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An Investigation on the Performance of Students in Mathematics: A Case Study

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Abstract: All the stack holders are greatly concerned with the students' performance in mathematics as this is considered to be significantly important for engineers. This study intends to investigate the performance of the students' in mathematics. During the investigation a case study of 14 batch of 1st and 2nd semesters taken. The data has been collected from the examination department of MUET and subjected to a Statistical Package for Social Science (SPSS) analysis which indicates overall students' performance in the subject. The results of study showed that there is no significant relationship between the results of first semester and second semester. However the null hypothesis is accepted for only the departments of Electronics engineering and Chemical Engineering.

Key Words: Applied Calculus, linear Algebra & Analytical Geometry, Trends in International Mathematics and Science Studies.

1. INTRODUCTION

Mathematics is accepted compulsorily across the world in school education and a basic subject for engineering. The basic criteria for the admission in MUET are that the student should passed intermediate education in pre – engineering group, except for the admission in Bio–Medical Engineering where the students of pre – medical group are also eligible. In today's high-tech world rapidly developed technology leads to change in the expectation of communities from the individuals. In this regard systems of education across the globe are facing as a challenge, (Gunandra C.D., 2015).To educate individuals in globalized world information construct, critical thinking, establishing connectivity among phenomena and individuals are very significant for which assessment study is being important and increased over time which present empirical data about a country. This type of empirical findings may help in quality comparative assessments among the communities creating an opportunity in evaluation and policy making in the field of education. Some of the projects, such as TIMSS (Trends in International Mathematics and Science Studies), PIRLS (Progress in International Reading Literacy Study) and PISA (Program for International Student Assessment), which were applied for this purpose and organized by OEDC and aiming at determining the students' achievements and in school and in out of school factors that affect their achievements are the main case studies in the field of education, (Wu. 2001).

In Mehran University of Engineering and Technology, Jamshoro, the Department of Basic Sciences and Related Studies offered different subjects of mathematics like, Applied Calculus (AC), Linear Algebra and Analytical Geometry (LAAG), Differential Equations and Fourier Series (DEFS), Complex Variables and Transforms (CVT), Numerical Analysis and Computer Applications (NACA) etc; to the students of all disciplines from first semester to sixth semester. In engineering the subjects of Applied Calculus (AC) and Linear Algebra and Analytical Geometry (LAAG) plays a vital role. In this regard the performance of the students in the two subjects were investigated through statistical techniques; variance, regression and correlation. The knowledge of the two subjects helps the students to get better results in later mathematical subjects of third, fourth, fifth and sixth semesters. It also helps them in different subjects of engineering as well as in Fluid Mechanics, Fluid Dynamics, Thermodynamics, and Control Engineering etc.

2. METHODOLOGY

The present study is descriptive in nature. In this study the students of twelve disciplines of 14 batch were investigated. The total number of students in first semester were 887 and in the second semester 875. The data was analyzed by applying statistical tools like variance, regression and correlation. The independent z – test and t – tests were applied to test the significance between the results.

The basic equations for these calculations are Variance from the population

$$\sigma^2 = \sum \frac{(X - \mu)^2}{N}$$

There are alternate formulas for variance that can be easier to use:

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$$\sigma^2 = \frac{\sum X^2 - \left(\frac{\sum X}{N}\right)^2}{N}$$

and variance form sample

$$s^2 = \frac{\sum X^2 - \left(\frac{\sum X}{n}\right)^2}{n-1}$$

The formula for coefficient of correlation is

$$r = \frac{n\sum XY - \sum X \sum Y}{\sqrt{[n\sum X^2 - (\sum X)^2]\,[n\sum Y^2 - (\sum Y)^2]}}$$

The equation of linear regression line is obtained from the relation Y = a + bX , where slope of the line = a = $\overline{Y} - b\overline{X}$ intercept of the line = b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - (\sum X)^2}$

ANOVA is used to test the significance mean difference among the results.

Null Hypothesis is set to test the significance of the results with 95 % confidence interval.

Null hypothesis H_{o1}= there is a significance relationship between the results.

