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Gender Differences in Academic Achievement of Students at Sana'a University

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Introduction

Women have occupied an honorable status in Islam.

In accordance with Islamic principles, women have designated rights as well as obligations. Islam has emphasized that it is an obligatory for women to educate. Unfortunately, most of the Islamic countries, including Arab countries, have retarded, so women have deprived from practicing their rights in the area of education. This situation has lasted for a long period of time.

In the era of technology and advancement in every walk of life, Arab countries including Yemen have started to realize that their development will depend on the efforts of men as well as women.

Despite of social and cultural obstacles, especially in rural areas of Yemen, women enrollment in education is noticeably increasing year after another. For instance, the female enrollment growth rate has increased from 7.93 to 15.36 in basic education through the school years 2001-2003 (The Education Survey 2002/2003).

The research for reliable data about gender differences and culture differences, as well as the analysis of the factors differences, underlying the development of these differences, has become a major concern of behavior scientists.

Gage and Berliner (1988) concluded their review of the literature in the area of gender achievement by commenting that almost without exception the studies show the girls do better on the average than boys in school achievement, "grades", particularly in elementary grades. This is true even in mathematics and science subjects. These differences narrow considerably in high school. But throughout the school years, the scholastic performance of females seems more stabled. That is, less fluctuating than that of males.

Pollard (1993) studied the gender achievement of African- American students and found that consistent with other researches, in which female students had higher achievement level than male students.

To study the relationship between gender and special class, it has been found that in accordance with surveys of 8th graders taken in 1988 (the National Educational longitudinal Study) and high school and students taken in 1980 (the High school and Beyond), social class and socioeconomic status (SEC) is the best predictor of grades and test scores. Controlling for SEC, females achieve better than males, and among lower class groups outperform their male counterparts (Wellesley, 1992 in Flanagan, 1993).

In a study conducted by Finn and Reis (1979) cited in Gage and Berliner (1988), it has been reported that in all female schools, where women do not as consistently experience the marked differences in role expectations held for males and females, women show higher performance in mathematics and science than they do in coeducational schools.

Nowell and Hedges (1998) studied the trends in gender differences in academic achievement from 1960 to 1994. They found that females have a slight advantage on average in verbal abilities and males have a slight advantage on average in mathematics. They also found that evidence from seven surveys representative of the United States twelfth grade students' population and the National Assessment of Educational Progress long-term

trend data is brought to bear on the magnitude of gender difference in achievement, the level of agreement among different indices of differences, and the stability of these differences over time. Results show that gender differences in mean and variance are small, while differences in extreme scores are often substantial. None of these differences have changed significantly since 1960, with the possible exception of mean differences in mathematics and science.

Severiens and ten Dam (1998) performed meta-analysis on 22 studies that investigate gender differences in learning Orientations. The studies used Entwistles' Approaches to Studying Inventory, and were conducted in a variety of higher education settings. The results show significant mean gender differences on the Reproduction Orientation (females score higher), Furthermore, gender differences appeared on 11 of 16 scales (e.g. relating ideas, operational learning, fear of failure, negative attitude to studying, extrinsic motivation).

Graham and Rees (1995) indicated that girls are still far outnumbering boys in examination entries for modern foreign languages at all levels.

Adedayo (1999) investigated the effect of methods of teaching on achievement in mathematics of first year National Certificate of Education students in Nigeria. He found that achievement in mathematics was not affected by gender in its own. Instead, he argued that gender and instructional method have jointly affected achievement.

In conclusion, females tend to do better on measure of verbal ability and scholastics achievement than males on tests of mathematics and spatial abilities. This does not mean, however, that we should teach females and males differently. The whole picture of such studies shows tremendous overlapping.

Objectives of the Study

This study was designed to:

- Investigate the gender differences in the academic achievement at Sana'a University and its relationship with the area of specialty (science and arts);
- Investigate the effect of gender differences in academic achievement when the instructor is Yemeni or non-Yemeni;
- Apply the statistic D (The Standard Mean Difference) that proposed by Willingham and Cole (1997) (Cited in Latham, 1998) to measure the gender differences in the academic achievement.

