
Images of Scientists: The Perceptions of Senior School Students

By

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Abstract

This study sought to know the perceptions of senior school students on who the scientists are, using descriptive survey research design. The population of the study comprised 14,135 (7,713 male and 6,422 female) students in public secondary schools in Delta State Capital Territory. The sample used in this study included 3,000 (1,500 male and 1,500 female) students. The instrument, "Perception-of-Scientists-Task" (POST), was used to collect responses from students. Simple percentage and Chi-Square statistics were used to analyze the data. The results revealed that 94.7% male and 98.7% female students believed that the scientists were men. Also, this study revealed that there was no significant different between the number of male and female students who supported that the scientists were men; there were significant differences between the number of male and female students who supported that scientists were females or both males and females. Implications and recommendations of the study were highlighted to improve teaching and learning.

The stereotypic "mad science image of scientists" has been documented through a number of studies (chambers, 1983), such as "draw-a-scientist task. Chambers' initial study of a large sample of elementary studies, found that less than 1% of the 4,807 studies drew a female scientist. In another study (Barman, 1997), out of 1504 students from 23 state, the district of Columbia and 3 additional countries, it was revealed that students still perceive scientists as white males with laboratory coats, eye glasses and facial hair. Though there was equal representation from both male in the study, only 24% of the middle school students included a female as a scientist in their drawing (Jones, Howe and Rua, 2000).

The difference in the social experiences of men and women gives them different ways of looking at life and interpreting events and hence, different standpoints. (Harding, 1986; Hartstock, 1983; Smith, 1987). This fact was used by Harding (1991) to criticize science; she asserted that men and women have different standpoints in life, yet science is developed primarily from the perspectives of one group, the male eurocentric one; women experiences have been neglected as starting points of scientific researches and as generator of evidence for or against knowledge claims. Harding (1991) further claimed that as a result of women's different life experiences, they have distinct standpoint, which can bring in different experiences and engender certain pattern of thought and understanding that is absent from science. Therefore, Science Curriculum should be gender inclusive in terms of life experiences.

Statement of the Problem

The study on images of scientists, that is who are the scientists (males or females or both), was carried out in United States of America (U.S.A), by Chambers (1983), in U.S.A. United Kingdom (U.K.), Canada and Australia by Barman (1997). In each of these studies and in most cases, scientists were regarded as males. No such study has been documented in Africa, including Nigeria. To bridge this gap, therefore, is where the interest of the researcher lies.

The problem of this study, therefore, is stated thus: what are the perceptions of senior school students on the images of scientists in Delta State Capital Territory?

Purpose of the Study

The purpose of this study is to find out the perceptions of the senior school students on who the scientists are and whether their perceptions are gender based or biased.

Research Question

What are the perceptions of senior school students on who the scientists are?

Hypotheses

Ho₁: There is no significant difference between the number of male and female senior secondary school students whose perceptions are that scientists are males.

Ho₂. There is no significant difference between the number of male and female senior school students whose perceptions are that scientists are females.

Ho₃: There is no significant difference between the number of male and female Senior School students whose perceptions are that scientists are both males and females.

Methodology

The study employed descriptive survey research design, since the researcher intended to determine the status of a given phenomenon (Perceptions of senior school

students on the images of scientists) (Kerlenger, 1979; Nworgu, 1991; Maduabum, 2004; Akuezuilo and Agu, 2002).

The population consisted 14,135 senior secondary school students in public schools in Delta State Capital Territory. Out of this population, 7,713 were boys and 6,422 were girls. A simple random sampling technique was applied in selecting a total sample of 3,000 students, where 1,500 students were boys and another 1,500 students were girls.

The instrument tagged "perception-of-scientist-talk" (POST) was used to collect data. POST is researcher's made, modified from Draw-a-Scientist-Task constructed by chambers (1983), consisting of question items eliciting from the senior secondary school students, who the scientists are. Such questions included: (i) is the scientist a man or woman? (ii) Who is likely to pass science subject at credit level, between a male and female students? (iii) Who is likely to be a better science teacher? (iv) If you are awarded scholarship, would you like to study science or science related course?, etc. POST was validated by two science education experts; one concentrated on face validity, while the other on content validity. The Kuder-Richardson -21 (K-R 21) estimate was used to ascertain the reliability index of POST which was 0.93 and was said to be reliable (Maduabum, 2004; Egbule and Okobia, 2001). The responses of students found in POST were collected for analyses.

The simple percentage statistic was used in analyzing the data in order to give answer to the research question. Besides simple percentage statistic, chi square (χ^2) was used to analyze data in order to test the hypotheses guiding this study.

Research Question One

What are the perceptions of senior school students on whom the scientists are? The answers to research question one are as found in tables and 2.

Table 1: Male Senior School students Responses on the Perception of Who the Scientists Are (N=1,500)

S/N	Subject/item	Responses		
		Favouring Male	Favouring Female	Favouring both Male & Female
1.	Who is a scientist?	1,420(94.7%)	60(4%)	20(1.3%)
2.	Who is likely to pass science at credit level between the male & female students?	1,500(100%)	0(0%)	0(0%)
3.	Who is a better science teacher between the male & female teacher?	1,490(99%)	0(0%)	10(1%)
4.	Are the worlds know scientists males or females?	1,500(100%)	0(0%)	0(0%)
5.	Who is likely to study science in the University?	1,342(89%)	100(7%)	58(4%)

Table 2: Female Senior School Students' Responses on the Perception of Who the Scientists Are (N= 1,500)