3. RESULTS AND DISCUSSION

(Table 1) showing the mean, median, standard deviation, variance and coefficient of variation of the marks of students for the twelve disciplines in first semester. The minimum average is 39.27 with standard deviation of 14.07 for Biomedical Engineering and the maximum average is 70.44 with standard deviation of 17.72 For Computer Systems Engineering.

(Table 2) showing the mean, median, standard deviation, variance and coefficient of variation of the marks of students for the twelve disciplines in second semester. The minimum average in the second semester is 45.14 with standard deviation of 20.02 for Mining Engineering and the maximum average is 74.83 with standard deviation of 14.9 for Computer Systems Engineering.

(Table 3) showing the hypothesis test values at 95% confidence interval for the difference between the means for the results of twelve disciples in two semesters. The table shows that the hypothesis is rejected for ten disciples and accepted only for the electronics engineering and software engineering.

(Fig. 1) hawing the bar charts for the average marks in first semester and second semester for the twelve departments. It clearly shows that the average marks of second semester are greater that the average marks of first semester for most disciplines except Electrical Engineering.

(Fig. 1) showing the parallel bar chart between the average marks of two semesters.

(Fig, 2) showing the trend lines of the average marks of two semesters for the twelve disciplines showing that the average marks of second semester are greater than the average marks of first semester but the trend is decreasing.\

The **(Fig 3.1 – 3.12)** showing the equations of linear regression lines and the coefficient of correlation for the marks of two semesters for twelve disciplines.

Table-1: Showing the mean, Median, Standard Deviation, Variance and Coefficient of variation for the first Semester

S. No.	DEPTT	FIRST SEMES TER					
		NUMBER OF STUDENTS	MEAN	MEDIAN	S.D	VAR	COVAR
1	ME	133	50.16	50	20.82	433.4724	41.50717703
2	EL	126	60.32	61	24.58	604.1764	40.74933687
3	ES	100	63.96	65	23.62	557.9044	36.92933083
4	CS	78	70.44	71	17.72	313.9984	25.15616127
5	SW	84	60.72	60	22	484	36.23188406
6	TL	93	70.3	72.5	17.1	292.41	24.32432432
7	BM	33	39.27	39	14.07	197.9649	35.82887701
8	CH	49	61.14	61	19.67	386.9089	32.17206412
9	PG	66	58.64	66	23.91	571.6881	40.77421555
10	MT	48	36.79	35.5	18.74	351.1876	50.93775482
11	MN	38	50.79	50	18.96	359.4816	37.33018311
12	IN	39	54.41	55	21.33	454.9689	39.20235251

Table 2: Showing the mean, Median, Standard Deviation, Variance and Coefficient of variation for the second Semester

S. No.	DEPTT	SECOND SEMESTER					
		NUMBER OF STUDENTS	MEAN	MEDIAN	S.D	VAR	COVAR
1	ME	130	71.44	74	18.49	341.8801	25.8818589
2	EL	125	57.2	55	20.41	416.5681	35.68181818
3	ES	99	73.21	80	20.17	406.8289	27.55088103
4	CS	78	74.83	77.5	14.9	222.01	19.91180008
5	SW	84	69.21	75	19.03	362.1409	27.49602659
6	TL	91	63.58	60	18.45	340.4025	29.0185593
7	BM	34	56.85	54.5	18.2	331.24	32.01407212
8	CH	50	70.84	72	18.39	338.1921	25.95990966
9	PG	66	73.03	75	20.14	405.6196	27.57770779
10	MT	44	57	55.5	23.3	542.89	40.87719298
11	MN	36	45.14	37	20.02	400.8004	44.35090829
12	IN	38	63.87	65	18.32	335.6224	28.68326288

