

Gender Participation and Performance of Pre-Service Teachers in Physics Education Program in College of Education, Azare

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Abstract: *This study was carried out with a view to investigating the existence of gender imbalance in the participation and performance of pre-service teachers in physics education program in College of Education, Azare. Data used in the study were obtained from students' personal records, examination score sheets and final cumulative results. Simple percentage and chi-square test were used to analyze the data. Findings revealed that there exists serious gender gap in favor of male students in the participation of pre-service teachers in physics education program. However, findings also showed that the performance of pre-service teachers in physics education is independent of gender. The study concludes that, although women are underrepresented in physics education program in College of Education, Azare, both male and female students have equal chances of performing well in physics. Suggestions on how to adjust the observed gender imbalance in favor of the disadvantaged group were proffered.*

Keywords: *Gender, pre-service, underrepresented, participation, performance.*

I. Introduction

The state of science and technology in Nigeria is now a matter of great concern to all. This concern arises from the increasing realization that Nigeria cannot develop rapidly without producing adequate scientific and technological man-power. In support of this assertion, Raimi and Adeoye (2002) observed that the key to socio-economic development of a nation is its ability to generate enough scientific and technological capacity as well as its ability to absorb scientific and technological knowledge.

Physics is an indispensable tool in understanding the complexities of modern technology and myriad of other scientific development useful to mankind (Oludipe, 2003). It is an important element in the training of chemist, engineers, computer scientists as well as practitioners of other physical and biochemical sciences (Sadler and Tai (2001). According to Okoroh (2003), unless one understands the foundation of physics and links it with applied knowledge, one cannot call himself or herself a scientist in a modern society. He further observed that the applications of physics should be appreciated not only in a relatively narrow engineering technological sense, but in a sufficiently wide range to embrace all the fundamental fields of human knowledge. No wonder, in the developed countries such as the former USSR, it is considered essential to give students evidence of exploitation of the success of physics in medicine (health physics), in biology (biophysics) and in other sciences such as chemistry (Bajulaye, 2009).

Gender is a broad analytical concept which draws out women's roles and responsibilities in relation to men. However, it has been observed that the education of girls and women in Nigeria is very low compared to the education of boys and men (Umoinyang and Ekwueme, 2005). This situation is even worse in the northern part of the country. For example, in Bauchi state only 36 girls out of every 100 children attend primary school while only 20 girls out of 100 children attend primary school in Sokoto state (Muhammad, 2010).

Purpose of the study

The main purpose of this study is to compare the participation and performance of male and female students in physics education program in College of Education Azare, Bauchi State. Specifically, the study aims to explore the trend in the enrollment of male and female students into physics education program from 1998/1999 to 2008/2009 academic sessions and compare the performance of male and female students that graduated from physics education program from 2002/2003 to 2007/2008 academic sessions.

Research questions

This study intends to provide answers to the following research questions:

- What is the trend in the enrolment of both male and female students into physics education program from 1998/1999 to 2008/2009 academic?
- Is there any difference in the performance of males and females that have graduated from physics education program from 2002/2003 to 2007/2008 academic sessions? If so, to what extent?

Research Hypothesis

The following null hypothesis was formulated and tested at 0.05 level of significance:

- The performance of pre-service teachers in physics education is not independent of gender.

Design of the study

The current investigation is an ex post facto study. It is only concerned about the past records of students that graduated from the physics education program from 1998/1999 to 2008/2009 academic sessions.

Area of study

This study is restricted to performance of pre-service teachers in physics education alone.

Population

The population used in this study consists of all the pre-service teachers that enrolled and graduated from the physics education program in College of Education, Azare since the inception of the program up till 2010.

Sample and sampling technique

For convenience, the actual samples were restricted to pre-service teachers that enrolled into and graduated from physics education program between 1998/1999 to 2008/2009 academic session. This sample consists of a total of 227 pre-service physics teachers.

II. Methods of Data Collection

The data used in this study were extracted from archives of students' personal record, examination score sheets and students' final cumulative results. All these documents were obtained from School of Science Examination Office.

