

Vol. 8 No. 2 (2016): JIPE Journal of Issues and Practice in Education

Published: 2018-04-14

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DOI: <https://doi.org/10.61538/jipe.v8i2.295>

Abstract

Different studies have shown that girls achieve at a lower level than boys, especially in the science and technology oriented subjects; there are equally differentials in enrolment patterns between males and females at various levels of educational institutions. These goes on to career choices. This paper examines the psychological basis for gender differentiation in enrolment in the sciences and related areas.

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TRENDS IN SCIENCE AND TECHNOLOGY ENROLMENT IN NIGERIA - PSYCHOLOGICAL BASIS FOR GENDER DIFFERENTIATION

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Abstract

Different studies have shown that girls achieve at a lower level than boys, especially in the science and technology oriented subjects, there are equally differentials in enrolment patterns between males and females at various levels of educational institutions. These goes on to career choices. This paper examines the psychological basis for gender differentiation in enrolment in the sciences and related areas.

Introduction

There are gender inequalities in opportunities to education, achievement orientation, success and career options. It has been argued by many that the differentials in education and career between men and women is as a result of childhood and adolescent training.

Males are encouraged to be aggressive, which they invariably exhibit in almost every facet of life, which result in their being go-getters and goal oriented in achievement and in their career, they are also encouraged to fend for themselves and to be invariably independent in thought and action. While this cannot be said to be true in the case of females.

Female are more often than not encouraged to be home-oriented, to be dependent on others and what this sort of training results to is a sort of inaction or lethargy on the part of females in education and career. For some,

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who may want to be achievement oriented and to move the education ladder, fear of success may set in because of the belief that one is not following the stereotype. The trend is not peculiar to the Nigerian environment. Berens (1972) lend credence to this. However, in view of the importance attached to gender understanding in the developed worlds and the efforts to reduce gender differentials in education and career, Lenny, (1991) said females are forging ahead in education and chosen career just as men, and the differentials between men and women are believed to be reducing. In Nigeria, adequate attention cannot be said to have been focused on gender differentials in education and professions and the understanding thereof. This notwithstanding, attempts have been made by various societies and the government to change the "traditional" views of people towards women and education.

Gender is one of the most obvious and salient of an individual's characteristics (Condry, 1985). It is one trait that influences behaviour and actions of humans in every facet of life. From childhood, every human lives with gender and its accompanied socialization, actions and reactions. Condry, (1985) argued that several studies employing a behavioural rather than a perceptual dependent variable have demonstrated that adults respond to children differently as a function of the perceived child's gender. Condry, Condry and Pogashnik (1983) reported that adults were more apt to respond quickly to crying girls than boys, encouraged more motor activity for boys than girls and react more positively to "adult" oriented dependent behaviour for boys than girls. Thus, the gender actions and reactions that children (and even adult) are used to, most times, influences their behaviour in the future. O'Leary (1977) postulated that females who do not adhere strictly to the stereotypes tend to have a greater level of achievement motivation and performance than

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others Mills (1983) further went on to report that sex typed individuals were more likely than anyone else to recall gender congruent attributes than gender-incongruent attributes

Roberts (1984) in a similar study reported that a higher level of mastery and competitiveness can be anticipated in groups of women in careers regarded as "unfeminine" while a higher level of feminine traits occur among women pursuing traditional careers. He further went on to say that as women report higher achievement levels, they tend to perceive themselves as having more instrumental traits without losing their traditional expressive traits.

Science and technology teaching was not encouraged at the rudimentary level of western education in Nigeria. This was why the need for a tertiary institution that would cater for the needs of science and technology oriented candidates and those wanting to go higher than the secondary school level was not deemed important enough until 1932. It took almost a century after the introduction of western education, before the Yaba Higher College was established in Lagos. The aims for the establishment of the institution among other aims was the need to prepare middle level manpower for the colonial departments of medicine, agriculture and works.

