Comparative Study of T-test and ANCOVA in Research

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Abstract:

To examine the effectiveness of yoga on the students of subjects English, the experiment was performed to the students from the class 9th, eleven classes three classes randomly selected and randomly 10 Boys and 10 girls from each class total 60 students. Those 60 students were known as the Experimental Group. The same way 60 students from the same class were selected as the controlled group. The students of the Experimental group were made to do yoga for 38 minutes up to 35 days. Then Both groups were tested by giving them the same question paper of subject English and graded them. After the calculation through ANCOVA, the researcher came to the conclusion that the Average grade of the experimental group is more effective than that of the controlled group. It Shows that yoga has proved effective in the field of Academic achievement of the students. The student could learn better after leaning YOGA. There is significant difference in average grade among the boys and girls of the controlled group. The Average of the Boys group is higher than that of the Girls group. It shows that the Boys of the controlled group learnt English better than the Girls. There is no significant difference in average grade among the boys and girls of the experimental group. It shows that the Boys and Girls of the experimental group learnt English equally.

After the calculation through t-test, the researcher came to the conclusion that the Average grades of the experimental group and controlled group have no significant difference. So we can say that the students of Experimental Group and Controlled Group taught equally. So it is proved that the programme of 'YOGA' is not effective. There is no significant difference in average grade among the boys and girls of the experimental group and controlled group. So we can say that the Boys and the Girls of Experimental Group and Controlled Group learnt English equally.

Keywords: *Yoga, Educational Achievement, Effectiveness, ANCOVA, t-test.*

Introduction

Research is scientific method so we can discuss of result according to all the aspects of work. Research mostly gets in form of statistical. This form of statistic is unknown but at the and of research information can not find answer. We should use such methods like statistical and comparative to make research meaningful.

Mainly methods are two.
  1. Descriptive statistical method 2. Imagination statistical method

By the method of imagination information is available from classification and interpretation base on image of universe values. The researcher declared the aims by student's test and classification and

interpretation with help of research purpose. In research classification and result of study are very important. Information of research is used to explain by statistic method. Classification of information is basic work. For that selection of proper method can be used to calculate according to statistical formula and interpretation such a right way. Meaningful interpretation provides real result moreover proper suggestion and guidance can be given. If we do not classified properly, we don't get meaningful interpretation of research it is mention in this research.

Statement of the Problem
Comparative Study of T-test and ANCOVA in Research

Objectives
The major objectives of the study were following.
1. To check the effectiveness of YOGA on Educational Achievement in English in standard IX.
2. To check the effectiveness of YOGA by T-test.
3. To check the effectiveness of YOGA by ANCOVA.
4. To compare the achievement of student of experimental and controlled group who get the YOGA education and don't get in the reference of educational achievement in English subject.
5. To compare of educational achievement in English of boys and girls of standard IX.

Hypothesis
The Hypothesis of the study is following.

Ho$_1$: There is no significant difference between the mean score of academic achievement in subject of English between controlled group and experimental group of standard IX.

Ho$_2$: There is no significant difference between the mean score of academic achievement in subject of English between boys and girls of controlled group of standard IX.

Ho$_3$: There is no significant difference between the mean score of academic achievement in subject of English between boys and girls of experimental class of standard IX.

Sample
In research 20 + 20 + 20 = 60 Students from three different classes of standard IX of P.P.Savani Vidyabhavan, Surat were randomly selected, that were known as experimental group, Same other students of those classes were known as controlled group.

Methodology
In this research, three classes of the P.P.Savani Vidyabhavan were selected. Twenty students from each class (total 60) were given education after teaching them YOGA (Pranayam, Yogasans, Aumkar Nad, Dhyan-meditation). The other students of the same class were given education without teaching YOGA. Test was taken of the all students with same question – paper of English. Achieved scores were taken from English and an Arithmetical skilfull scheme was applied on them.