Method of data analysis

Data used in this research work were presented as frequency count, simple percentage, clustered bar chart and time series graph. Statistical analysis of the data was also done using chi-square test. All calculations were done with the aid of Microsoft excel.

III. Results

Table 1 shows the number of students that enrolled into physics education program from 1998/1999 to 2007/2008 academic session. As shown in the table, no female student enrolled into physics education program from 1998/1999 to 2001/2002 academic sessions. Table 1 also shows that the highest number of female students that ever enrolled into physics education program was six and this was in 2006/2007 academic session. Also in Table 1, the lowest number of male students that ever enrolled into physics education program was six (that was in 1998/1999 academic session), while the highest enrollment for male students was fifty in 2007/2008 academic session. On the overall, out of a total of 227 pre-service teachers that enrolled in physics education program within the academic sessions considered in this study, 209 students were male while 18 students were female. This corresponds to 92% male enrollment and 8% female enrollment (see Table 1).

Table 1: Students' Enrolment into Physics Education Program from 1998/1999 to 2007/2008 Academic Sessions

Academic Session	Number of Male	Number of Female	Total Number of Students
1998/1999	6(100%)	0(0%)	6 (100%)
1999/2000	8(100%)	0(0%)	8 (100%)
2000/2001	9(100%)	0(0%)	9 (100%)
2001/2002	14(100%)	0(0%)	14 (100%)
2002/2003	23(88%)	3(11.5%)	26 (100%)
2003/2004	27(93.1%)	2(6.9%)	29 (100%)
2004/2005	21(95.5%)	1(4.5%)	22 (100%)
2005/2006	14(82.4%)	3(17.6%)	17 (100%)
2006/2007	37(86%)	6(14%)	43 (100%)
2007/2008	50(94.3%)	3(5.7%)	53 (100%)
Overall enrollment	209(92.1%)	18(7.9%)	227 (100%)

In Figure 1, the proportion of male and female students that enrolled into physics education program is displayed as clustered bar charts. As shown in Figure 1, the highest proportion of female students, enrolled in 2006/2007 academic session (17.6%) while the lowest proportion of female students (0%) were found to enroll in 1998/1999, 1999/2000, 2000/2001 and 2001/200002 academic sessions. As for the male students, the highest proportion was 100% of the total number of students enrolled in 1998/1999, 1999/2000, 2000/2001 and 2001/2002 academic sessions while the lowest proportion (82.4%) was recorded in 2005/20006 session.