With the independence of Nigeria in 1960, was also the boost given to sciences. Encouragements were given to pupils to go in for the sciences, more science schools were built, more science oriented courses were also introduced. This was necessary for the nation especially with the realization that science is at the base of every technological advancement. However, this boost for the sciences did not take into cognizance, gender differentiation. Such differentiation and the need to tackle it was not made into a policy statement until 1981 when the new national policy on education was revised. In the new

policy, the need for more female enrolment in schools was not only highlighted, but equally highlighted was also the need to have a higher enrolment of females in technical and vocational schools. Females were also encouraged to have a choice of going in for the sciences, if they so desired without any form of discouragement. This paved way for a higher enrolment of girls in a subject like agriculture, which hitherto was regarded as a masculine subjects.

Though enrolment in the sciences by students is generally poor, the participation of girls can be said to be more critical. This is more so in the Northern (Nigeria) region, where the western education was late to be introduced and where people generally shy away from the sciences. Again, cultural practices prevalent in the region is a major militating factor. Further, from the secondary school level to the university, participation of girls dwindles at every level. For graduate studies, the same chart continues. Furthermore, participation of girls becomes even more critical at every subsequent level, in this so called "unfeminine" fields. For example, in the 1981/82 session, of the final year students in technical and vocational schools, in Anambra state, there were only 80 females in a population of students, that were over 800. And in some states of the federation e.g. Kano state, girls are said to shy away totally from the vocational and technical schools, or their number are very insignificant in the schools.

At the University level, 29.9 percent of females are said to go in to the education faculty, 28.9 percent into the Arts and social science, 4.2 percent to the science and administrative faculties, 1 percent, to the engineering faculties, and 9.4 percent, to the law faculties. At the graduate level, the same trend can be said to also be. A critical review of females graduating at the supposed "unfeminine" fields (at graduate level) at the university of

Ilorin, Ilorin between 1988-1991, reveal a minute female number (Mowaiye – Fagbemi, 2000).
A look at tables I and II is also quite revealing:-

Table I
Ramat Polytechnic, Maiduguri, Borno State Student Enrolment: 1985-86

S/N	PROGRAMMES	M	F	National Diploma	
				Total	%
					MF
1	Accountancy	35	7	42	16.6%
2	Banking	4	6	10	60%
3	Agricultural/Mechanization	27	-	27	0%
4	Int. Engineering Technology	18	-	18	0%
5	General Agriculture	49	1	50	2%
6	Architectural Technology	9	9	18	50%
7	Town and Regional Planning	22	-	23	0%
8	Building Technology	14	-	14	0%
9	Civil Engineer Tech	25	-	25	0%
10	Quantity Surveying	17	-	17	0%
11	Electrical/Electronics	26	1	27	0%
12	Engineering Technology	-	-	20	100%
13	Nutrition & Dietetics	-	-	20	0%
	Mech. Engineering Technology	47	-	47	0%

Source: Digest of statistics Education in Nigeria p. 67

Table II
The Polytechnic of Sokoto State, Birnin –Kebbi Student out-turn : June 1984

S/N	Programmes	M	F	MF	F
1	Marketing	-	-	-	0
2	Bus Admin. & Management	-	-	-	0
3	Accountancy	-	-	-	0
4	Purchasing & Supply	-	-	-	0
5	Building Technology	30	-	30	0
6	Quantity Surveying	28	-	28	0
7	Architectural Technology	30	-	30	0
8	Metallurgy	20	-	20	0
9	Statistics	-	-	-	0
10	Science Lab Technology	-	-	-	0
11	Land Surveying	19	-	19	0
12	Electrical Eng. Technology	49	-	49	0
13	Mechanical Eng. Technology	21	-	21	0
14	Civil Engineering Technology	31	-	31	0
15	Int. Engineering Technology	28	-	28	0
16	Agri. Mechanization	19	-	19	0

Source: Digest of Statistics of technical education in Nigeria. P.217.

In 1994, in a study conducted by the National Commission for Colleges of Education, on Students enrolment by sex in the northern colleges of Education, only 19.63% of the students were females. A breakdown of their analysis shows that less than 19% of the students were females in the school of science and Arts and Social Science. Table III says it all.

