A Study on Academic Performance of Undergraduate Students

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Abstract — **<For ~~~~ later>**

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I. INTRODUCTION

In this paper, we investigated factors affecting university students' academic performance through Pearson's correlation analysis. Dominant factors that affect academic performance, such as academic approach, mental stability, environs & environment, and cognitive capabilities, were considered while carrying out this study. Our sampled clusters were limited to NUST (National University of Science and Technology) students, and students from all years and fields were considered to eliminate biases from the results. Our sample size consisted of 148 students. The Pearson's coefficient represents the strength of the relationship between two variables. The higher the value of the coefficient, the stronger the relationship. Using this method, we discovered that the variables associated with the environs & environment, as well as mental stability, had the biggest impact on students' academic performance.

Aside from the theoretical worth of academic performance, the ability to predict academic success using statistics has a lot of practical benefit.

In Pakistan, the government's expenditure on educational activities amounted to 2.508% of the total GDP in 2019 [1]. Granted that it is significantly lower than the developed countries in western parts of the world, that, on average, reserve 6.78% of their total GDP on educational activities, whereas the average young person will stay in education until the age of 21. Academic performance of students, henceforth, is highly valued among these advanced economies, such that any increments in understanding of academic performance have substantial implications.

The dominant measures of academic performance in relevant papers surrounding academic performance, are grades, and deriving from these grades, the Grade Point Average (GPA) [2]. The internal reliability of using GPAs to keep track of academic performance is relatively higher than other lesser used measures, specifically because they essentially converge to grade inflation when dealing with large sample sizes.

For the objective of this paper, we develop relations of academic performance with independent factors that influence it. The student's immediate surroundings and environment have the greatest impact on his or her academic performance. Home has a significant impact on a student's academic progress and has direct control

over an individual's psychological and emotional behavior. The second factor that takes part in determining academic performance is the academic approach of the students. An evident link relevant to the approach of students is that poor study habits may lead to lower grades than those with better study habits. The third factor was the learning skills of the individual. Anne Virtanen et al. [3] explained the generic learning skills of university students. It explained that teaching practice involving academic interactions led to better learning skills development.

Academic interaction also plays a vital role in determining students' academic performance. Arif Altun et al. [4] described academic performance based on academic interaction in a learning-based environment. For incorporating these algorithms into learning environments, the ease of learning and user-friendly qualities of the results are critical.

The issue of mental health is another factor that affects university students' academic performance. Depression and anxiety, which are prevalent in the subject of mental health, have a significant impact on academic performance in the long run.

II. RELATED WORK

Many recent works have been conducted on academic performance of students in universities and the factors which influence them. Hanson [5] reported the factors influencing the academic performance of students and developed its relationship with certain factors upon which it is dependent.

Hassan Afzal et al. [6] concluded the significance of motivation behind a student's educational success. The study delineates that students' motivations, dimensions, extrinsic motivation, and intrinsic motivation have a positive impact on academic performance of students.

Kathleen Lynne Lane et al. [7] carried out a research-based analysis on the behavior of academic performance with emotional behavioral disorders. Findings also suggested that behavioral variables (e.g., school adjustment, externalizing, and internalizing) were predictive of broad reading and broad written expression scores, with school adjustment (a protective factor) accounting for the most variance in the three-variable model.

McKenzie and Schweitzer [8] conducted prospective research and explored the psychological and demographic predictors of first year students at Australian Universities.

Moreover, Waleed Muaghed Al-Rahmi and Mohd. Shahizan Othman [9] studied the impact of the use of social media on the academic performance of university students.

III. METHODOLOGY

A. Population

This study aims to assess the general academic performance of undergraduate students residing within Pakistan. For this purpose, our study was directed towards all the undergrad students currently studying in NUST. The size of this target population is 7197 students.

B. Sampling Technique

From common observation, students of different fields display different behavioral patterns and hence, varying academic performance. Cluster sampling was used where different institutions served as an individual cluster and random samples were selected from among these clusters.

Keeping in mind the time constraints, sample size was obtained using Cochran's [10] formula:

$$n = \frac{\frac{z^2 * p(1-p)}{e^2}}{1 + \left(\frac{z^2 * p(1-p)}{e^2 N}\right)}$$

Where N represents the population size and keeping e, the margin of error, a value of 0.08, the confidence level z at 0.95, and the standard deviation at 0.5, we calculate the ideal sample size for the present case to be 148 students.

C. Research Tool

The collection of data was accomplished through the conduct of a digital survey, created on Google Forms. The questionnaire was designed in such a way as to assess all the hypothesized dimensions with and without having a substantial effect on the academic performance of students. These dimensions can be coined under five distinctive terms, namely, Structured Academic Approach, Environs & Environment, Mental Stability, Academic Interactivity, and Academic Achievements. The respondents were asked to indicate their degree of agreement with statements pertaining to these dimensions, scored on a five-point Likert-type scale [11].

D. Analyzing Data

After the collection of necessary data, appropriate analysis techniques should be utilized

to get the best estimate of academic performance of a sample student, based on the factors discussed above. Since the dataset consists of both qualitative and quantitative data, each dimension hypothesized can be treated as an independent variable and the respondent's academic performance as a direct dependent variable, allowing for coefficient correlation analysis and Guildford's [12] Rule of Thumb to be applicable.

1) Coefficient Correlation

<SOMETHING>

2) Guildford's Rule of Thumb

Guildford's rule of thumb is able to denote the relational associativity given by Pearson's correlation coefficient r, between two variables, one independent and the other dependent, a degree and magnitude of strength. [13]

Table 1: Rule of Thumb for Interpreting the Size of a Correlation Coefficient

Correlation Coefficient r	Strength
r < 0.20	Very weak
$0.20 \leq r \leq 0.40$	Weak
$0.40 \leq r \leq 0.70$	Medium
$0.70 \leq r \leq 0.90$	Strong
0.90 < r	Very Strong

Table 1 shows the scalability table defined by Guildford's Rule of Thumb and serves as the basis for deducing inferences in the following section, that is Results & Discussions. It is to be noted that a value of zero for the correlation coefficient implies that there is no relation between the two chosen variables.

IV. RESULTS & DISCUSSIONS

A. Sample Heading

Sample text.

V. CONCLUSIONS

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