Chapter 4.
Analysis and Interpretation

4. Analysis and Interpretation

For the analysis, the data was categorized based on the 3 variables, namely:

- Experience level of the teacher- below and above 5 years
- Gender of the teacher- Male or Female
- Nature of the school the teacher is working in- Private or Government.

Thereafter, the teacher effectiveness score of every teacher was cumulated and a mean score was calculated for each of the above-mentioned categories. The data was analysed based on the differences in the mean of the 3 series curated based on the above-mentioned variables.

Statistical software E-views was used to calculate test for equality because we wished to study the difference in the mean score of effectiveness based on the years of experience, gender, and the nature of the school the teacher works in. An equality hypothesis test tests if two or more population means are different. The null hypothesis states that the difference between the means of the populations is equal to a hypothesized value (0 indicating no difference), against the alternative hypothesis that it is not equal to (or less than, or greater than) the hypothesized value. When the test p-value is small, we reject the null hypothesis and conclude that the populations differ in means.
And then t score values are calculated to check whether the difference in the mean scores is significant or not.

4.1 To capture the difference in teacher effectiveness based on gender.

Hypothesis: There exists no significant difference between the effectiveness levels of male and female secondary school teachers.

$$H_{0:} \mu_m = \mu_f$$

$$H_{1:} \mu_m \neq \mu_f$$

Where μ_m is the mean score of the male teachers and,

μ_f is the mean score of the female teachers

We began our analysis by first looking into the descriptive statistics of our series of male and female secondary school teachers, respectively. The charts given below shows the results of the descriptive statistics generated in the E-Views software:

Series: MALE	
Sample 1 42	
Observations 38	
Mean	514.0000
Median	511.5000
Maximum	569.0000
Minimum	450.0000
Std. Dev.	29.15847
Skewness	-0.342267
Kurtosis	2.951251
Jarque-Bera	0.745693
Probability	0.688771
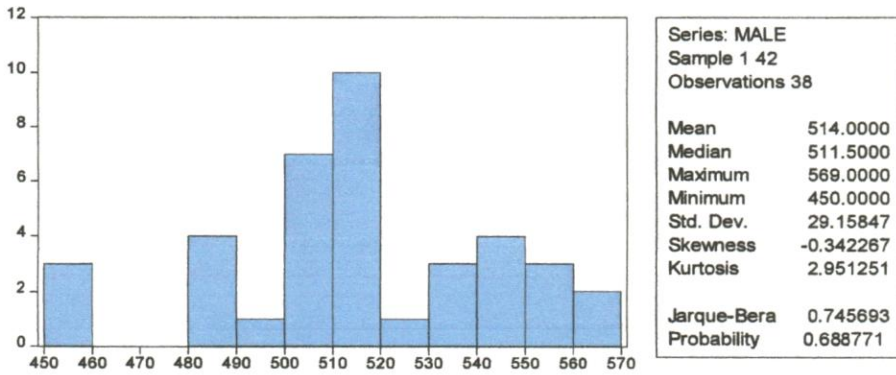
Figure 2Descriptive Statistics of Female Teachers
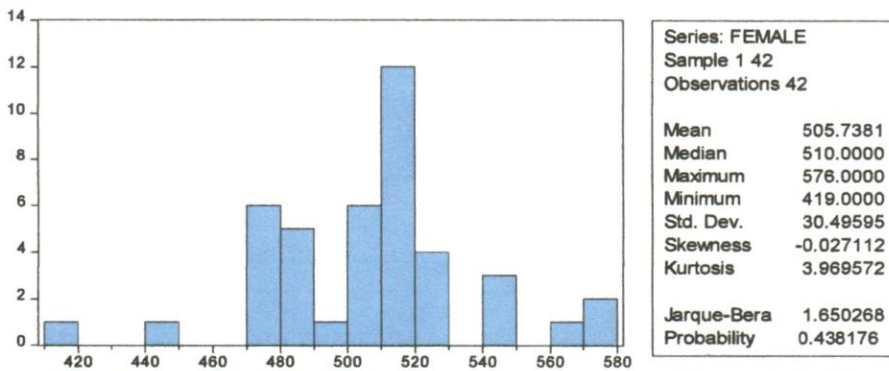
Series: FEMALE	
Sample 1 42	
Observations 42	
Mean	505.7381
Median	510.0000
Maximum	576.0000
Minimum	419.0000
Std. Dev.	30.49595
Skewness	-0.027112
Kurtosis	3.969572
Jarque-Bera	1.650268
Probability	0.438176

