (2016) qualifications must relate to academic and professional preparation, professional growth, classroom interaction and evaluation. This is true because a teacher who is not trained in a particular discipline will not perform as much as if he trained in that particular field. In this case the teacher relies on 'reading and teaching' because the in-depth knowledge is lacking for effective instructional delivery.

The findings of the study revealed that adequate infrastructure, good facilities among others helps in reducing mass failure among Chemistry students in senior secondary schools to a high extent. This could be due to the fact that when there is available resources and well-equipped laboratories it motivates students to learn and aid effective teaching and learning. This finding is in consonance with the opinion of Hallak in Odeh (2015) who states that facilities form one of the potent factors that contribute to academic performance of students in the school system. They include the school buildings, classroom, accommodation, libraries, laboratories, furniture, recreational equipment, apparatus and other instructional materials. He went further to say that their availability, relevance and adequacy contribute to academic performance of students. He however, quickly added that unattractive school buildings and overcrowded classrooms among others contribute to poor academic performance of the students in secondary and other levels of education. This is also in line with Afolabi (2015) who found that students with a good learning environment background performed better than their counterparts with poor environmental background.

The school environment, classrooms, libraries, technical workshops, laboratories, teachers' quality, school management teaching methods, peers etc, are variables that affect students' academic performance. Hence the school environment remains an important area that should be studied and well managed to enhance pupils' academic performance (Ajayi, 2015).Therefore, a well-equipped classroom and adequate facilities could be an effective means of reducing students' mass failure in Chemistry.

The findings of this study revealed that integration of technology help students to gain complex practical ideas, get clear pictures of stories to practical, facilitate thinking, get more examples and reduces number of written languages. Various studies on learning styles have shown that when learners can learn in a way that suits them, improvements in the effectiveness of the learning process normally ensue (Wabuyele, 2006). Alabi (2011), in a studied that investigated the influence of multimedia on students' attitude towards learning reported that multimedia presentation encouraged learning as they provided a stimulating environment and promoted enthusiasm. A multimedia-based learning environment helps reserved students who are afraid to make mistakes in a classroom

situation (Benedict, 2010). The use of computer-based multimedia presentation in carrying out instruction is an innovation in educational technology (Libin Yang, 2015). This mode of technology utilizes computer as a medium of presentation in form of text, pictures, graphics, tables and animations. The most important advantage of using integrating technology as a demonstrator is that demonstration and illustration whether simple or complex can be placed under the control of the students, to be repeated, interrupted, slowed down, or even reversed at will (Adesanya, 2014). With the help of computer-based multimedia presentation, the teacher can make the content of the course lively and vivid to arouse the attention of the students (Olori, 2010).

The findings of the study revealed that proper funding of the school system leads to high level of staff commitment, infrastructural development and reduction in education. However, lack of funding of secondary school could lead to corruption and embezzlement. This could be due to the fact that the improvement in funding is geared towards improving on the standard of education provided for the citizens especially in secondary schools. It is very important to note that the quality of educational output is positively related to the quality of funding. One of the benefits of funding is that it serves as a means of motivating staff in the work environment. According to Hertzberg (2019) salary is one of the hygiene factors that motivate staff to work. When this is not forth coming, it reduces the level of commitment of workers in the organization. The timely and adequate payment of staff salaries and other welfare package is a factor that stimulates workers willingness to work.

Recommendations

Based on the findings of the study, the following recommendation were made;

1. Attention should be given to qualified teachers to handle the teaching of Chemistry. Hence, recruiting, preparing and training teachers with ICT knowledge should be the central strategies for improving schools because teachers are instrumental in translating subject contents into teachable classroom lessons.
2. Government should provide more teaching-learning facilities in schools to make the learning environment more attractive to both students and teachers as environment has a great influence on the teaching and learning process.
3. The government, school authorities, school owners and all the stakeholders in the educational sector should ensure effective integration of technology in teaching and learning of Chemistry.
4. The government should be committed to the adequate funding of secondary education through appropriate budgetary allocation for the sustenance of secondary education in the country. The government should consider an upward review of the educational budget to meet up with the 26% allocation recommended by UNESCO and above.

Conclusion

Based on the findings of the study, the following conclusions were drawn:

The study revealed that teachers' qualification helps in reducing mass failure among Chemistry students in senior secondary schools to a high extent. Adequate infrastructure, good facilities among others helps in reducing mass failure among Chemistry students in senior secondary schools to a high extent. Integration of technology help students to gain complex practical ideas, get clear pictures of stories to practical, facilitate thinking, get more examples and reduces number of written languages and proper funding of the school system leads to high level of staff commitment, infrastructural development and reduction in education and lack of funding of secondary school could lead to corruption and embezzlement.

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