Assessment of Women's Exploits in Science Education: An Empirical Survey of the Views of Science Educators in Akwa Ibom State

BY

Essien Edem UDO, *Ph.D*
Science Education Department
Faculty of Education
University of Uyo, Uyo

AND

ESSEN, Enoima Cyrinus Benedict
Public Health Department of Physical and Health Education
University of Uyo

ABSTRACT

The study sought access the women's exploits in science education in Akwa Ibom State. Descriptive survey design was adopted for the study. The study was conducted in Akwa Ibom State. The population of the study comprised of all science educator (teachers) in Akwa Ibom State. Stratified Sampling Technique was used to select 210 respondents that constituted the sample size for the study. The Main Instrument used in this study was a questionnaire titled "Assessment of Women's Expliots in Science Education: (AWESE)". Face and content validation of the instrument was carried out by an expert in test, measurement and evaluation from University of Uyo to ensure that the instrument has the accuracy, appropriateness and completeness for the study under consideration. Cronbach Alpha technique was used to determine the level of reliability of the instrument. The reliability coefficient obtained was 0.80 and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as independent t-test analysis. The test for significance was done at 0.05 alpha levels. The study concluded that providing women and girls with equal access to education, health care, decent work, and representation in political and economic decision-making processes will fuel sustainable economies and benefit societies and humanity at large. One of the recommendations was that to increase participation of females in science education programs, financial support in the form of scholarship or bursary should be given to them by the government, stakeholders or NGOs to enable them purchase apparatus, machinery and textbooks for their studies.

KEYWORDS: Women Exploit, Science Education and Akwa Ibom State

Introduction

Education of females has an overwhelming effect on national development since females contribute immensely to food production, domestic food storage and food processing, marketing and all household activities in Africa (Anamuah-Mensah, 2007), as lack of their education has been linked to low birth weight, poor health and high mortality rates in children, high fertility rates, poor family nutrition, low life expectancy, poor sanitation and high illiteracy rates. Thus education continues to be central to a country's well-being and economic development. Governments in many parts of Africa are aware of the benefits that will accrue from the education of the girl child. Accordingly, Lopez-Claros and Zahidi, (2007) indicated that when a country educates its citizens (women as well as men),

economic productivity rises, maternal and infant mortality rates fall, fertility rates decline, and the health and educational prospects of the next generation are improved. The socio-economic importance of female education can thus not be over emphasized. Women's roles in nations building cannot be underrated. Women all over the world are planning seriously to excel in all sphere of life. In recent years, women have put aside gender inequality, marginalization, inferiority complex, full house wife-ship. Yet, the constraint on women job is still very much with us and it is a strong enigma against the optimal performance of these set of gender in their respective organization particularly in science education.

Statement of the Problem

In recent years, women exploits in science education has been considered to be a progress in facilitating women access in science education. There is still gender disparity in performance and completion of science education among women based programmes. It has been speculated that women have made exploits in science education but not much explanation has been made on this matter. That is why this study is conducted for presentation of detailed information on the subject matter.

Objective of the Study

1. To find out the difference in exploits between older and younger female science educators in Akwa Ibom State.
2. To determine the difference in exploits between urban and rural female science educators.
3. To examine the limitations faced by female science educators in execution of their duties.

Research Questions

1. What is the extent in the difference of women exploit between older and younger female science educators Akwa Ibom State?
2. What is the extent to determine the difference in exploits between urban and rural female science educators?
3. What are the constraints faced by female science educators in execution of their duties?

Research Hypotheses

$H0_1$: There is no significant difference in women exploit between older and younger female science educator

$H0_2$: There is no significant difference to determine the difference in exploit between urban and rural female science education.

Conceptual Review

Concept of Science Education

Science education is the teaching and learning of science to non-scientists, who are school children, college students, or adults within the general public. The field of science education includes work in science content, science process (the scientific method), some social science, and some teaching pedagogy. The standards for science education provide expectations for the development of understanding for students through the entire course of