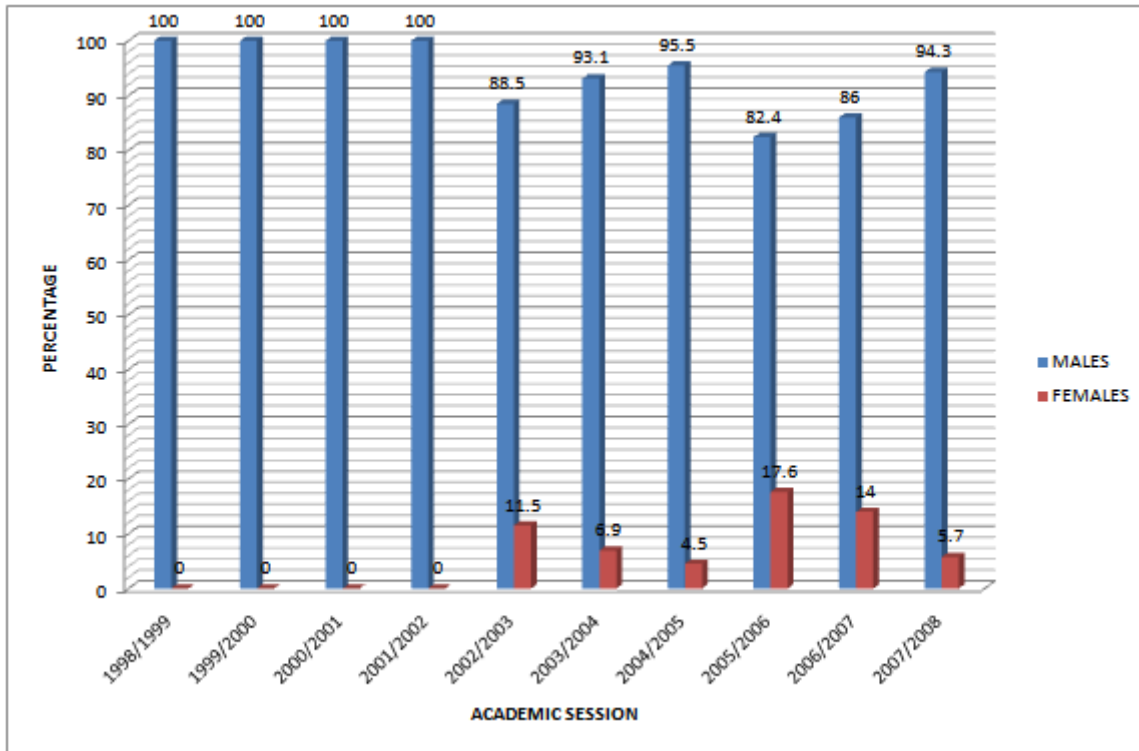


Figure 1: Bar chart showing the proportion of male and female students that enrolled for Physics from 1998/1999 to 2007/2008 academic sessions.

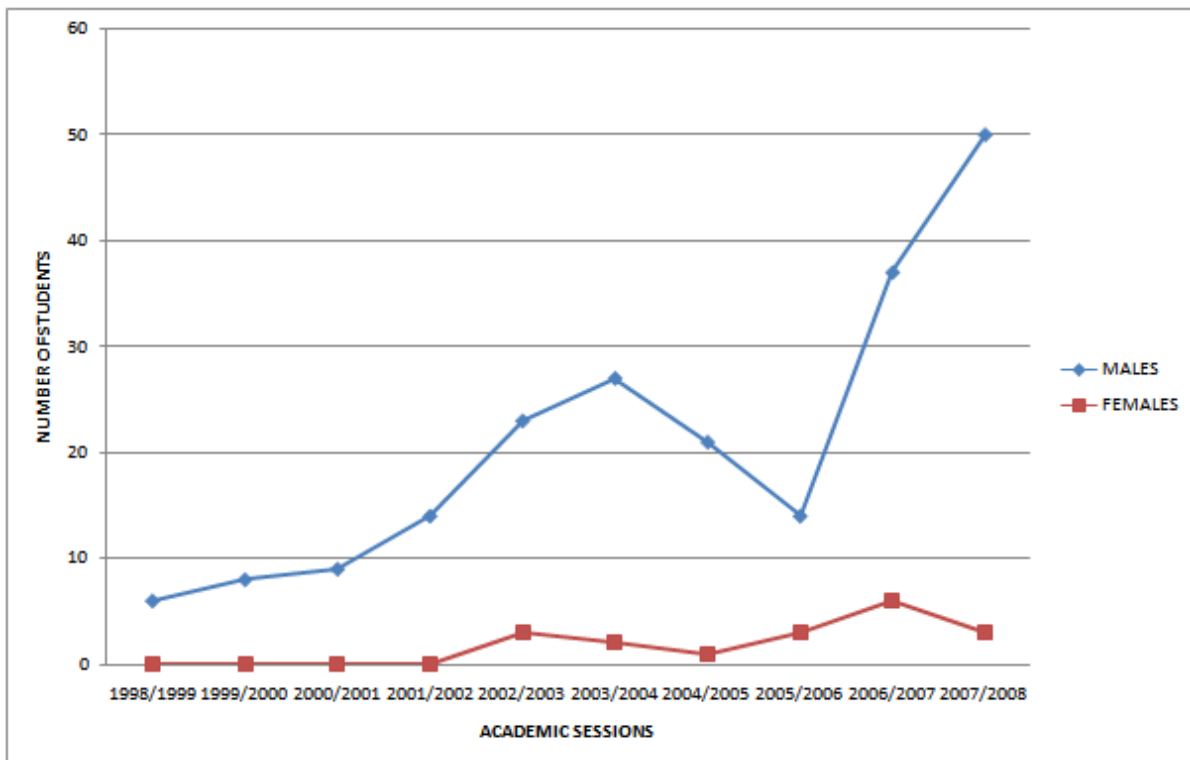


Figure 2: Time Series showing the trend in Male and Female enrollment into Physics from 1998/1999 to 2007/2008 Academic sessions.

