

THE ROLE OF MATRIX SKILLS ON ACADEMIC ACHIEVEMENT OF SCIENCE EDUCATION STUDENTS IN SECONDARY SCHOOLS IN BAYELSA STATE

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DOI: <https://doi.org/10.5281/zenodo.17250393>

Abstract

The study investigated the Role of Matrix Skills on Academic Achievement of Science Education Students in Secondary Schools in Bayelsa State. Three research questions guided the work, with a descriptive survey as the design for the study; the population for the study involved all secondary schools science education students in Ogbia Local Government Area of Bayelsa State, and with a total of 100 science students as respondents which was achieved through the use of random sampling techniques. Data was collected using a structured questionnaire designed in 5 points rating scale. The instrument was validated by three experts in the field, the reliability co-efficient of 0.68 was established using cronbach alpha method, while mean and standard deviation were used to answer the research questions. Findings revealed that the Role of Matrix Skills on Academic Achievement of Science Education Students in Secondary Schools in Bayelsa State are enormous, there are lots of factors that militate against the Role of Matrix Skills on Academic Achievement of Science Education Students in Secondary Schools in Bayelsa State, and the recommendations are; Activities that will enhance the engagement of students in science process skills should be given enough encouragement by science instructors. The government authorities and curriculum planners of science education programmes of institution of learning should budget and allocate finance that will be use to build facilities to improved science process skills; Science education curriculum should be structured to embrace science practicals. Teaching and learning of science should be intensifying from junior secondary schools levels to the tertiary levels. Science education students should be encouraged to demonstrating practically on what they have learnt.

Keywords: Matrix Skills, Academic Achievement, Science Education, Process Skills, Secondary School Students

Introduction Background to the Study

The term Matrix is referred as a set of arranged numbers in rows and columns so as to form a rectangular array. The numbers are called the elements, or entries, of the matrix. Matrix has wide applications in engineering, physics, economic and statistics as well as in various branches of mathematics. Matrices also have important applications in computer graphics, where they have been used to represent rotations and other transformations of images. Matrices also have important applications in computer graphics, where they have been used to represent rotations and other transformations of images (Authur & Niels 2023). Matrix technique is also intended to facilitate students' synthesis of social and scientific issues and high level of critical engagement with texts. to facilitate students' synthesis of social and scientific issues and high level of critical engagement with texts. These are not usually textbooks, but may include written texts such as videos, newspapers articles, television programmes, students written reflections or any other stimulus material suggested by the teacher or students.

In the same vein, science is believed to be vital tool for individual development at large. According to Robin (2004), science is the field in which the content of science and the processes of science learning no longer is obvious but has to be given justification. Maranan (2017), exerted that science process skills are the things that scientists do when they study and investigate, observing, classifying, communicating, measuring, inferring, and predicting are among the thinking skills used by scientists, teachers and students when doing science. Much of the pleasure of both learning and teaching science is experiencing science. Mastering abilities of these process skills will help to develop the kind of science programme that mirrors real science.

According Opatye (2012). Science is a core subject at all levels of education in Nigeria. Science education is also to provide more effective preparation for citizenship. In order to achieve this, qualified and highly scientifically literate teachers are required who are well aware of their global demands for teaching with a view to engendering scientific and technological values in learners. Omoifo (2012) emphasised that science teachers therefore, need to recognise the nature of scientific endeavours and how it relates to science teaching if they are to help their students completely understand the content and underlying principles of science. Science teachers as matter of interest need to be aware of national educational policies and goals in order to discharge their teaching activities towards achieving those goals whatever be their gender, type of school and school locations.

The development of basic process skills is important as well as development of proper scientific attitude and values. Science education aims to train students to think like scientists and emphasis would be expected on the development of attitude that good scientist are able to display (Opulencia, 2011). One of the major purposes of teaching science is for the inculcation of desirable attitudes and values (Pacia, 2014). Shaping students attitudes, behaviours, and motivations are necessary today for without these broader skills and strengths, student will be unprepared for the challenges they and their world will face (Miller, 2017). Therefore, upon the prevailing background, the present study is set to investigate the Role of Matrix Skills on the Academic Achievement of Science Educations Students in Secondary Schools in Bayelsa State.

Statement of the Problem

Process skills and attitude toward Science are important elements that may influence students' performance. According to Johnston (2009), science process skills are significant in improving students' cognitive development and facilitating students' active participation during the teaching and learning process Attitude toward science is positively correlated with science achievement. Developing mastery in basic process skills and positive attitude toward Science is aiming for quality students' performance. The students' performance

(Academic achievement) according to Mushtaq and Khan (2012) plays an important role in producing great leaders and manpower for the country thus responsible for the country's economic and social development.