their K-12 education and beyond (Mary, 2021). Science education is the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community. The learners may be children, college students, or adults within the general public (Definitions.net, 2021). Science education has a key role in preparing young people to cope with the emergent environmental challenges. Therefore, environmental education, which appears to becoming a part of science education programmes currently, might help in the development of individuals to demonstrate responsible environmental behaviour towards their environment in order to develop a sustainable environment. One of the key aims for science education is to prepare pupils for science-related careers in, for example, medicine, engineering, industry and teaching professions (Aikenhead, 2005). It is the anticipation of science curriculum developers in general that pupils are able to incorporate scientific content into their own thinking so that this content is made available later in the science-related world of work (AAAS, 198 cited in Aikenhead, 2005).The large-scale introduction of elements of the history of science was linked not only to an attempt to create a positive stance towards science, but also towards improving the cultural dimension of scientific knowledge (e.g., aspects of scientific knowledge related to the social context of science, through a change in philosophy of the science curriculum). However, the emergence of the framework within which new scientific knowledge is born and developed appears as an autonomous goal, without any indication of a close relationship between the historical elements and the conceptual and methodological dimensions of scientific knowledge (Holton, 2003). The introduction of conceptual models from the history of science is a characteristic example of such an approach. In this case, teaching materials deriving from the analysis of elements of the history of science can contribute to the development of teaching interventions that aim to transform students' alternative conceptions when they approach natural phenomena and the concepts that explain them (Irwin, 2000). Science education aims to increase people's understanding of science and the construction of knowledge as well as to promote scientific literacy and responsible citizenship. We can use science communication to increase science-related knowledge among adults, in particular. Popularized non-fiction books, exhibitions, science events, and science blogs are excellent ways to improve adults' scientific knowledge (Timonen, 2020). According to (Taber 2011) science education has been informed by an extensive research programme into student thinking and learning in science, and in particular exploring how teachers can facilitate conceptual change towards canonical scientific thinking. Constructivism emphasises the active role of the learner, and the significance of current knowledge and understanding in mediating learning, and the importance of teaching that provides an optimal level of guidance to learners.

Difference in Exploits between Older and Younger Female Science Educators

Many positive and negative views have been put forward regarding age and teaching. It is a general thought that as age advanced and designation is promoted, teachers loose the enthusiasm to teach. Another thought was that age and experience go hand in hand. Age is an asset because as the age advanced the teacher becomes experienced and he knows where to tap the potential of the students and how to make him understand his worth. Some students feel that the teacher enthusiasm deteriorated as the age advanced which may be due to the boredom of teaching the same content over several years and added responsibilities on academic, administrative and research aspects (David, 2006). It was also noted that students respected senior staff while neglecting the juniors as they felt that marks and their grades were governed by senior staff members (Marsh, et. al., 2000). However newer recruits or young teachers tried to imitate senior teachers, they had an urge for improvement. They could very well make use of audio-visual aids, mikes and other techniques for improving their teaching capabilities. These were few positive points in favor of younger teachers. The

experience increased as the age advanced. Age is traditionally an asset to an individual, a most accessible variable, which is added to a person's resume.

Women Exploit in Science Education

Female teachers have been associated with improved educational experiences and enhanced learning outcomes for girls in some contexts. By acting as positive role models for girls, female teachers are found to effectively dispel myths about innate abilities among boys and improve girls' perceptions, interest, and self-efficacy in science education. Yet, the latest brief suggests that lower self-efficacy of female science and mathematics teachers may affect girls own self-efficacy in these subjects, and their pursuit of science education careers (UNESCO, 2021). Substantive gains and scientific aptitude is the essential requirement in the technology dependent world (Brickhouse et al 2006). Be obtained by improving the women's contribution in scientific movement. Providing the men and women with correct knowledge, valuable aptitudes and good technical abilities is possible through science education which develops self-reliance and generates employment. "Providing women and girls with equal access to education, health care, decent work, and representation in political and economic decision-making processes will fuel sustainable economies and benefit societies and humanity at large" was the goal stated at the UN climate change conference.

Contribution of Women in Science Education

When acquiring an understanding of the contributions of women in the fields of science and technology, it is apparent that women develop interest and enthusiasm, only then they participate efficiently. In other words, their perspectives and viewpoints need to be identified in these fields. Common wisdom and previous research suggested those barriers to advancements that women and technology organizations faced and the experience that they had, primarily as a result of male dominance and the pervasively masculine culture led to dissatisfaction among the female employees (Cummings, Sabattini, & Carter, 2008). In practical terms the involvement of women in SET is essential. A recent report notes that 'A more diverse workforce, which reflects a wider variety of experiences and views, can greatly benefit the SET enterprise as well as society as a whole'. They bring different strengths (and limitations) to science than men. In organizations, where women were employed, possessing educational qualifications in the fields of science and technology are in some cases, not allowed to have a say in the decision making matters or enjoy equal rights and opportunities as their male counterparts. Changes have taken place and in the present existence, there have been number of employment opportunities available for women, from the science and technology fields. Research has indicated that many women have rendered a significant contribution in the sharing of information, technology transfer, organizational development, financial assistance and policy development (Radhika,2019). In the usage of technology, women as well as men are performing social roles and there are power relations between them, which usually have an effect upon the use and management of natural resources. Cultures, social roles and the natural environmental conditions have a major impact in the formation of gender roles. Women are powerful agents of change, who possess specific knowledge and skills to effectively contribute to climate change adaptation and mitigation and to the prevention of and education for natural disasters. However, they are largely under-represented project design and in decision-making processes at all levels. UNESCO strives to empower women and respond to their specific needs (UNESCO, 2018).