Source: Compiled by the researcher based on Primary data

The above table shows that the mean and standard deviation of teacher effectiveness levels of male secondary school teachers are 514 and 29.15 respectively. Similarly, the mean and standard deviation of teacher effectiveness of female secondary school teachers are 505.7and 30.49 respectively. Moreover, the data is normally distributed as the probability value of the Jarque-Bera statistics of both the series of male and female teachers is greater than 0.05, thereby rejecting the null hypothesis of not normally distributed. The data shows the mean score of male teachers based on the effectiveness was higher than the mean score of the female teachers. To test our hypothesis we look at the results obtained from the test of equality of mean. The results are as follows:

Figure 3: Results for the test of equality of mean

Test for Equality of Means Between Series
Date: 05/09/21   Time: 20:16
Sample: 1 42
Included observations: 42

Method	df	Value	Probability
t-test	78	1.235468	0.2204
Satterthwaite-Welch t-test*	77.75136	1.238275	0.2193
Anova F-test	(1, 78)	1.526380	0.2204
Welch F-test*	(1, 77.7514)	1.533325	0.2193

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	1	1361.768	1361.768
Within	78	69588.12	892.1554
Total	79	70949.89	898.0998

Category Statistics

Variable	Count	Mean	Std. Dev.	Std. Err. of Mean
MALE	38	514.0000	29.15847	4.730128
FEMALE	42	505.7381	30.49595	4.705627
All	80	509.6625	29.96831	3.350559

The calculated t-value is 1.235 and its corresponding probability value is 0.2204. By comparing the probability value with the level of significance value of 0.05, we will have to accept the null hypothesis since the corresponding probability value was much higher than the level of significance. This shows that our hypothesis that there exists no significant difference between the effectiveness levels of male and female secondary school teachers is true and gender has no role to play in the effectiveness levels of teachers.

4.2 To capture the difference in teacher effectiveness based on the years of experience:

Hypothesis: There exists no significant difference between the effectiveness among teachers with respect to their years of experience.

$$H_0: \mu_{>5} = \mu_{<5}$$

$$H_1: \mu_{>5} \neq \mu_{<5}$$

Where $\mu_{>5}$ is the mean score of the school teachers with more than five years of experience and,

$\mu_{<5}$ is the mean score of the school teachers with less than five years of experience

We began our analysis by first looking into the descriptive statistics of our series of teachers having more than five years of teaching experience and teachers having less than

five years of teaching experience. The charts given below shows the results of the descriptive statistics generated in the E-Views software

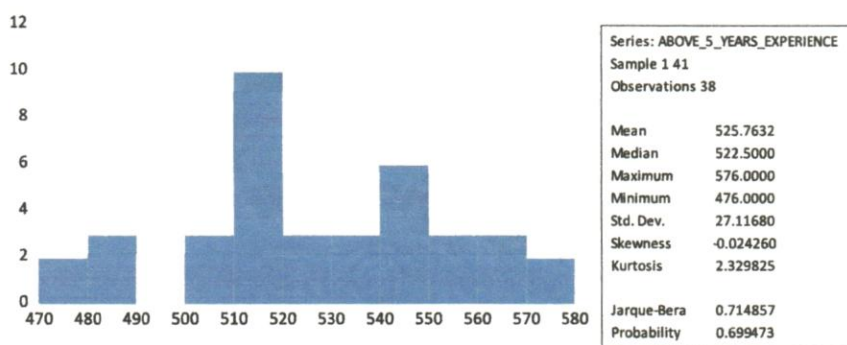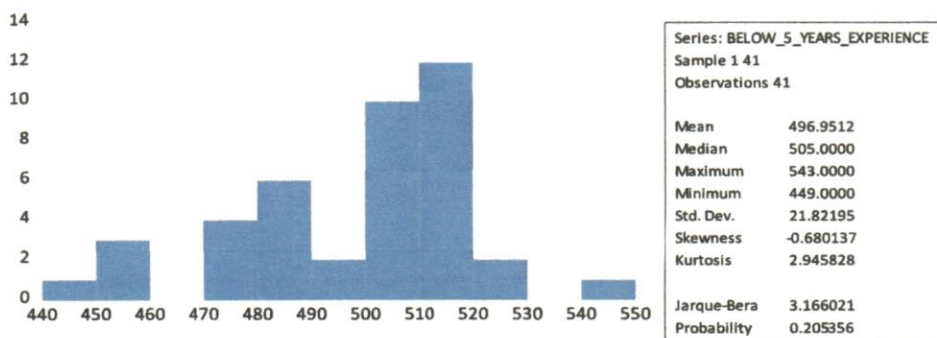Figure4: Descriptive Stats for >5years experience