Therefore, the problem that propelled this study is to investigate the Role of Matrix Skills on the Academic Achievement of Science Education Students in Secondary Schools in Bayelsa State.

Purpose of the Study

The purpose of the present research is generally to investigate the Role of Matrix Skills on the Academic Achievement of Science Education Students in Secondary Schools in Bayelsa State. Specifically, the study intends to;

- 1 Investigates the role of matrix skills on academic achievement of science education students in secondary schools in Bayelsa State.
- 2 Find out factors that militates against the role of role of matrix skills on academic achievement of science education students in secondary schools in Bayelsa State
- 3 Provide strategies to improve the role of matrix skills on academic achievements of science education students in secondary schools in Bayelsa State.

Research Questions

The following research questions are set to guide the study.

- 1 What are the roles of matrix skills on academic achievement of science education students in secondary schools in Bayelsa State?
- 2 What are the factors that militate against the role of matrix skills on academic achievement of science education students in secondary schools in Bayelsa State?
- 3 What are the strategies to improve the role of matrix skills on academic achievements of science education students in secondary schools in Bayelsa State?.

Research Methodology

The design for the study is a descriptive survey. According to Nwankwo (2013, p.62), as the name implies, descriptive survey is the study that the researchers collects data from a large sample drawn from a given population and the describes certain features of the sample as they are at the time of the study which are of interest to the researcher; however, without manipulating any independent variables are merely described as they are at the particular time.

The population for the study included all the secondary schools science education students' in Ogbia LGA of Bayelsa state. The study involved 100 science education students of secondary schools in Ogbia LGA of Bayelsa State, which was drawn by the aid of random sampling techniques. Instrument for data collection was a questionnaire titled, "Role of Matrix Skills on

Academic Achievement Of Science Education Student In Secondary Schools" (RMSAASESSS). Validity of the Role of Matrix Skills on Academic Achievement of Science Students in Secondary School (RMSAASESSS) was done by two experts in the field of study. Copies of the instrument were administered to 10 science students in schools outside the study sample which served as pilot testing with reliability co – efficient of 0. 68 levels of significant to make the instrument reliable for the present study. Instructions guiding the filling of the instrument were thoroughly explained to the respondents. The use of Likerts five Scale of

strongly agreed (SA), Agreed (A), Undecided (U), disagreed (DA), and Strongly disagreed (SD) served as the statistical tool for data analysis, hence, any item whose means responses is less than the cut off means 3.00 were regarded as a disagreed while those items whose mean were equal to, or greater than the cut off mean of 3.00 were regarded as agreed.

Results and Discussions

The data analyses are presented in tables according to the research questions.

Research question 1: What are the Roles of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State?

Answer to research question one is presented in Table 4.1.

Mean and SD of the Roles of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State

S/N	STATEMENT	MEAN	SD	REMARKS
1	Important applications in computer graphics	3.60	0.49	Agreed
2	Used to represent rotations	3.16	1.01	Agreed
3	Transformations of images	3.22	0.97	Agreed
4	Facilitate students' synthesis of social and scientific issues			Agreed
5	High level of critical engagement with texts	3.00	1.03	Agreed
6	Mastering science process skills	3.16	0.88	
7	Developed science programme that mirrors real science	3.34		Agreed
8	Help students to think systematically.	3.00	0.87	
9	Developing a sense of responsibility,			Agreed
10	Increasing the permanence of learning and providing research methods	3.62	0.96	
		3.45		Agreed
		3.32	1.10	Agreed
	Grand mean		1.09	Agreed
		3.38	0.84	
			0.87	Agreed

Data in Table 4.1 above showed that respondents agreed on all items on the Roles of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State?

Research question 2 What are the Factors that Militate against the Role of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State?

Answer to research question two is presented in Table 4.2.

Mean and SD of the Factors that Militate against the Roles of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State?

S/N	STATEMENT	MEAN	SD	REMARKS
1	Emotional disturbance as result of poverty	3.34	0.87	Agreed
2	Lack of conducive school environment	3.45	1.09	Agreed
3		3.00	0.96	Agreed
4	Lack of quality teacher training	3.62	1.10	Agreed
5	Family education level	3.32	0.84	Agreed
6	Lack of academic support	3.28	0.87	Agreed
7	Intellectual and motivational dimension	3.18	1.09	Agreed
8	Lack of motivation and creativity abilities	3.10	1.00	Agreed
9	School management	3.04	1.07	Agreed
10	Teacher professional competence	3.24	0.86	Agreed
	Students health status	3.08	1.07	Agreed
	Grand mean			

Data in Table 4.2 above showed that respondents agreed on all items on the Factors that Militate against the Roles of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State?