Group	Number of Students
Experimental	60
Controlled	60

Data Analysis and interpretation
Each group of standard VIII, got the score in English in annual exam, were taken as score of pre test and the score of English of standard 9 were taken as the score of post test and examined the justification of average difference with ANCOVA.
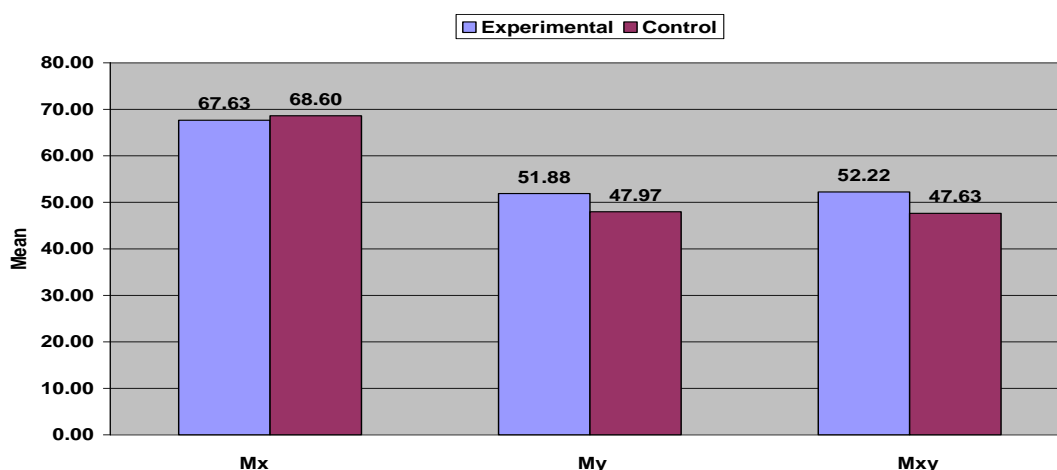
Hypothesis –1
There is no significant difference between the mean score of academic achievement in subject of English between controlled group and experimental class of standard IX.

Table 1: ANCOVA of Post test achievement scores of English Student of std. IX in both experimenatal and controlled group by eliminating effect of Post – test achievement scores

Source of Variance	Sum of Square	Df	Mean sum of Square	F-Value	Table F Value	Level of Significant
SV	SS	Df	MSS	F	TV	LS
BV	631.36	1	631.36	6.27	F.05=3.92	
WV	11881.92	118	100.69		F.01=6.86	0.05
TOTAL	12513.28	119				

ANCOVA shows that the experimental and controlled group differ significantly in the post test achievement scores after eliminating the effect due to their initial pre test achievement scores (F=6.27, LS<0.05). The comparative bar diagram of pre test(Mx), post test(My) and Adj. post test(Mxy) in both experimental and in controlled is achievement score of English shown in the figure below.
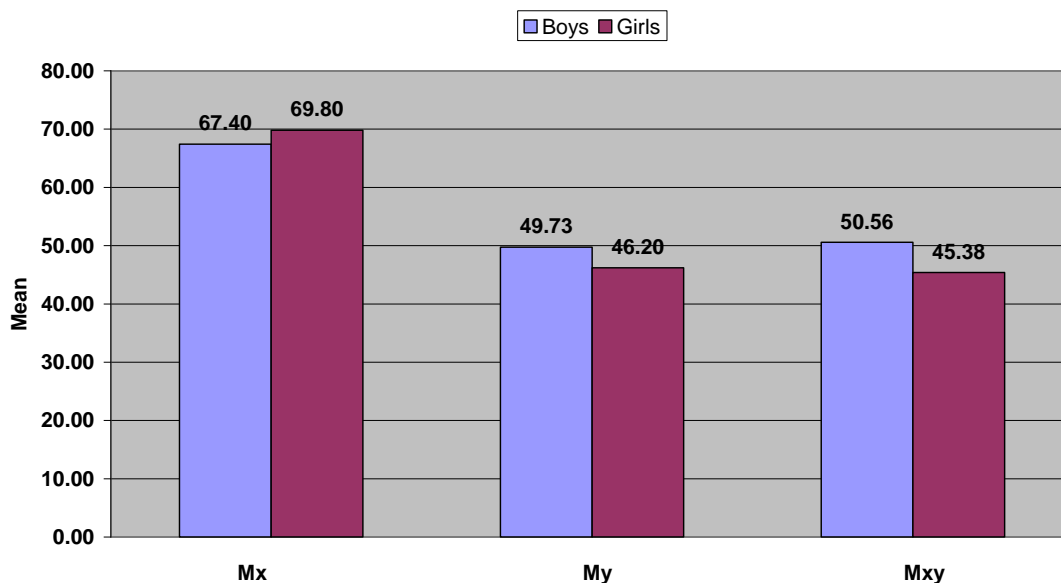
Figure 1 English Std 9

Hypothesis – 2
There is no significant difference between the mean score of academic achievement in subject of English between boys and girls of controlled group of standard IX.

Table 2: ANCOVA of Post test achievement scores of English Student of std. IX controlled group in both Boys and by Girls effect of Post – test achievement scores

Source of Variance	Sum of Square	Df	Mean sum of Square	F-Value	Table F Value	Level of Significant
SV	SS	Df	MSS	F	TV	LS
BV	400.25	1	400.25	4.06	F.05=4.008	0.05
WV	5723.98	58	98.69		F.01=7.103	
TOTAL	5456.65	59				

ANCOVA shows that the experimental and controlled group differ significantly in the post test achievement scores after eliminating the effect due to their initial pre test achievement scores (F=4.06, LS<0.05). The comparative bar diagram of pre test(Mx), post test(My) and Adj. post test(Mxy) in both experimental and in controlled is achievement score of English shown in the figure below.