Series: ABOVE_5_YEARS_EXPERIENCE		
Sample 1 41		
Observations 38		
Mean	525.7632	
Median	522.5000	
Maximum	576.0000	
Minimum	476.0000	
Std. Dev.	27.11680	
Skewness	-0.024260	
Kurtosis	2.329825	
Jarque-Bera	0.714857	
Probability	0.699473	

Figure 5: Descriptive Stats for< 5years Experience

Series: BELOW_5_YEARS_EXPERIENCE		
Sample 1 41		
Observations 41		
Mean	496.9512	
Median	505.0000	
Maximum	543.0000	
Minimum	449.0000	
Std. Dev.	21.82195	
Skewness	-0.680137	
Kurtosis	2.945828	
Jarque-Bera	3.166021	
Probability	0.205356	

Source: Compiled by the researcher based on Primary data

The above table shows that the mean and standard deviation of teacher effectiveness levels of secondary school teachers with than 5 years of teaching experience are 495.09 and 21.82. Similarly, the mean and standard deviation of teacher effectiveness levels of secondary school teachers with more than 5 years of teaching experience are 525.76 and 27.11. Moreover, the data is normally distributed as the probability value of the Jarque-Bera statistics of both the series of teachers above and below five years of experience is greater than 0.05, thereby rejecting the null hypothesis of not being normally distributed. The data shows the mean score of teachers with more than five years of experience based on the effectiveness was lesser than the mean score of the teachers with less than five years of experience. To test the validity of the above statement, we undertook a test of equality of means between series. The results are as follows:

Figure 6: Results for the test of equality of mean

Test for Equality of Means Between Series
Date: 07/14/21   Time: 15:24
Sample: 1 41
Included observations: 41

Method	df	Value	Probability
t-test	77	-5.220472	0.0000
Satterthwaite-Welch t-test*	71.06427	-5.177690	0.0000
Anova F-test	(1, 77)	27.25333	0.0000
Welch F-test*	(1, 71.0643)	26.80848	0.0000

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	1	16371.38	16371.38
Within	77	46254.77	600.7113
Total	78	62626.15	802.8994

Category Statistics

Variable	Count	Mean	Std. Dev.	Std. Err. of Mean
ABOVE_5_...	41	496.9512	21.82195	3.408016
BELOW_5...	38	525.7632	27.11680	4.398926
All	79	510.8101	28.33548	3.187990

The calculated t-value is -5.22 and its corresponding probability value is 0.000. By comparing the probability value with the level of significance value of 0.05, we will have to reject the null hypothesis since the corresponding probability value less than the level of significance. We can say that there is significant difference of mean score between the teachers having above and below five years of experience. Hence, experience of teaching as factor can significantly impact the effectiveness of a teacher.

4.3 To capture *the difference in* teacher effectiveness based on the nature of school the teacher teaches in :

Hypothesis: There exists no significant difference between the effectiveness levels of secondary school teachers in government and private schools.

$$H_0: \mu_g = \mu_p$$

$$H_1: \mu_g \neq \mu_p$$

Where μ_g is the mean score of the government school teachers and,

μ_p is the mean score of the private school teachers.

We began our analysis by first looking into the descriptive statistics of our series of teachers teaching in a Government School and the series of teachers teaching in a Private school. The charts given below shows the results of the descriptive statistics generated in the E-Views software
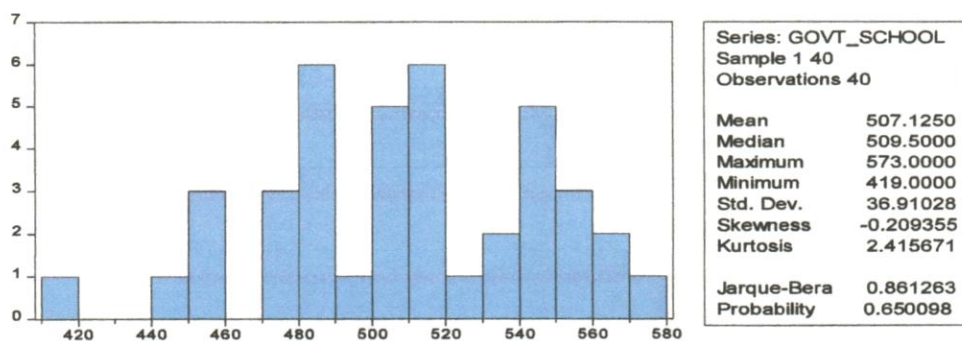
Figure6: Descriptive Stats for teachers of Govt school

