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A STATISTICAL ANALYSIS FOR MATHEMATICS & STATISTICS IN ENGINEERING TECHNOLOGIES (RANDOM SAMPLING)

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ABSTRACT

This paper aims to assess the degree of students' interest in mathematics and statistics.

Five universities, having Engineering and technology education in Sindh Province, have been taken as targeted population. Non-parametric test Statistic χ^2 at $\alpha = 0.05$ on collected categorical data has been applied to check their significance and difference in the number of observations. Since the value of $\chi^2(4) = 48.480$, $p < 0.005$; hence the conclusion has been drawn from collected data that there is a statistically significant difference in the student's interest of the selected universities. The significant difference exists in the observed and actual frequencies while asking the students about their expectation of marks in the subject of mathematics hence $\chi^2(4) = 239.820$, $p < 0.005$.

Key words: mathematics, actual frequencies, Statistics

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1. INTRODUCTION

Attitude towards mathematics plays a crucial role in the teaching and learning process, which involves students' success in mathematics. Attitude is based on value and belief, as well as varying degree of factual knowledge. Positive attitude towards mathematics leads students towards success. As its lower level has been discussed earlier by M. Shahid and S. Zulfiqar in their research that is very helpful approach. It provides base for higher studies in mathematics because of their achievement in mathematics at secondary school level (M. Shahid and S. Zulfiqar, 2008)¹.

Chi-Square χ^2 is used to check that hypothetical statement. It is positively skewed distribution, which extends from 0 to infinity. Chi-Square test has huge applications in different fields, for example, Goodness of fit, Independence of variables and Homogeneity of samples. Here we provide formula of test statistic Chi square and degree of freedom:

2. CHI SQUARE

$$\chi_0^2 = \sum \frac{(O_i^2 - E_i^2)^2}{E_i}$$

where,

χ_0^2 = Chi square

O_i = Observed frequency

E_i = Expected frequency

3. DEGREES OF FREEDOM

$$df = (n - 1)$$

where, $(n - 1)$ is number of categories.

Here we also provide table IV of Fisher Yates: Statistical tables for Biological, Agricultural and Medical Research, published by Oliver & Boyd, Ltd; Edinburgh.

Table 1

df (Degree of freedom)	PROPORTION IN CRITICAL REGION				
	0.10	0.05	0.025	0.01	0.005
1	02.71	03.84	05.02	06.63	07.88
2	04.61	05.99	07.38	09.21	10.6
3	06.25	07.81	09.35	11.340	12.840
4	07.78	09.49	11.140	13.280	14.860
5	09.24	11.070	12.830	15.090	16.750
6	10.640	12.590	14.450	16.810	18.550
7	12.020	14.070	16.010	18.480	20.280
8	13.360	15.510	17.530	20.090	21.960
9	14.680	16.920	19.020	21.670	23.590

As given critical tabled values are based on sampling distributions of the Pearson chi-square statistic. If above table value of χ^2 is less than Calculated χ^2 then our hypothetical statement of H_0 is rejected.

4. LITERATURE REVIEW

Muhammad Shahid Farooq and Syed Zia Ullah Shah's research is based on a survey of 10th class from 10 private and public sector school. In this work students' success in mathematics has been focused; moreover, the research is based on student's attitudes towards mathematics. Their samples for the study were 685 students (female = 306 & male = 379) in matriculation class. They used the survey questionnaire ($\alpha = 0.7452$) and t-test for further statistical calculation at 0.05 significance level to observe the attitudes of female and male students towards mathematics at Secondary School Level. (Muhammad Shahid Farooq and Syed Zia Ullah Shah; 2008)¹.

Irish government was greatly concerned about students' interest in mathematics. They awarded bonus points to students in order to create their interest in mathematics. Through this they aimed to know the reason of detachment of students' interest in mathematics. Csikszentmihalyi said that, if intrigued by opportunities of the domain, most students will make sure to develop the skills they need to operate within it. It was illustrated in PISA (2003) that less than 50% of Irish students agreed that they would learn mathematics; they divided interest level into two types in their research: first type is situational interest and second is individual interest (Mark Prendergast; 2011)².

From the research even a critical examination was concluded that gender and age do not influence student's interest in mathematics, but due to attendance of basic schools' education, motivational methodology of teachers, student's level of education, material like books are the basic factors in students unresponsive attitude towards mathematics (Yarhands Dissou, Francis Tabi, Richard Kena; 2014)³.

In different scenario, Outcomes-Based Education (OBE) is working over a comparable view of measuring the performance of the Engineering University Students, which is meant to determine the reason affecting the performance of students in the examination based assessment. In the descriptive type of research they used regression analysis (Nestor C. Camello; 2014)⁴.