Figure 2 is a time-series graph, showing the trend in the number of male and female students that enrolled into the physics education program from 1998/1999 academic session to 2007/2008 academic session. As shown in the Figure, there was a steady increase in the number of male students that enrolled into the physics

education program over the period of time considered in this study. The only exception to this general trend was found in 2004/2005 and 2005/2006 sessions where slight deviations from the general trend were observed. As for the female enrollment, no discernible trend was observed as there was fluctuation in the number of female students that enrolled into physics education program over the period of time considered in this study (see Fig. 2).

Table 2: Students' Performance in Physics Education Program from 2002/2003 to 2007/2008 Sessions.

	Distinctions	Credit	Merit	Pass	Lower Pass	Total
Male	6	25	36	7	1	75
Female	0	1	3	2	0	6
Total	6	26	39	9	1	81

Table 2 shows the performance of male and female students in physics education program from 2002/2003 academic session to 2007/2008 academic session. As shown in Table 2, out of the six students that graduated with distinction, six were male students while none was female students. Also in Table 2, the number of male students that graduated with credit, merit, pass and lower pass were twenty-five, thirty-six, seven and one respectively. Table 2 also shows that one, three and two female students graduated with credit, merit and pass respectively while no female students graduated with lower pass.

Table 3: Chi-Square Summary Table for Comparing the Performance of Male and Female Students in Physics Education Program

	N	df	α	χ^2 (critical)	χ^2 (Calculated)
Male	75	4	0.05	9.488	3.922
Female	6				

In Table 3, the chi-square summary table for comparing the performance of male and female students in physics education program was presented. As shown in Table 3, the null hypothesis formulated earlier in this paper is not rejected at 0.05 level of significance as the calculated value of χ^2 (3.922) is less than the critical value of χ^2 (9.488). This implies that the performance of pre-service teachers in physics education is independent of gender.

IV. Discussion

The findings obtained in this study have revealed that there was a serious gender imbalance in the number of students that enrolled into physics education program from 1998/1999 academic session to 2007/2008 academic session. These agree with previous research findings from other part of the world. For instance, in a research findings reported by Greenberg (2006), it was observed that there was a gender gap in the enrollment of students into physics courses. No significant difference was observed between the performance of male and female students in physics courses. Kost, Pollock and Finkelstein (2007) and Pinker (2005) also observed that regardless of gender, students who have similar background and skills exhibit no significant difference in performance. Any cases of gender disparity in performance reported in literatures can be attributed to difference in prior physics and mathematics knowledge by students, biased instructional techniques employed by physics teachers and biased assessment methods used by physics teachers (Greenberg, 2006, Kost, Pollock, and Finkelstein, 2007 and Kost-Smith, Pollock, and Finkelstein, 2010)

V. Findings

Findings emanating from this research work revealed that:

- ✓ While the number of male pre-service teachers that enrolled into physics education program showed a steady increase over the period of time investigated in this study, no discernible trend was observed for the enrollment of female pre-service teachers over the same period of time.
- ✓ There was a serious gender imbalance in the enrollment of male and female pre-service teachers into physics education program, with female students having less than ten percent of the total number of enrollment for the entire period of time considered in this study.

VI. Recommendations

The following recommendations have been proffered:

- Female academic staff should be recruited into physics department. The female staff will serve as role models for female students who may want to select physics as a course of study.

- Incentives in the form of scholarship and monthly stipends should be provided for female students who choose to study physics at post secondary school level.
- Regular career talk should be organized for secondary school students. In this career talk, emphasis should be placed on the vital role of physics education in the modern world.
- Physics teachers should be gender sensitive in the instructional and assessment strategies they use in their classes.

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