Series: GOVT_SCHOOL	
Sample 1 40	
Observations 40	
Mean	507.1250
Median	509.5000
Maximum	573.0000
Minimum	419.0000
Std. Dev.	36.91028
Skewness	-0.209355
Kurtosis	2.415671
Jarque-Bera	0.861263
Probability	0.650098

Figure 7: Descriptive Stats for teachers of Pvt school
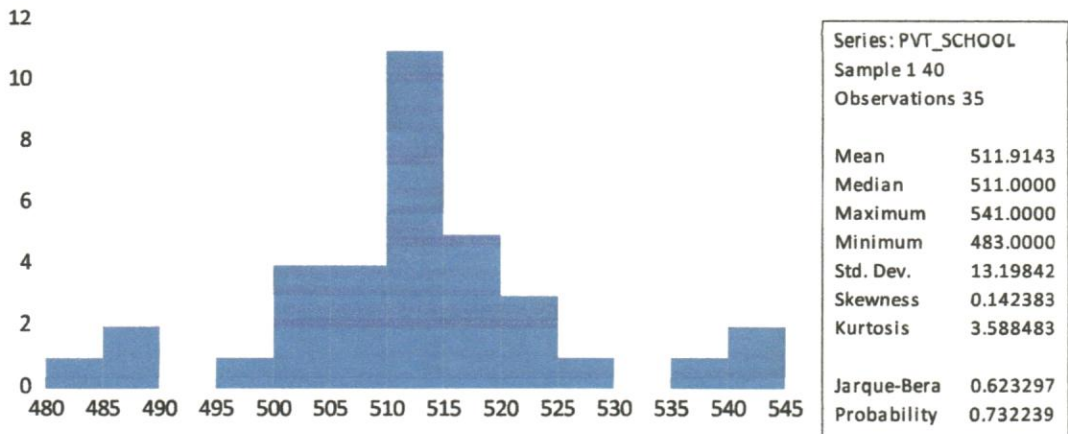
			Series: PVT_SCHOOL
			Sample 1 40
			Observations 35
			Mean 511.9143
			Median 511.0000
			Maximum 541.0000
			Minimum 483.0000
			Std. Dev. 13.19842
			Skewness 0.142383
			Kurtosis 3.588483
			Jarque-Bera 0.623297
			Probability 0.732239

Source: Compiled by the researcher based on Primary data

The above table shows that the mean and standard deviation of teacher effectiveness levels of secondary school teachers teaching in government schools are 507.12 and 36.91. Similarly, the mean and standard deviation of teacher effectiveness levels of secondary school teachers teaching in private schools are 512.2 and 21.06. Moreover, the data is normally distributed as the probability value of the Jarque-Bera statistics of both the series of Government and private school teachers is greater than 0.05, thereby rejecting the null hypothesis of not normally distributedThe data shows that the mean score of the teachers of the private school is greater than the mean score of the government school teachers. To test the validity of the above statement, we undertook a test of equality of means between series. The results are as follows:

Figure 8: Results for the test of equality of mean

Test for Equality of Means Between Series

Date: 07/11/21 Time: 15:59
Sample: 1 40
Included observations: 40

Method	df	Value	Probability
t-test	73	-0.727506	0.4692
Satterthwaite-Welch t-test*	50.00613	-0.766543	0.4470
Anova F-test	(1, 73)	0.529265	0.4692
Welch F-test*	(1, 50.0061)	0.587588	0.4470

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	1	428.1621	428.1621
Within	73	59055.12	808.9742
Total	74	59483.28	803.8281

Category Statistics

Variable	Count	Mean	Std. Dev.	Std. Err. of Mean
GOVT_SC...	40	507.1250	36.91028	5.836027
PVT_SCH...	35	511.9143	13.19842	2.230940
All	75	509.3600	28.35186	3.273791

The calculated t-value is -0.727 and its corresponding probability value is 0.469. By comparing the probability value with the level of significance value of 0.05, we will have to accept the null hypothesis since the corresponding probability value was much higher than the level of significance. We can say that there is no significant difference between the mean score of government and private school teachers. Hence, nature of school as factor does not significantly impact the effectiveness of a teacher.