Limitations of Women in Science Education

Why does the proportion of women in science education-related professions fail to reflect the interest girls demonstrate for mathematics and science courses in early school years? Various

factors have been documented as possible contributors to the gender discrepancy in science education. These factors can be classified under the nature versus nurture debate. One of the assumptions under the nature argument is that girls' brains develop differently from boys', and that biological differences explain the gender gap in science education (Psychol Bull, 2009). This line of thought has been dismissed by those who argue that the evidence that biological factors cause gender differences in science education is inconclusive (Eccles, 2009). Furthermore, there is evidence that in some countries, girls perform as well as or even better than boys in science (Unesco 2010). There are many factors related to the nurture debate and its association with the observed gender differences in science education. The most common constraint face by female science educators are:

***Gender differences-mathematical/biological*;** According to Robertson et al. (2010), career persistence in science can be predicted by individual differences in lifestyle preferences that are closely linked to career perspective. For instance, in terms of working hours, women preferred to work less hours than men which was probably due to their preference in spending their time more in pursuit of a quality life than work. In addition, women in their mid-30s put less value on their careers but more on family, friendships, and the community.

Family responsibilities; these has to do with the role of women such as

- Caring for your children.
- Supervising a younger sibling.
- Regularly assisting a grandparent or older adult relative.
- Routinely taking care of household tasks like cooking, cleaning, and running errand.

Women are perceived less competitive: Women have different attitudes than men toward competition, toward risk, toward altruism, researchers say. The distinctions are sometimes quite stark, and perhaps tangibly important. When we think about the gender gap in pay, it's easy to blame discrimination, but here an argument has emerged about another kind of sexism—the damning effects of gendered norms.

***Perceived lack of commitment among women*:** The lack of family support also affects women organizational commitment and career. Women Employees sometimes have to rely on their family assistance in caring for their children when they are required to attend courses or work outstation. In addition, heavy workload is a Challenge for women employees as they bear numerous responsibilities towards their family as Well. Nowadays, the growing number of dual career couples also led to a family-work conflict. The importance of social support from peers, which enable women employees to attain a well-balanced career

Masculinity associated with creativity: Here women remain woefully underrepresented in a wide range of creative professions. Newly published research suggests that this imbalance can be traced to our reflexive tendency to link masculinity and creativity—a bias so strong it can lead people to judge the same work as more creative if they believe it was produced by a man

Difficulty in finding work-life balance: Work-life balance assumes great significance for women as they are virtually in two full time jobs - one at home and the other at office. Working mothers often have to challenge perceptions and stereotypes that evolve as a working woman becomes a working mother... When a woman seeks a position of power within an organization, she must consider the toll on other facets of her life, including hobbies, personal relationships and family. Most executive jobs require a substantial amount of time and effort, which a working mother may not be able to devote due to family

obligations. So also, it may be nearly impossible for a working mother in a top management position to be the primary care giver of her child. Women often find it more difficult to maintain balance on account of the competing pressures of work and demands at home. Working women have to carefully handle their personal balance and skillfully blend their roles, so as to optimise their potential in all quadrants of life.

Others: It is critical that the Nation's workforce in a climate of significant and global economic restructuring aims at attaining and maintaining a state of technological and scientific readiness that will enable it to thrive in the global economy. To achieve this all the sections of the population must be fully developed. A way of achieving this is through the building and encouraging of scientific literacy. The participation of women in science, mathematics and technology education has been and is still low around the world (Kishore, 2008; McCarthy, 2003; Ellis,2003). United Nations has recognized the role of women in the development of any country as well as the importance of understanding the ender differentiated efforts of development plan and to this end the platform of Action of he the United Nations World Conference on women (1995) noted that women's empowerment and full participation are prerequisites for the achievement of equality, development and peace. Though women are underrepresented in almost every sphere of recognized scientific participation (Macathy, 2003) there is increasing participation in the 21st century (British Council, 2001). Generally speaking, science subjects like chemistry are given masculine outlook many educationist, such that girls in Science, Mathematics and technology Education attracts attention. Fegbesan (2010) states that curricular, pedagogic practices and classroom organization hinder the access and retention of girls in science and technology education. Gender mainstream have led to advance studies and women participation in science education. The results showed that students experience some constraints in pursuing science education programs at the University level. Students indicated that some apparatus/ machinery/textbooks were either unavailable or very expensive to buy. This makes science and technology-based programs very expensive to pursue. Thus, to increase participation of females into science education programs, financial support in the form of scholarship or bursary should be given to them by the government, stakeholders or NGOs to enable them purchase apparatus, machinery and textbooks for their studies.

