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MARKS COMPARISON: A COMPARATIVE STUDY OF MARKS DISTRIBUTION OF STUDENT OF MATRICULATION IN MULTAN DISTRICT

Abstract

There is an important consideration that males and females have some psychological differences. They differ in their thinking, communication and behavior. So, these differences must have marked themselves in an academic point of view. The purpose of this study was to compare the academic performances among the male and female students. This study utilized the gender-wise marks and the divisions of the passed students who had appeared in the annual matriculation examination 2014 under the Board of Intermediate & Secondary Education (BISE), Multan. We are also concerned with finding the probabilities of passing academic divisions for the students and the association between the gender and the academic performances. Equality of the means of the marks was also tested in this study. The study revealed that the mean marks were significantly different for boys and girls at matriculation level and the girls seem to perform academically better than boys.

Keywords: Academic divisions, Marks comparison, Marks distribution, Ordinary logistic regression.

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Introduction

There is a growing acknowledgment that there are psychological differences between males and females that affect the way that males and females think, communicate, and behave. These differences marked themselves in different aspects e.g., at playgrounds, schools, home, and workplace etc. In the recent years, however, it has been indicated that while both males and females have upgraded their performances, females are attaining higher marks than their counterparts. There was significant evidence for females obtaining higher grade point average (GPA) than the males and achieving more school and post-school qualification Females overtake males in examinations at all levels and in almost all subjects (Jabor et al. 2012).

Regarding the comparison of males and females in an academic background, a lot of work has can be found in the available literature. For instance, Haley et al. (2007) reported a significant effect of gender among the performance of students while considering a course in introductory business statistics. Rudasill et al. (2009) described the role of gender in grade scoring. Farooq et al. (2011) concluded that socioeconomic status (SES) and parent's education, in addition to gender of student, have a significant effect on student's overall academic achievement. Sahranavard and Hassan (2013) compared male and female science students and, however, found no significant difference between their performances. Recently, Voyer et al. (2014) described the gender differences in scholastic achievements through meta-analysis.

Many studies, in Pakistan, aimed at gender differences at school level, like Iqbal et al. (2010) and few mentioned above. However, no gender comparison has not been made yet for the students of matriculation level in Pakistan. Our concern regarding to this paper is to compare the academic performance of male and female students appearing in their matriculation examination, taking BISE Multan as case study. We are also interested in the proportion of passing divisions gender wise.

Methodology

Our data set consists of sample of 5,225 candidates, including 2,630 males and 2,595 females, who have passed their matriculation annual examination in 2014 under BISE, Multan. The sample was taken from 52,247 candidates, passing their matriculation, available in the copy of the result gazette.

In this paper, different descriptive measures were computed while histogram and Box-Whisker plot were used for graphical presentation. The two-sample t-test was used to compare the mean marks between male and female students. The ordinal logistic regression (OLR) is used to find the gender-wise probabilities of passing divisions. Furthermore, usual proportion test was used to compare probabilities of passing in different divisions of male and female students. For the said analyses, SPSS 21, Minitab 16, Statgraphics 16.1 and Stata 12 were used.

Results

Figure 1 shows the histogram for the marks at matriculation level of male and female students. On the other hand, Figure 2 shows the Box-Whisker plot of the marks where plus (+) sign shows the sample means. These figures show the positive skewed shape of the distribution of marks of male and



Figure 2: Box and Whisker plot

female students. The distribution of marks, obtained by male students, is highly positive skewed than the distribution of marks, scored by female students.

Table 1 shows the comparison of mean marks of the passing students at matriculation level. For this purpose, the t-test is used. The results show that there is significant difference between marks, obtained by male and female students. The female students seem to perform better than their male counter parts and average lead made by female students is about 26 marks.

Gender	Mean	S.E	t- statistic	p-value
Male	665.95	137.41	7.016	<0.01
Female	692.28	133.79	7.016	

Table 1: Comparing the mean marks

The OLR model used here is defined as:

$$\pi^{(j)} = P(y \le j) = \frac{1}{1 + e^{-(\alpha^{(j)} - \beta X)}}; j = 1, 2, 3, \dots, \text{ (number of total)}$$

categories)-1.