Table 3: Hypothesis test results

S. No.	DEPTT	COFFICIENT OF CORRELATION r	AT α = 0.05 z- test is ± 1.96	Hypothesis
1	ME	0.14	-8.78524259	REJECT
2	EL	0.47	1.093310793	ACCEPT
3	ES	0.8	-2.972184548	REJECT
4	CS	0.25	2.357971816	REJECT
5	SW	0.6	-1.739234419	ACCEPT
6	TL	0.7	-2.803985848	REJECT
7	BM	0.69	-4.433880739	REJECT
8	CH	0.8	-2.532109414	REJECT
9	PG	0.17	-3.740709895	REJECT
10	MT	-0.18	-4.559108538	REJECT
11	MN	0.72	2.126756386	REJECT
12	IN	0.71	-2.089393154	REJECT

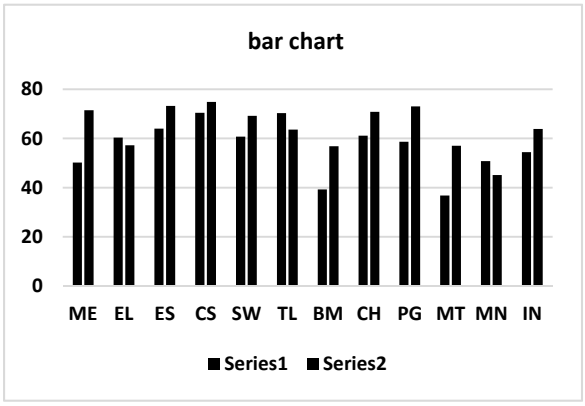


Fig 1: Parallel Bar Charts For The Averages

Fig 2: Trend Lines For The Average(S)

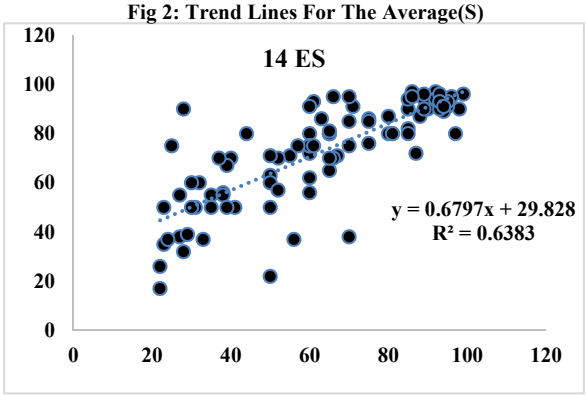
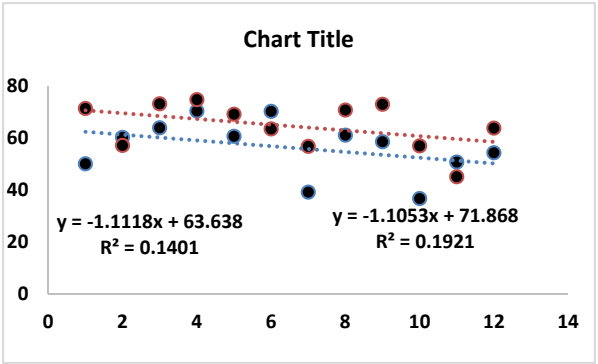