Method

Descriptive survey design was adopted for the study. The study was conducted in Akwa Ibom State. The population of the study comprised all science educators (teacher). Stratified Sampling technique was used to select 210 science education respondents which constituted the sample size used for the study. The instrument titled "Assessment of Women's Exploits in Science Education Questionnaire (AWESE)" was used for data collection. Face and content validation of the instrument was carried out by one expert in test, measurement and evaluation from University of Uyo to ensure that the instrument had accuracy, appropriateness and completeness. Cronbach Alpha technique was used to determine the level of the reliability of the instrument. In this case the reliability coefficient obtained was 0.89 and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as percentage analysis used in answering research questions and simple regression in testing the hypothesis. The test for significance was done at 0.05 alpha levels.

Results

Research Questions Three: The research question sought to find out the constraints faced by female science educators in execution of their duties. To answer the research question, percentage analysis was performed on the data, (see table 1).

Table 1: Percentage analysis of the constraints faced by female science educators in execution of their duties

CONSTRAINTS	FREQUENCY	PERCENTAGE
Gender differences-mathematical/biological	37	17.62
Family responsibilities	35	16.67
Women are perceived less competitive	41	19.52
Perceived lack of commitment among women	47	22.38**
Masculinity associated with creativity	28	13.33
Difficulty in finding work-life balance	22	10.48*
TOTAL	**210**	**100%**

**** The highest percentage frequency**
*** The least percentage frequency**
SOURCE: Field survey

The above table 1 presents the percentage analysis of the constraints faced by female science educators in execution of their duties. From the result of the data analysis, it was observed that the constraints tagged "perceived lack of commitment among women" 47(22.38%) was rated the greatest. This was seconded by "women are perceived less competitive" 41(19.52%). The third was "Gender differences-mathematical/biological" 37(17.62%), while "difficulty in finding work-life balance" 22(10.48%) was rated the least constraints faced by female science educators in execution of their duties.

Hypotheses Testing

Hypothesis One: The null hypothesis states that there is no significant difference in women exploit between older and younger female science educator. In order to answer the hypothesis, independent t-test analysis was performed on the data (see table 2).

TABLE 2: Independent t-test analysis of the difference in women exploit between older and younger female science educator

AGE	N	X	SD	t
OLDER	98	16.35	0.74	
				16.95*
YOUNGER	112	14.08	1.18	

***Significant at 0.05; df = 208; N = 210; critical t = 1.960**

The above table 2 indicates that the calculated t-value (16.95) was higher than the critical t-value (1.960) at 0.05 level of significance with 208 degrees of freedom. Hence, the result was significant. The result therefore means that there is significant difference in women exploit between older and younger female science educator. The result was therefore in agreement with the research findings of David, (2006) who stress that age and experience go hand in hand. Age is an asset because as the age advanced the teacher becomes experienced and he/she knows where to tap the potential of the students and how to make him understand his worth. The significance of the result caused the null hypotheses to be rejected while the alternative one was accepted.

Hypothesis Two: The null hypothesis states that there is no significant difference to determine the difference in exploit between urban and rural female science education. In order to answer the hypothesis, independent t-test analysis was performed on the data (see table 3).

TABLE 3: Independent t-test analysis of the difference in exploit between urban and rural female science education

AGE	N	X	SD	t
URBAN	105	16.29	1.17	17.57*
RURAL	105	13.99	0.64	

***Significant at 0.05; df = 208; N = 210; critical t = 1.960**

The above table 3 indicates that the calculated t-value (17.57) was higher than the critical t-value (1.960) at 0.05 level of significance with 208 degrees of freedom. Hence, the result was significant. The result therefore means that there is significant difference to determine the difference in exploit between urban and rural female science education. The result was therefore in agreement with the research findings of UNESCO (2021), acting as positive role models, female teachers are found to effectively dispel myths about innate abilities among boys and improve girls' perceptions, interest, and self-efficacy in science education. Providing men and women with correct knowledge, valuable aptitudes and good technical abilities is possible through science education which develops self-reliance and generates employment. The significance of the result caused the null hypotheses to be rejected while the alternative one was accepted.

Conclusion

The study concluded that science education has been informed by an extensive research programme into student thinking and learning in science, and in particular exploring how teachers can facilitate conceptual change towards canonical scientific thinking. Therefore, providing women and girls with equal access to education, health care, decent work, and representation in political and economic decision-making processes will fuel sustainable economies and benefit societies and humanity at large. Hence, the study reveals that there is significant difference in women exploit between older and younger female science educator. Also that there is significant difference to determine the difference in exploit between urban and rural female science education.

Recommendations

1. To increase participation of females in science education programs, financial support in the form of scholarship or bursary should be given to them by the government, stakeholders or NGOs to enable them purchase apparatus, machinery and textbooks for their studies.

2. Parents should set aside gender inequality, marginalization, and inferiority complex and encourage women in science education because of their overwhelming effect on national development.

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