Table III

Schools	Students Enrolment By School		TOTAL
	MALE	FEMALE	
Arts & Soc. Science	916	71	987
Languages	617	187	804
Science	808	59	867
Voc. & Tech	410	385	795
Total	2551	703	3254

Source: Dealing with diversity, p.14

Equally, the situation remain the same if teaching staff of various institutions are considered. This situation is

not surprising since females cannot teach what they have not learnt. It follows that the more females embrace science and technology based subjects in schools, the higher the probability of those who would be available in the teaching of such "masculine" subject (see tables iv & v and Mowaiye Fagbemi, 2000).

Table iv

Federal Polytechnic, Ilaro Teaching Staff: 1986-87

S/N	Departments	M	F	MF	%
1	Accountancy	6	-	6	0
2	Bus Admin & Management	8	-	8	0
3	Marketing	5	-	5	0
4	Secretarial Studies	5	-	5	0
5	Food Technology	8	2	10	0
6	Science Lab Technology	21	1	22	0
7	Building Technology	10	-	10	0
8	Civil Engr. Technology	13	2	15	0
9	Electrical/Electronics Engr.	-	-	-	-
10	Mechanical Engr. Technology	17	-	17	0
11	General Studies	13	2	13	0
Total		112	8	120	

Source: Digest of Digest of Statistics on Technological Education in Nigeria p.167

Table v

Katsina Polytechnic Teaching Staff: 1985 - 86

S/No	Departments	M	F	MF	%
1	General Agriculture	6	-	6	0
2	Catering & Hotel Management	3	1	4	0
3	Electrical/Electronics	4	-	4	0
4	Engineering Technology	2	-	2	0
5	Civil Engineering Technology	4	-	4	0
6	Mechanical Engr. Technology	3	-	3	0
7	Building Technology	-	-	-	-
8	Quantity Surveying	23	-	23	0
9	Statistics & Computer Studies	-	-	-	-
10	Business Administration and Management	10	1	11	0
11	Secretarial Studies	6	1	7	0
12	Public Administration	7	2	9	0
Total		73	6	79	

Source: Digest of statistics on Technical Education in Nigeria p.125

A survey of academic staff at the University Ilorin, also observed a death of women academics in the sciences. (Mowaiye Fagbemi, 2000).

In another related research, the University of Ilorin Nigeria was used as a case study. A random sample of twenty (20) males and twenty (20) females (T - 40) based in the faculties of Arts and Social Sciences participated in the study. The sample were given questionnaires made up of 80 items relating to gender traits and characteristics and they were required to indicate how desirable the generated items were to respondents' own sex in the Nigeria Society. The questionnaire was on a seven point scale; extremely desirable (7), most desirable (6), desirable (5), not more desirable or undesirable to both males and females (4), undesirable (2) and extremely undesirable (1). Thereafter, the factor analytic procedure involving the weighting of the factors was carried out on the items. The items were generated from literature review as regards gender characteristics among Nigerians, opinions of civil servants in Kwara state as regards gender roles and review of studies on generally accepted gender roles especially the works of Sandra Bem. The average age of subjects was 18.

The percentage was used for the weighting of factors. This is an acceptable form of bringing out weight of factors and acceptable by measurement experts (Anastasi, 1976).

Results

The respondents were traditional in their views as regards gender roles. It was revealing to see males at the University level still having the traditional notions of that which is for their sex and likewise the females especially in this age, and all technological advancement. A high percentage of the males still feel that men like taking

leadership roles while just 45% of the females agree to this for their sex. Being self dependent and striving for achievement equally weighted high for males but not for females. It was interesting to find the female undergraduate not having much opinion of their own sense of judgment, or thinking of females as being not courageous, (items 18, 39 and 23) while the men felt dominant, courageous, takes risks, have quick judgment competitive and don't get easily discouraged. (items 52, 23, 29, 18, 13 and 29). The females actually simply were feminine and traditional in their response. For example, they were high on item 62 as to taking care of the body in feminine way, (80%), and being nurturant, (75%) being dependent on others (70%), being affectionate (80%), loving children and being conventional to feminine roles (95%).