Research question 3 what are the Strategies to improve the Roles of Matrix Skills on Academic Achievements of Science Students in Secondary Schools in Bayelsa State?

Answer to research question three is presented in Table 4.3.

Mean and SD of the Strategies to improve the Roles of Matrix Skills on Academic Achievements of Science Students in Secondary Schools in Bayelsa State?

S/N	STATEMENT	MEAN	SD	REMARKS
1	Development of basic process skills	3.21	0.87	Agreed
2	Development of scientific attitudes and values	3.05	1.09	Agreed
3	Trained students to think like scientists	3.00	0.96	Agreed
4	Innovation on elements to influence students performance	3.45	1.10	Agreed
5	Improving students cognitive development	3.00	0.84	Agreed
6	Facilitating student active participation during teaching and learning process	3.08	0.87	Agreed
7	Positive attitude towards science	3.18	1.09	Agreed
8	Conducive school environment	3.20	1.11	Agreed
9	Availability of updated facilities for teaching and learning	3.04	1.07	Agreed
10	Rewards and motivations on perceived success Grand mean	3.11 3.12	0.86 0.87	Agreed Agreed

Data in Table 4.3 above showed that respondents agreed on all items on the Strategies to improve the Roles of Matrix Skills on Academic Achievements of Science Students in Secondary Schools in Bayelsa State?

Discussion of Findings The Roles of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State

From findings, with grand mean results of 3.38 and SD of 0.87 in table one indicates that all respondents responded to agreed on all the 10 items on the Roles of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State

. This is in line with the study of Karamustafaoglu in Maranan (2017), which reviewed that understanding of Science process usually refer to skills or abilities that must be owned by the scientists on the process of scientific discovery. These skills are divided into two groups: basic and integrated process skills. The basic process skills include observing, asking questions, classifying, measuring and predicting. While the integrated process skills include, identifying and defining variables, interpreting data, manipulating materials, recording data, formulating hypotheses, designing investigations, make inferences and

generalizations. The study is also in line with Panoy in Marana (2017) who cited that the goal of science education is to develop students' skills and enables individuals to apply those skills in everyday lives. These skills affect the personal, social, and global life of individuals. Science Process Skills are necessary tool to produce scientific information, to perform scientific research and to solve problems

Factors that Militate against the Roles of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State

From findings, with grand mean results of 3.08 and SD of 1.07 in table three indicates that all respondents responded to agreed on all the 10 items on the Factors that Militate against the Roles of Matrix Skills on Academic Achievement of Science Students in Secondary Schools in Bayelsa State. This is in line with Hussan (2006) who reviewed that secondary school students in public schools often come from economically poor and average income families. These families face various problems causing emotional disturbance among their children. The findings of this study is supported by Ozcan (2021), that family Education level affect student academic success in terms of academic support, intellectual and motivation dimension, school physical conditions affect student academic success in terms of learning, motivation and creativity. School management affect student academic success in terms of operation and attitude. School environment affect success in terms of motivation and social effect and socioeconomic effect.

Strategies to improve the Roles of Matrix Skills on Academic Achievements of Science Students in Secondary Schools in Bayelsa State

From findings, with grand mean results of 3.38 and SD of 0.87 in table one indicates that all respondents responded to agreed on all the 10 items on the Strategies to improve the Roles of Matrix Skills on Academic Achievements of Science Students in Secondary Schools in Bayelsa State? This aligned with the study of Maranan (2017), which is of the view that development of basic process skills is important as well as development of proper scientific attitude and values. Science Education aims to train students to think like scientist and emphasis would be expected on the development of attitude that good scientist are able to display, process skills and attitude towards science and important element that may influence student to performance. More so, Johnson (2009) buttressed that Science process are significant in improving students cognitive development and facilitating student active participation during teaching and learning process attitude towards science positively correlated with science achievements.

Summary, Conclusion and Recommendation Summary

This study was prompted by the quest to investigate the Roles of Matrix Skills on Academic Achievements of Science Education Students in Secondary Schools in Bayelsa State. Literatures for the study were reviewed in line with the purpose of the study to establish the **Roles** of Matrix Skills on Academic Achievements of Science Education Students in Secondary Schools in Bayelsa State.