Fig. 3.1



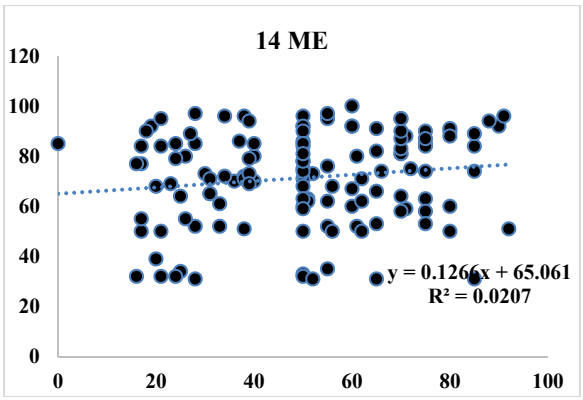


Fig. 3.2

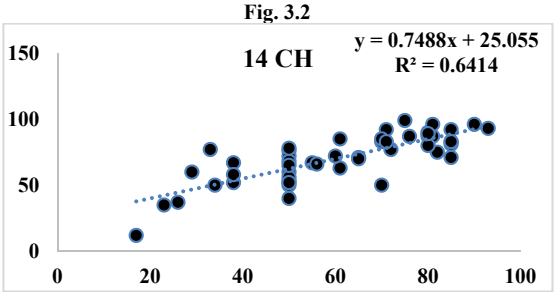


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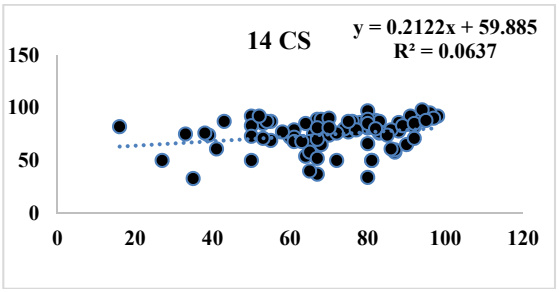


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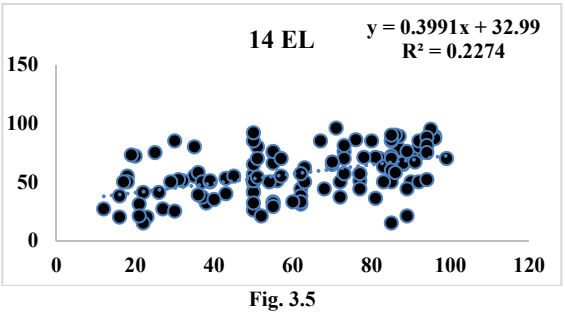


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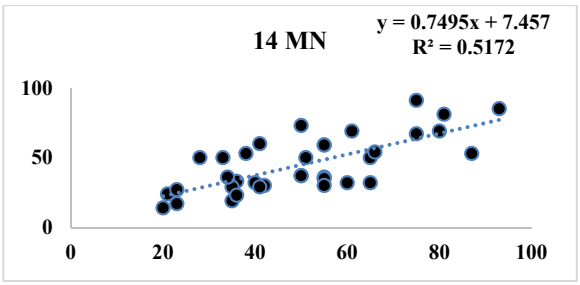


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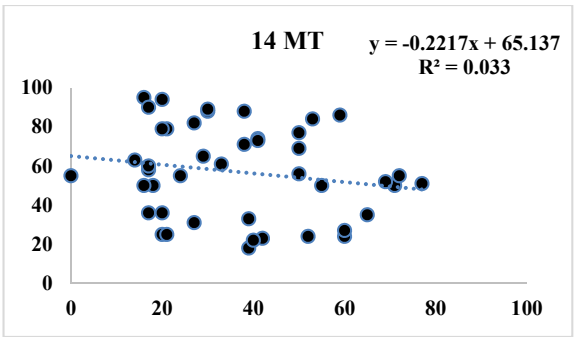


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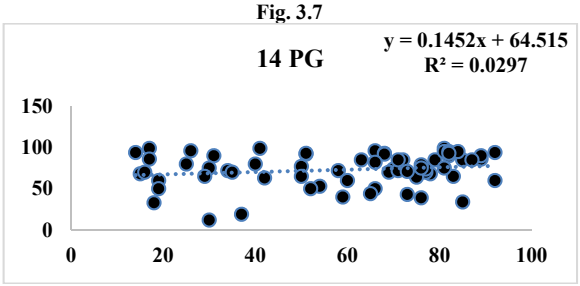


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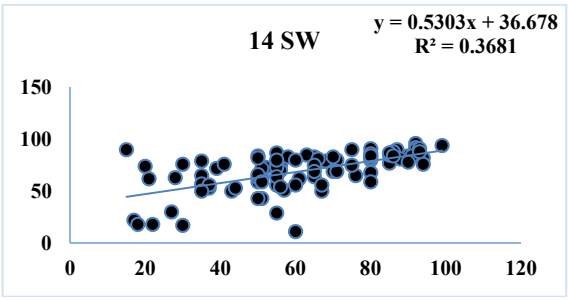