Figure 2 Engish Control Group

Hypothesis -3 There is no significant difference between the mean score of academic achievement in subject of English between boys and girls of experimental group of standard IX.

Table 3: ANCOVA of Post test achievement scores of English Student of std. IX experimental group in both Boys and by Girls effect of Post – test achievement scores

Source of Variance	Sum of Square	Df	Mean sum of Square	F-Value	Table F Value	Level of Significant
SV	SS	Df	MSS	F	TV	LS
BV	251.33	1	251.33	2.65	F.05=4.008	Not Significant
WV	5490.47	58	94.66		F.01=7.103	
TOTAL	5741.80	59				

ANCOVA shows that there is no significant difference between in the post test achievement scores after eliminating the effect due to their initial pre test achievement scores (F=2.65). The comparative bar diagram of pre test(Mx), post test(My) and Adj. post test(Mxy) in both Boys and in Girls is achievement score of English shown in the figure below.

Figur 3 English Experimental Group
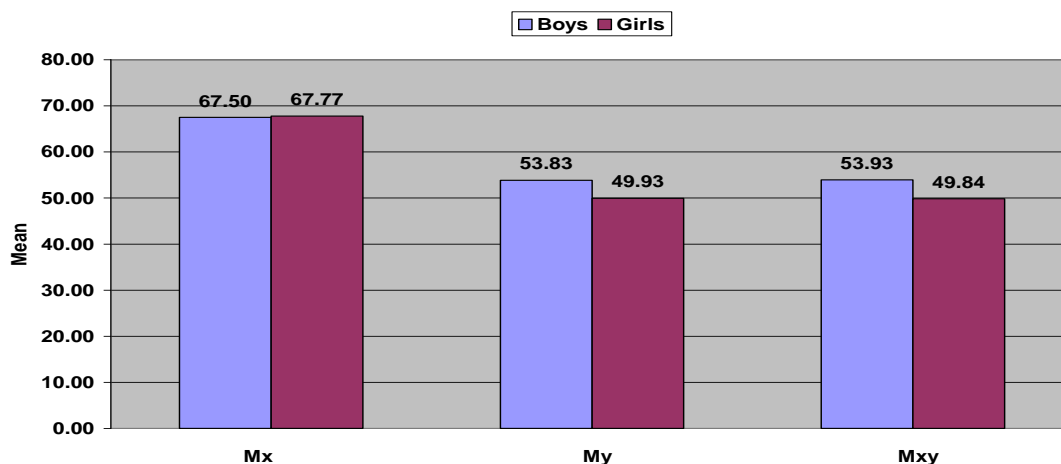
Each group of standard VIII, got the score in English in annual exam, were taken as score of pre test and the score of English of standard 9 were taken as the score of post test and examined the justification of average difference with T-test.

For Hypothesis – 1

Beforee training the average figure, standard deviation and and t-test of the Experimental Goup and the Controlled Group for English subject of std 8th is shown in the following Table 4.

Table 4

Group	Number	Mean	Standard Deviation	't'	Level of Significant
Experimental	60	67.63	13.81	0.37	0.05
Controlled	60	68.60	14.85		

The significant value at 0.05 level 't' = 0.05(118) = 1.98

It is found from the table-4 the mean of the subject English of standard 8th for the experimental group is 67.63 and the controlled group is 68.60. The standard deviation of both group is 13.81 and 14.85 and t-test is 0.37. Thus the value is less than 1.98. It is not Significant at the level of 0.05. According to this it is said that the both group are equal so the distribution of the group is successful. After the training of YOGA the Average score, the standard deviation, and the t-test of the English subject for standard 9th of the Post test is shown in Table 5.

Table 5

Group	Number	Mean	Standard Deviation	't'	Level of Significant
Experimental	60	51.88	14.05	1.502	0.05
Controlled	60	47.97	14.27		

The significant value at 0.05 level 't' = 0.05(118) = 1.98

It is found from the table-5 that after training both group the score of subject English for standard 9th the mean for the Experimental Group is 51.88 and the Controlled Group is 47.97. The standard deviation of both in sequence is 14.05 and 14.27 and t-test 1.502. This value is less than 1.98. It is not Significant at 0.05 level. So Hypothesis 1 is accepted. So we can say that the students of Experimental Group and Controlled Group learnt equally. So it is proved that the programme of 'YOGA' is not effective.

For Hypothesis –2

Before training the average figure, standard deviation and and t-test of the Boys and Girls of the Controlled Group for English subject of std 8th is shown in the following Table 6.