The study also focused on the theories of cognitive and constructivists as foundation to the literature reviews. Three research questions that formed the research questionnaire were analyzed by the use of mean and standard deviation, and the discussion of findings was done as appropriate. The population of

the study involved science education students at senior secondary school levels in Ogbia LGA of Bayelsa State. The total of 100 students was used as respondents for the study from ten (10) selected senior secondary schools in Ogbia Local Government Area with the aid of simple random sampling techniques. The study specifically considered the role of matrix skills on academic achievement of science education students in secondary schools in Bayelsa State, factors that militates against the role of role of matrix skills on academic achievement of science education students in secondary schools in Bayelsa State, and strategies to improve the role of matrix skills on academic achievements of science education students in secondary schools in Bayelsa State. Data in Table 4.1 of research question one above showed that respondents agreed on all items on the Roles of Matrix Skills on Academic Achievement of Science Education Students in Secondary Schools in Bayelsa State. Data in Table 4.2 of research question two above showed that respondents agreed on all items on the Factors that Militate against the Roles of Matrix Skills on Academic Achievement of Science Education Students in Secondary Schools in Bayelsa State, and Data in Table 4.3 of research question three above showed that respondents agreed on all items on the Strategies to improve the Roles of Matrix Skills on Academic Achievements of Science Education Students in Secondary Schools in Bayelsa State.

Understanding of Science process usually refers to skills or abilities that must be owned by the scientists on the process of scientific discovery. These skills are divided into two groups: basic and integrated process skills. The basic process skills include observing, asking questions, classifying, measuring and predicting, while the integrated process skills include, identifying and defining variables, interpreting data, manipulating materials, and recording of data. Family Education level also affect student academic success in terms of academic support, intellectual and motivation dimension, school physical conditions affect student academic success in terms of learning, motivation and creativity. School management affect student academic success in terms of operation and attitude. School environment affect success in terms of motivation and social effect and social-economic effect.

Development of basic process skills is important as well as development of proper scientific attitude and values. Science Education aims to train students to think like scientist and emphasis would be expected on the development of attitude that good scientist are able to display, process skills and attitude towards science and important element that may influence student to performance

Conclusion

The study had five main chapters, chapter 1, 2, and 3 are the proposal of the work with background of study, statement of problem, purpose of the study, research questions, and definition of terms, e.t.c. chapter 2, was the empirical reviews of literatures related to this work , and chapter 3 is the research methodology while chapters 4 and 5 completes the study with chapter 4 presenting and analyzing the research findings in statistical manner, and then finally, chapter five summarized, concludes and made recommendations on ways forward in solving the problem that prompted the study. The Roles of Matrix Skills on Academic Achievements of Science Education Students in Secondary Schools in Bayelsa State should be given

maximum attention by the relevant organs of government, most especially, the School management which affect student's academic success in terms of operation and attitude. School environment affect success in terms of motivation, social effect and social-economic effect.

Recommendations

The researcher therefore recommends that:

1. Activities that will enhance engagement of students in science process skills should be given enough encouragement by science instructors.
2. The government authorities and curriculum planners of science education programmes of institution of learning should budget and allocate finance that will be use to build up facilities to improve science process skills.
3. Science education curriculum should be structured to embrace science practicals.
4. Teaching and learning of science education should be intensifying from junior secondary to senior secondary levels.
5. Science education students should encourage demonstrating practically on what they have learnt.

References

- Akangbou, T. R. (2014). Challenge and opportunity: Rethinking the role and function of developmental education in community colleges. *New Directions for Community Colleges*, 145 (Spring), 11-30.
- Authur, C. & Niels, F.H. (2023). **Matrix** | Definition, Types, & Facts | Britannica Encyclopedia Britannica › Science › Mathematics
- Hussan (2006). FACTORS RESPONSIBLE FOR POOR ACADEMIC PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN NIGERIA, www.researchproject.com.ng › research-project-topics-materials-students
- Nwankwo, O. C. (2007). *A Practical Guide to Research Writing; Fr Students of Research Enterprise* (Revised fifth edition), University of Port Harcourt Press Ltd
- Omoifo, C. N. (2012). *Dance of the limits-reversing the trends in science education in Nigeria*. Inaugural Lecture Series 124, Benin City: University of Benin Press.
- Opataye, J. A. (2012). Nigeria Secondary School Science Teachers" Awareness and Preparation for the Challenges of Vision 20:2020. *An International Multidisciplinary Journal, Ethiopia* Vol. 6 (4), Serial No.
- Robin, M. (2004). *The role of practical work in the teaching and learning of science*, the University of York, Department of Educational Studies.