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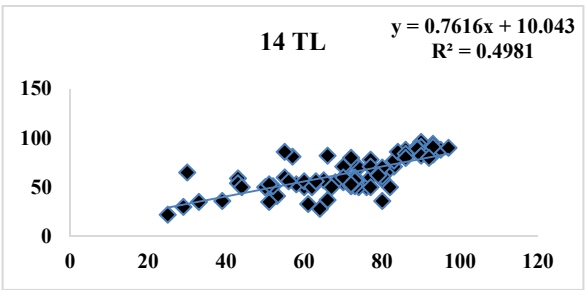


Fig. 3.10

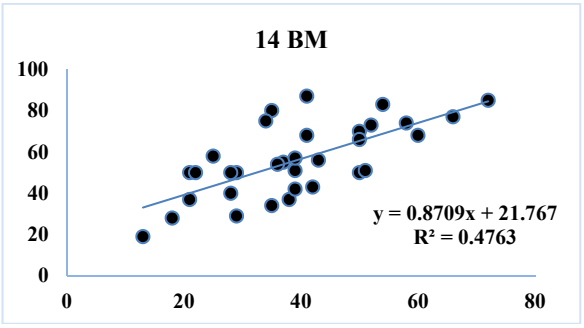


Fig. 3.11

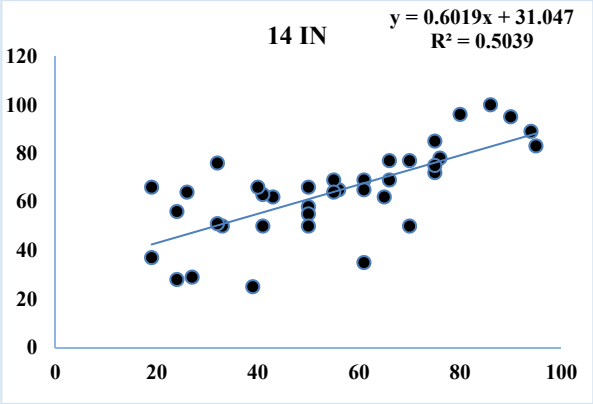


Fig. 3.12

4. CONCLUSION

From the study it is shown that there is no significance relationship between the results of the applied calculus and linear algebra and analytical geometry for the students often disciplines. Hence the null hypothesis is rejected for these departments and accepted for only two departments. It is also showed that the average marks of the students in the subject of linear algebra and analytical geometry are greater than that of applied calculus, although the trend is decreasing. From Chi – square test it is found that the results of first and second semesters are independent.

From the study, it can be said that for better performance in mathematics, to develop a positive attitude towards the subject is significantly important. Students' perceptions on learning the subject settled in their minds have to be changed. The study also revealed that the performance of the students in the two subjects is independent of their technologies.

REFERENCES:

Das, G. C., R. Das, M. P. Kashyap (2015). "An Investigation on The Relationship Between Performance in Mathematics and Students' Attitude Towards The Subject in Secondary Schools of Guwahti." International Journal of Applied Research, Vol. 5 (6), 142-145.

Lepmann, L., J. Afanasjev, (2015). Conceptions of mathematics in different ability and achievement groups among 7th grade students. In C. Bergsten, B. Grevholm (Eds.), Proceedings of NORMA 01, the 3rd Nordic Conference on Mathematics Education, Linköping: Linköping University. 185-194.

Muthulakshin, P., (2014). An Investigation on High School Students' Attitude Towards Mathematics. International Journal of Applied Mathematics. Vol. 4 (01) 170 – 172.

Ramirez, M. J., (2005). Attitude Towards Mathematics and Academic Performance Among Chilean 8th Grade. Studios Pedagogicos (Valdivia) vol. 31(01), 97 – 112

Stramel, J. K.. (2011). A naturalistic inquiry into the attitudes toward mathematics and mathematics self-efficacy beliefs of middle school students. Dissertation Abstracts International, 71 (10), 3521.

Stramel, J. K., (2011). A naturalistic inquiry into the attitudes toward mathematics and mathematics self-efficacy beliefs of middle school students. Dissertation Abstracts International, 71 (10), 3521.

Wu; M., (2010). Comparing the Similarities and Differences of PISA 2003 and TIMSS. OECD Education working papers No. 32 OECD Publishing.