Many of the male respondents felt they should be compassionate (50%), sensitive to other people's needs (50%) and understanding (50%) and that they could be helpful. In some instance, the ratio of female and male response to some items were almost at par, for example, the ratio of those who believe male and female should be tactful (items 12) and should be sensitive to other people's needs (item 19). Being warm was equally felt desirable by both sexes, so also was being sincere, being active, being calm and being trustworthy (item 37, 45, 60, and 80). The most weighted item by the females was being gentle and conventional in behaviour to feminine roles (95%) while the most weighted item for the males was taking leadership roles.

Conclusively, the results showed that the stereotype was still in vogue for the respondents, in thinking and traits, enrolment, choice of subjects and vocations. The results of the study is collaborated by a survey carried by the National Commission for Colleges of Education (2003) for as recent as 2001-2002.

Psychological Basis For Gender Differentiation

From an early age, even before children are aware of distinct differences in the sexes, assigned roles within the home and playthings given super-imposes on the mind expectations from one's sex and how "he" is different from "she" and vice-versa. He can play with mechanical toys which has the influence of opening up the scientific mind while she plays with dolls, bathing and dressing them up. A boy is allowed to help his father at repair works, the girl can only help to cook, something which does not open up the scientific mind as does mechanical repairs. While the male is encouraged to explore the environment, to be adventurous, aggressive and inquisitive, the female is dissuaded from same. If she forms any of these habits of behaviour, she is labelled Tom-boy. For fear of an unwanted label that may suggest that there is something wrong with her behaviour, the female may relapse in her adventurous spirits. Further, the nurturant training given to females and encouraged in them does not in any way, align with the science - for there is nothing nurturant about science - only inquisitiveness and exploration.

In school, the stereotype in the home follows. Different factors within the school system combine to put off the female psychologically from the sciences. Graphic design of textbooks, pictorial materials, literacy style, topics and examples of scientists of note, take on the masculine form. Characters for modeling for the female in science is rare. Excelling in the sciences raises eyebrows. Taking to it is tending towards taking the extreme of what is not given. The young girl who has a scientific flare, looks around her and rarely does she see a female science teacher. These coupled with overt comments of teachers and texts have a restrictive effect psychologically on the female. When experiences within the social milieu are imbibed, and the female makes her decision, the psychological reaction is not only that she moves far away

from enrolment in sciences she encourages other sex mates to do the same.

Females need to internalize the awareness of how their situation came to be so, to be able to proffer solutions to them. Differentials in science enrolment is not so much the effect of biological make-up as much as it is the result of social - psychological make up. Courage and tenacity to uphold one's choice has to come in for the female who wants to excel in an area like the sciences.

Parents should encourage female wards to follow their talents through, in the effort to bridge the differentials in science enrolment. Teachers need to stop all forms of gender differentials in the curriculum and teaching that could endanger maximum female participation and enrolment in the sciences. Special training programmes to facilitate maximum female participation and enrolment in the sciences should be adopted.

Research that would focus specifically on ensuring maximum participation and enrolment of females in the sciences should not only be encouraged but should be aided in every way possible.

Bridging the differentials in science enrolment and career between the sexes would also entail a general encouragement for enrolment in the sciences by both males and females, for as succinctly put by Abdullahi (1991), students generally shy away from the science fields, which is believed would give quick financial rewards like banking and finance. Such tendencies need to be tackled promptly to ensure a further higher percentage of female enrolment. If a new orientation of what it takes to succeed in a male domain is understood by females, thus leading to a greater understanding of gender relations, the females would be able to move in chosen professions, the sciences inclusive, and they would be able to gain the support of their male folks.

The differentials in education and professions between males and females is not only due to differentials in the socialization process but also to the orientation and attitude of mind of the females. Negativism such as the feeling of insecurity, body weakness and the dependency syndrome must be put off.

Conclusion- Trends in science enrolment in Nigeria have combined with other factors like societal perception of weakly females to restrict the aspiration and enrolment of females from the sciences. Differentiated motives, role concept and aspirations have been basis for the differentiation in science enrolment and career between the sexes. For gender differentials in science enrolment and career to be bridged, the psychological basis of the differentials ought to be tackled. These would entail multi-facet efforts on the part of parents, guardians, teachers and the Government.

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