Where y shows the response variable, with three ordered categories which are, first, second and third division. π_j is probability of obtaining jth passing divisions. $\alpha^{(j)}$ is the jth intercept used for finding the probability of jth division. β is the slop of the model which remain constant for each j. X is the gender codded as 1 for male and 0 for female.

Table 2 shows the results of OLR where response is the passing divisions codded as 1 for 1st division, 2 for 2nd divisions and 3 for 3rd division. Gender is used as predictor in the OLR model. From Table 2 it can be seen that the value of two constants are estimated intercepts for the logits of the cumulative probabilities of 1st division, and for 2nd division, respectively.

Because of the cumulative probability for the 3rd division is 1, so there is no need to estimate its coefficient. The Wald test shows the significance of the estimated coefficients. The Wald test is more efficient when sample size is small and for larger sample size all the classical parametric test statistics are asymptotically equivalent (Buse 1991).

Predictor	Coefficient	SE. Coefficient	Wald	p-value
Constant	-0.1862	0.0388	23.0400	< 0.01
Constant	2.4980	0.0613	1660.5625	< 0.01
Gender	0.3949	0.0542	53.1441	< 0.01

Table 2: OLR estimates and summary

Table 3 shows the events probabilities of passing divisions for both, boys and girls, calculated using the OLR. Let " G_1 " denotes a boy and " G_2 " denotes a girl. Let D_i shows the *i*th division, where *i*=1, 2, 3. Then $P_r(D_i \cap G_1)$ is the probability of male students towards *ith* divisions shows that, there are approximately 55% males attaining the 1st division, 40% having 2^{nd} division and 5% having tendency for 3^{rd} division, where \sum $P_r(D_i/G_1)=1$. Similarly, $P_r(D_i/G_2)$ is the probability of female students towards *ith* divisions shows that. there are approximately 45% females attaining the 1st division, 47% having 2^{nd} division and 8% having tendency for 3^{rd} division, where \sum $P_r(D_i \cap G_2) = 1.$

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Gender	Divisions				
	1^{st}	2 nd	3rd		
Boy	0.55	0.40	0.05		
Girl	0.45	0.47	0.08		

Table 3: Probabilities of obtaining divisions

By using proportion test in Table 4, it is concluded that the proportions of male and female students towards divisions are significantly disfferent. $P_r(D_i)$, where *i*=1,2,3 are also shown in

Table 4 which is 50.35% for D_1 , 43.25% and 6.4% for D_2 and D_3 respectively. The joint probability for total sample is $P_r(D_i \cap G_j)$, where *i*=1,2,3 and j=1,2 and $\sum P_r(D_i \cap G_j)=1$, are also shown in Table 4.

	Gender			
	Male (%)	Female (%)	Total (%)	p-value
Division 1 st	1446(55*)	1184(45*)	2630	< 0.001
-	(27.675)***	(22.660)***	(50.35)**	
Division 2nd	1058(47*)	1202(53*)	2260	0.0030
2	(20.249)***	(23.005)***	(43.25)**	
Division 3rd	126(38*)	209(62*)	335	< 0.001
0	(2.411)***	(4.000)***	(6.4)**	
Total	2630	2595	5225	

Table 4: Proportion test of gender with respect to passing divisions

*shows the proportion of gender for division; **shows the probability of division;

***shows the joint probability

Conclusion

The distributions of the marks obtained by both male and female students are positive skewed but the distribution for the marks of male student is highly skewed the female students.

The average marks at matriculation level for male and female students are not equal. Female students have higher mean marks than that of male students. Gender plays an important role in explaining the variability of passing divisions. Tendency of male students towards 1st division is more dominant as compared to that of female students, but female students are more dominant towards 2nd and 3rd division as compared to the male students. In other words, the girls who are getting 1st divisions are less in

counting as compared to boys but these girls show better academic performance than the boys on the basis on higher average marks.

Probability of obtaining a 1st division is the highest as compare to other divisions, and the probability of obtaining 3rd division is very low. Probability of the event that, a boy is getting 1st division, is the highest among all the others. And the probability of the event that, a boy is getting 3rd division, is least among all the others.

Recommendation

However, gender is highly significant factor for obtaining an academic division at matriculation level and gender plays an important role in explaining the academic performances but a better performance can be expected from both boys and girls by utilizing some control-able factors in this regard such as the same quality of education and a well-defined environment for study etc. These factors can be helpful in the future frame work.

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