The research study of Anne C. Frenzel is three fold

- From grade 5 to 9, they defined growing variations in interest of students in the context of mathematics.
- They discovered effects, e.g., schools strategy and gender.
- They examined either family or class room values for mathematics.

The study spreads existing knowledge concerning the importance for youths' interest, developed by positive relationships between classmates' and parents' as well as teachers interest in the improvement of students interest in mathematics (Anne C. Frenzel; 2010)⁵.

KIM (KIM – Kvalitet i Matematikkundervisningen, translated as Quality in Mathematics Teaching) collected response in 1995 and 2005 from the students in Norway. They described Mathematics studies, learner's doctrines and behaviors. In 2005 Andreassen defines the idea of mathematical performance between written and presented results in his Masters' thesis (2005) and Kirsti Kislenko wants to complete her study through the research of relationship between students' performance and their study progress. Different research scholars work for the relationship between performance, mathematical test and self confidence in mathematics in the KIM study. They had well planned idea about positive attitude towards mathematics and teaching this subject leads a motivational for learners and high performance with experiences that one achieved in this subject.(Kirsti Kislenko; 2005)⁶.

5. OBJECTIVES

- To evaluate the degree of Students interest in mathematics and statistics.
- To identify the factors which involved lessening Students interest
- To compare and contrast actual value and observed observation.

6. RESEARCH METHODOLOGY

This study relies greatly upon the collection of primary data, and secondary data is also used to collect information from the universities.

Targeted population for the study is five universities of Sindh providing engineering and technology education. The random sample of five hundred students is selected using simple random sampling (0 to n) for study. Well-designed questioners is used to get information focusing study objects.

Statistical software (SPSS) is applied for descriptive measures. Chi square test ($\alpha=0.05$) is applied to test the design hypothesis.

7. RESULTS

- Rejecting the hypothetical statement of H_0 against H_1 ; there statistical significant difference exists in the context of selecting university; (p value less than 0.05 at $\alpha=0.05$, $V=4$ and the value of chi square test 48.480) indicates that there is enough evidence to reject the claim of null hypothesis. About 26% of respondent does not know which university should be selected and which field should be preferred, mostly students were unaware about their respected goal. The answers of the students were followed by 25%, 21%, 19% and 8% , "my parents wish", "No idea about this university just I want to be an engineer", "This university's students find jobs very easily", "Teachers are very helpful" respectively
- Only 29% students had idea about the mathematics that it's only helpful to counting and business.

- It has been seen that more than 40 % student failed lots of time in the subject of mathematics while only 22% student never failed.
- There is adequate indication to reject null hypothesis against alternative hypothesis in the context of getting marks in mathematics ($\chi^2_{(4)} = 239.820$, $p < 0.005$)
- Only 20% respondent have idea that they can understand mathematics through lectures.
- When we asked how to develop students interest than merely 60% respondent agreed that only past know-how in mathematics can develop their interest in mathematics.
- About half of the students (50%) have idea that interest in mathematics is associated with only past performance in mathematics.
- 81% students feels that mathematics is difficult subject, $\chi^2(1) = 192.200$, $p < 0.005$.
- Out of 81% Students about 75% are not interested to learn mathematics, $\chi^2(1) = 97.780$, $p < 0.000$.
- 44% students agreed that there is advantages of practical of mathematics, while only 13% do not know its advantages.

8. CONCLUSION & RECOMMENDATION

- Majority of students in these universities have no idea about the selection of university; since the value of $\chi^2(4) = 48.480$, $p < 0.005$. They should be educated at intermediate level about the universities and their departments. It will be helpful in setting their minds according to their academic inclination. By this they can decide about their future.
- Mostly students want to get passed in mathematics subject which is quite frightening, because mathematics is symbolic language and is considered backbone of engineering. Using chi square test hence $\chi^2(4) = 239.820$, $p < 0.005$, result reveals that difference exist between observed values and expected values.
- If the past performance of student in mathematics is poor, they do not attempt to understand the subject. They should be encouraged to understand the subject by arranging special classes.
- The hypothetical statement is that 50% students think mathematics is difficult subject against H_1 is rejected. Hence it is concluded that there is significant difference between the data sets. It cannot be due to chance alone, since the calculated chi square $\chi^2(1) = 192.200$, $p < 0.005$. It has been observed that majority of students having perception that mathematics is difficult subject was just because they were not curious to learn and understand it $\chi^2(1) = 97.780$, $p < 0.000$.

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