S/N	Subject / Item	Favouring male	Favouring female	Favouring Both
1.	Who is a scientist?	1,480(98.7%)	15(11%)	5(0.3%)
1,48	Who is likely to pass science at	1,489(99.3)%	1(0.1%)	10(0.6%)
9	credit level between male and female students?			
(99.				
3%)				
149	Who is a better science teacher	1,492(99.5%)\	8 (0.5%)	0.(0%)
2	between the male & female			
(99.	teacher?			
5%)				
4.	Are the world known scientists males or females?	1,500(100%)	0 (0%)	0 (0%)
5.	Who is likely to study science in the university?	1,413(99.5%)	4(0.3%)	3 (0.2%)

From tables 1 & 2, 1,420 (94.7%) male and 1,480 (98.7%) Senior School students believed that scientists are males; all the 1,500 (100%) male and 1,489 (99.5%) female Senior School students believed that only male students could pass science at credit level. 1,490 (99.3%) male Senior School students and 1,492 (99.5%) female Senior School students believed that males are better science teachers than the females; all 1,500 (100%) male and 1,500 (100%) female students believed that the world famous/known scientists are males. 1,342 (89.4%) male and 1, 493 (99.5%) female senior school students believed that males are likely to study science in the university. 20 (1.3%) of male and 5(0.3%) of female students believed that scientists

could be male or female or both. On the average, 1,450, (99.1%) male and 1,291 (87%) female students believed that scientists are males.

Test of Null Hypotheses

Ho₁: there is no significant difference between the number of male and female senior school students whose perceptions are that scientists are male.

Table 3: Chi-Square (χ^2) Test of Number of Male and Female Students Whose Perceptions Are that Scientists Are Males

Gender	Observed response (O)	Expected response (E)	X ² cal	X ² Crit	Df	P	Test
Male	1,420	1,450	1.241	3.841	1	<0.05	2. tailed
Female	1,480	1,450					

In order to test Ho₁ chi-square (χ^2) test was performed and computed as shown in table 3. The X²cal was not significant. This implied that there is no significant difference between the number of male and female students on the perception of who the scientists are; male, as well as female students still believe that scientists are males.

Ho₂: there is no significant difference between the number of male and female senior school students whose perceptions are that scientists are females.

Table 4: Chi Square (χ^2) Test of the Number of Male and Female Students Whose Perceptions Are That Scientists Are Females

Gender	Observed response (O)	Expected response (E)	X ² cal	X ² Crit	Df	P	Test
Male	60	37	27,378	3,841	1	<0.05	2,tailed
Female	15	37					

In order to test Ho₂, χ^2 test was performed and computed as shown in table 4. The χ^2 cal was significant. The implication is that significantly more male than female students believed that scientists can be females. Besides, very few female students believed that scientists are females. Ho₃: there is no significant difference between the number of male and female Senior School students whose perceptions are that scientists are both males and females.

Table 5: Chi-Square (X^2) Test of Number of Male and Female Students Whose Perceptions are that Scientists are Both Males and Females

Gender	Observed response (O)	Expected response (E)	X^2_{cal}	X^2_{crit}	Df	P	Test
Male	20	12	9.417	3.841	1	<0.05	2.tailed
Female	5	12					

In order to test H_{03} , x^2 test was performed and computed as shown in table 5. The x^2 cal was significant. The implication is that significantly more males than females believed that both males and females are scientists.

Discussion

The finding in this study indicated that more students, including females believed that scientists are males / men. This agreed with the findings of chambers (1983) in the United States of America, Barman (1997) also in the United States of America and United Kingdom and Jones, Howe and Rua (2000) also in the united state of America. Chambers (1983) in his Draw-a-scientists task, observed that out of 4,507 chemistry students, less than 1 % drew a female as a scientist; Jones, Howe & Rua (2000) adopted chambers' (1983) Draw-a-scientists task and observed that out of 1,504 middle school students used as sample in their study, only 25% included a female as a scientist in their drawing. Barman (1997) in his study found that, even though there was equal representation from both genders in the study, students still perceive scientists as white males with lab coats, eyeglasses, and facial hair.

The reasons for this finding were advanced by Harding (1986), Hartstock (1983) and Smith (1987). They asserted that the difference in the social experiences of men and women gave them (males and females) different ways of looking at life and interpreting events and hence .different stand points. Harding (1991) in another study criticised science as being gender- biased in favour of men. She opined that men and women have different standpoints in life, yet science is developed primarily from the perspectives of one group, the male eurocentric one; women experiences have been neglected as starting points of scientific researches and as generator of evidence for or against knowledge claims. Many scholars (Kelly, 1985; Rosser, 1989) of gender issues have argued that the inherent masculinity of science is the prime reason for girls perceptions that males are scientists. They suggested that science is masculine at the surface level, at the deeper epistemological level and in the nature of the knowledge that is accepted as scientific. According to Association of American University Women(AAUW)(1992), Kahle (1990) and Rosser (1989), at the surfaces level of teaching-learning milieu, men comprised the majority of those who study, teach and practice science; the examples and applications used in teaching are frequently masculine; the classroom interactions sanction male dominance as a norm; even the assessments are gender biased. Bently and Watts (1978) and Manthorpe (1982) stated that

at a deeper level, scientific thinking and knowing embody a masculine world view and so, the general perception of people is that scientists are men.

Conclusion

94.7% of male senior school students involved in this study believed that scientists are males/men. 98.7% of female senior school students indicated that scientists are males/men. Only 4% and 1% of male and female senior school students, respectively, indicated that scientists are females.

The implication is that most senior school students, males and females, still believe that scientists are males. It is, therefore, recommended that more female experiences should be included in the teaching - learning process of sciences and related subjects so that females would not regard themselves as strangers in science teaching and learning.

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