Table 6

Group	Number	Mean	Standard Deviation	't'	Level of Significant
Boys	30	67.40	15.46	0.61	0.05
Girls	30	69.80	14.37		

The significant value at 0.05 level 't' = 0.05(58) = 2.00

It is found from the table-6 the mean of the subject English of standard 8th for the Boys of controlled group is 67.40 and the Girls of controlled group is 69.80. The standard deviation of both group is 15.46 and 14.37 and t-test is 0.61. Thus the value is less than 2.00. It is not Significant at the level of 0.05. According to this it is said that the both group are equal so the distribution of the group is successful. After training the average figure, standard deviation and and t-test of the Boys and Girls of the Controlled Group for English subject of std 9th is shown in the following Table 7.

Table 7

Group	Number	Mean	Standard Deviation	't'	Level of Significant
Boys	30	49.73	13.97	0.942	0.05
Girls	30	46.20	14.59		

The significant value at 0.05 level 't' = 0.05(58) = 2.00

It is found from the table-7 that after training both group the score of English subject for standard 9th the mean for the Boys of Controlled Group is 49.73 and the Girls of Controlled Group is 46.20. The standard deviation of both in sequence is 13.97 and 14.59 and t-test 0.942. This value is less than 2.00. It is not significant at 0.05 level. So Hypothesis 2 is accepted. So we can say that the Boys and the Girls of Controlled Group learnt English equally.

For Hypothesis –3
Before training the average figure, standard deviation and and t-test of the Boys and Girls of the Experimental Group for English subject of std 8th is shown in the following Table 8.

Table 8

Group	Number	Mean	Standard Deviation	't'	Level of Significant
Boys	30	67.50	14.80	0.07	0.05
Girls	30	67.77	13.00		

The significant value at 0.05 level 't' = 0.05(58) = 2.00

It is found from the table-8 the mean of the subject English of standard 8th for the Boys of Experimental Group is 67.50 and the Girls of Experimental group is 67.77. The standard deviation of both group is 14.80 and 13.00 and t-test is 0.07. Thus the value is less than 2.00 It not significant at the level of 0.05. According to this it is said that the both groups are equal so the distribution of the group is successful. After training the average figure, standard deviation and and t-test of the Boys and Girls of the Experimental Group for English subject of std 9th is shown in the following Table 9.

Table 9

Group	Number	Mean	Standard Deviation	't'	Level of Significant
Boys	30	53.83	14.18	1.059	0.05
Girls	30	49.93	13.88		

The significant value at 0.05 level 't' = 0.05(58) = 2.00

It is found from the table-9 that after training both group the score of English subject for standard 9th the mean for the Boys of Experimental Group is 53.83 and the Girls of Experimental Group is 49.93. The standard deviation of both in sequence is 14.18 and 13.88 and t-test 1.059. This value is less than 2.00. It is not significant at 0.05 level. So Hypothesis 3 is accepted. So we can say that the Boys and the Girls of Experimental Group learnt English equally.

Findings
From ANCOVA
Required concluding values by Excel Programme calculating are F = 6.27 which is df = 1 and df = 118 which is more than F.05 = 3.92 and less than F.01 = 6.86. It shows that by calculation, it is effective at F value 0.05. Thus hypothesis No 1 has been rejected, The difference between the Experimental group and controlled group improved average of the post test is 4.59. Which at 0.05 level is more than the required difference for it effectiveness And the Average of the Experimental group is higher than that of the controlled group. It Shows that YOGA has proved effective in the field of Academic achievement of the students. The student could learn better after leaning YOGA.

Required concluding values by Excel Programme calculating are F = 4.06 which is df = 1 and df = 58 which is more than F.05 = 4.008 and less than F.01 = 7.103. It shows that by calculation, it is effective at F value 0.05. Thus hypothesis No 2 has been rejected, The difference between the Boys and Girls improved average of the post test is 5.18. Which at 0.05 level is more than the required difference for it effectiveness And the Average of the Boys group is higher than that of the Girls group. It shows that the

Boys of the controlled group learnt English better than the Girls.

Required concluding values by Excel Programme calculating are F = 2.65 which is df = 1 and df = 58 which is less than F.05 = 4.008 and less than F.01 = 7.103. Thus hypothesis No 3 has been acceptable, The difference between the Boys and Girls improved average of the post test is 4.09. Which at 0.05 level is less than the required difference for its effectiveness. It shows that the Boys and Girls of the experimental group learnt English equally.

From t-test

All hypothesise are accepted.

Conclusions

Using of ANCOVA Hypothesis 1 and 2 are not accepted, when Hypothesis 3 is accepted. Hypothesis 1,2 and 3 are accepted by t-test. Thus true interpretation can be found by preparing calculation system.

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