The Study Hypothesis

This study was designed to test the following null hypotheses:

1. There are no significant gender differences among Sana'a University students in their academic achievement.
2. There are no significant gender differences in academic achievement among Sana'a University students with respect to area of specialty.
3. There are no significant gender differences among Sana'a University students with respect to staff as Yemeni or non-Yemeni.

Sampling and Methodology

The subjects of this study were the final examination grades of the second semester of the academic year 2001-2002 and the first semester of the academic year 2002-2003 of the junior and sophomore students in the faculties of Arts, Science, and Education at Sana'a University. The purpose of selecting these two levels is that because, normally, midway students are more stable comparing to freshmen and senior students. Random courses in

the area of specialty were selected. University requirement courses were ignored because they may not reflect the real students' interests. Further, two random courses from each department were selected of which one instructed by a Yemeni member of staff and the other instructed by non-Yemeni member of staff. This is to compare the grade rating between Yemeni and non-Yemeni staff. This procedure has lead to 36 different academic courses that contained the results of 5014 male and female students (3405 males and 1609 females). The percentages of the study sample are shown in Table I. These values were calculated according to the official statistics issued by the General Administration for Planning and Statistics of Sana'a University (Annual Statistics, 2002-2003). The system of the grade rating at Sana'a University has five levels distributed as follows:

Excellent (A): 90-100

Very Good (B): 80-89

Good (C): 64.5-79

Pass (D): 50-64

Fail (E): < 50.

The total number of students in each category was counted. Then, Excellent, Very Good, Good, Pass and Fail were rescored to 4,3,2,1, and 0 respectively. The distribution of the study sample with respect to faculty, gender, and grade ratings of the students is shown in Table II.

The Statistical Package for Social Sciences SPSS was used to analyse the data and to calculate the statistic D. A significance level α was set to be 5% throughout the study.

Table I: The percentages of the study sample

Faculty	Students	Male	Female	Total
Arts	Second Year	1752	747	2499
	Third Year	1296	489	1785
	Total	3048	1236	4248
	Sample Size	1290	302	1592
	Percentage	42.3	24.4	37.2
Science	Second Year	227	159	386
	Third Year	89	63	152
	Total	316	222	538
	Sample Size	187	212	399
	Percentage	59.2	95.5	74.2
Education Arts	Second Year	1370	725	2095
	Third Year	1066	557	1623
	Total	2436	1282	3718
	Sample Size	1800	956	2756
	Percentage	73.9	74.6	74.1
Education Science	Second Year	133	143	276
	Third Year	123	118	241
	Total	256	261	517
	Sample Size	128	139	267
	Percentage	50.0	53.3	51.6

Table II: Distribution of the study data

Facu[illegible]	[illegible]	Grade Rating				
		A	B	C	D	E
Arts	Male	57	127	372	559	175
	Female	32	39	114	96	21
Science	Male	10	31	49	61	36
	Female	7	57	69	56	23
Education Arts	Male	86	237	535	694	248
	Female	69	185	345	276	81
Education Science	Male	3	11	36	49	29
	Female	11	13	55	42	18
With non-Yemeni staff	Male	112	223	497	713	289
	Female	85	162	275	251	64
With Yemeni staff	Male	44	183	495	650	199
	Female	34	132	308	219	79
Total	Male	156	406	992	1363	488
	Female	119	294	583	470	143

ANALYSIS, RESULTS AND DISCUSSION

To ease comparability between male/female academic achievement, Willingham and Cole (1997) (cited in Latham 1998), have defined a new statistical tool called Statistic D (Standard Mean Difference). It is the mean score of female minus the mean score of male divided by the average standard deviation. Mathematically, this definition can be written as:

$$D = \frac{\bar{X}_f - \bar{X}_m}{S}$$

Where:

$\bar{X}_f$ and $\bar{X}_m$ are the mean score of females and males.i.e. :

$$\bar{X}_f = \frac{\sum_{i=1}^{n} f x_i}{n}, \bar{X}_m = \frac{\sum_{i=1}^{m} f x_i}{m}$$

n, m and f are the total number of females, total number of males and frequency of occurrence respectively. Further, S is the average standard deviation, i.e.:

$$S = \frac{S_f + S_m}{2}$$

Where:

$$S_f = \sqrt{\frac{\sum_{i=1}^{n} f_i (X_f - \bar{X}_f)^2}{n-1}}, \quad S_m = \sqrt{\frac{\sum_{i=1}^{m} f_i (X_m - \bar{X}_m)^2}{m-1}}$$

A positive D indicates that females have a higher average score, a negative D indicates males have a higher score, and a D of zero indicates no difference by gender. In general, an absolute value of D less than 0.2 indicates an insignificantly small difference (if any), 0.2 to 0.5 is considered small, 0.5 to 0.8 is considered medium sized, and anything more than 0.8 is large (Latham, 1998).

The standard mean difference on the academic achievement for Arts student was $D_a = -0.4$ which is in favor of male students. This gender difference is

considered small. On the other hand D for Science students was 0.27, D_{ea} for Education Arts students was 0.37 and D_{es} for education science students was 0.3. These positive D's are in the favor of female students and are considered significantly small. The overall gender difference D_{all} was 0.33, which indicate that female students achieve slightly better than male students.

When the nationality of the staff is considered D_n for non-Yemeni was 0.37 compared to D_y for Yemeni staff was 0.27. This means that female students received (earned) slight better grades from the non-Yemeni staff. Thus, generally, with exception of D_a, female students performance was slightly better than male students in the academic contest at Sana'a University.

To examine any possible interactions between areas of study, general achievement, rating with Yemeni staff, rating with non-Yemeni staff and gender, chi-square analysis was used. Table III shows that there is relationship between gender and area of study, general achievement, rating with Yemeni staff and rating with non-Yemeni staff which means that male and female students are achieving academically different at Sana'a University.

Table III: Chi-square statistical analysis results

Faculty	χ^2-Value	P-Value
Arts	41.898	0.000
Science	13.164	0.010
Education Arts	61.983	0.000
Education Science	11.384	0.023
With non-Yemeni staff	81.198	0.000
With Yemeni staff	52.255	0.000
Total	125.579	0.000

CONCLUSION

In conclusion, the standard mean difference on the academic achievement indicated that male students achieved slightly better than female students at the Faculty of Arts. However, the academic achievement of female students was slightly better than male students at the Faculties of Science, Education Arts and Education Science at Sana'a University. This study also revealed that both Yemeni and non-Yemeni staff gave female students slightly better grades than male student, but non-Yemeni staff tended to give female students slightly better grades than Yemeni staff did. The chi-square statistical analysis results revealed that male and female students academically achieve differently at Sana'a University. Finally, as the gender differences on the academic achievement are practically clear through this study, further research is needed to answer why?.

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Abstract

Gender differences on the academic achievement was assessed through rescoring and analysing a random sample of the final examination results of 5014 male and female students at Sana'a University, Yemen. The sample was for students from three faculties, namely Arts, Science and Education. The results were to 36 random samples of the academic courses from the second semester of the academic year 2001-2002 and the first semester of the academic year 2002-2003. The percentages of females were 18.97%, 53.1% and 36.4% in the Arts, Science and Education respectively. The students' sample of Education has been separated into Education Arts and Education Science. The percentages of males were 65.3% and 47.9% in Education Arts and Education Science respectively. The standard mean differences on the academic achievement in Science, Education Arts and Education Science were in the favor of female students while the standard mean difference in Arts was in the favor of male students. All other statistics are indicating that female students are academically performing slightly better than males students at Sana'a University, Yemen.