Study and Evaluation of Student Performance Parameters using statistical features of excel

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Abstract - **Now-a-days the performance in higher education in India is a turning point in the academics for all students. This academic performance is influenced by many factors; therefore it is essential to analyze statistically each and every parameter of students that help us to identify the highly and lowery influenced parameters on student performance. This paper will discuss the statistical analysis of student's demographic information, behavioral data, examination score of first semester and SPI (Student performance index). This paper shows the relationship between collected data on various parameters of student versus student performance index of students. Demographic information and behavioral data of students are used to get the result that which parameters are highly affected on student's SPI result. The raw data was preprocessed in terms of filling up missing values, transforming values in one form into another and relevant attribute/ variable selection.**

Index Terms - **Students' performance, SPI, Demographic Information, Transforming, Missing Values.**

I. INTRODUCTION

The ability to identify a student's performance is very important in educational environments. Students' academic performance is based upon diverse factors like personal, social, psychological and other environmental variables.

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Statistical analysis is important technique to discover hidden patterns and relationships that helpful in decision making. In this tie, the objectives of the present investigation were edge so as to assist the low academic achievers in higher education and identification of different factors, which affects a student's learning behavior and performance during academic career. This paper is aimed to verify the observation of students' performance in every semester versus their demographic information. This paper used statistical analysis for getting observation of student performances versus demographic information. Student academic performance is identified by Student Performance Index that can get by student in each and every semester of course. In the observation, it is highlighted that which parameters are highly affects on student academic performance and which are the lowery affected. This paper also produced some outcomes based on the observation and some suggestions those can used to make decision as to improve the student academic performances. This paper also has been analyzed Internal Practical Marks and External Practical Marks statistically to verify whether there exists a relationship between these two terms or not.

In this connection, the objectives of the present investigation were framed so as to assist the low academic achievers in higher education by Identification of different factors, which effects a student's learning behavior and performance during academic career

II. RESEARCH BACKGROUND AND RELATED WORK:

A number of reviews pertaining to not only the diverse factors like personal, socio-economic, psychological and other environmental variables that influence the performance of students but also the models that have been used for the performance prediction are available in the literature and a few specific studies are listed below for reference. Mika [1] suggested that insufficient skills in basic mathematics caused

problems for any students who pursued in engineering. The research objectives are to identity the factors that contribute to the overall performance of students and to analyze any correlation between the abilities of students at entry point to the overall academic performance. Those factors can then be used as inputs to predict the overall performance achievement of students.

Hijazi and Naqvi[2] conducted as study on the student performance by selecting a sample of 300 students from a group of colleges affiliated to Punjab university of Pakistan. The hypothesis that was stated as "Student's attitude towards attendance in class, hours spent in study on daily basis after college, students' family income, students' mother's age and mother's education are significantly related with student performance" was framed. By means of simple linear regression analysis, it was found that the factors like mother's education and student's family income were highly correlated with the student academic performance.

Khan[3] conducted a performance study on 400 students comprising 200 boys and 200 girls selected from the senior secondary school of Aligarh Muslim University, Aligarh, India with a main objective to establish the prognostic value of different measures of cognition, personality and demographic variables for success at higher secondary level in science stream. It was found that girls with high socio-economic status had relatively higher academic achievement in science stream and boys with low socio-economic status had relatively higher academic achievement in general.

Galit[4] gave a case study that use students data to analyze their learning behavior to predict the results and to warn students at risk before their final exams.

Al-Radaideh[5] applied a decision tree model to predict the final grade of students who studied the C++ course in Yarmouk University, Jordan in the year 2005. Three different classification methods namely ID3, C4.5, and the NaïveBayes were used. The outcome of their results indicated that Decision Tree model had better prediction than other models.

Pandey and Pal [6] conducted study on the student performance based by selecting 60 students from a degree college of Dr. R. M. L. Awadh University, Faizabad, India. By means of association rule they find the interestingness of student in opting class teaching language.

Bray [7], This study observed that the percentage of students receiving private tutoring in India was relatively higher than in Malaysia, Singapore, Japan, China and Sri Lanka. It was also observed that there was an enhancement of academic performance with the intensity of private tutoring and this variation of intensity of private tutoring depends on the collective factor namely socio-economic conditions.

III. DATA SELECTION METHODOLOGY:

Through extensive search of the literature and discussion with experts on student performance, a number of factors that are considered to have influence on the performance of a student were identified.

In this step only those fields were selected which were required for analysis. A few derived variables were selected. Data are collected by preparing questioners and prepared a Googel doc form following questioners and shared it among all the MCM students for the data collection. All the predictor and response variables used in the analysis are given in Table 1 for reference.

[Table 1: Predictor and Response variables used in the analysis]

Sr. No	Variable	Description	Possible Values
1	ENO	Enrollment Number	
2	AI	Area of Interest	1 – Networking 2 - Web Application Development 3 - Database 4 - Designing 5 - Research 6 - Mobile Application Development 7 – Others
3	FI	Father's Income	1 - Less (0 -100000 Rs.) 2 - Average (100001 – 200000 Rs.) 3 - Adequate (200001 – 300000 Rs.) 4 - Good (300001 – 500000 Rs.) 5 - Excellent (Above 500001 Rs.)
4	WCL	Weekly Computer Lab Usage	1 – poor (0 – 9 hr) 2 – average (10-19 hr) 3 – adequate (20-29 hr) 4 – Good (30-39hr) 5 – Excellent (above 40hr)
5	LRM	Library Reading Material	1 - Subject Books, subject books and others 2- Subject Books and Magazines or newspaper 3 – Newspaper, Magazines and Others 4 – Subject Books, Magazines and News Paper 5 – others or newspaper and magazines
6	WLU	Weekly Library Usage	1 - Poor (0 hr) 2 - Average (1-4 hr) 3 - Good (5-9hr)

			4 - Excellent (10-15 hr)
7	FOCU	Father's Occupation	1 - Government Employee 2 - Private Employee 3 – Others
8	FQUL	Father's Qualification	1- Average up to Higher Secondary 2 – Good (Diploma or Graduate) 3 – Very Good (Post Graduate) 4 – Excellent (Above that)
9	AFS	Attendance Ratio in first semester	1 – Poor (0- 30) 2 – Average (31 - 60) 3- Good (61 - 80) 4 – Very Good (81 - 90) 5 – Excellent (91 - 100)
10	ASS	Attendance Ratio in second semester	1 – Poor (0- 30) 2 – Average (31 - 60) 3- Good (61 - 80) 4 – Very Good (81 - 90) 5 – Excellent (91 - 100)
11	ATS	Attendance Ratio in third semester	1 – Poor (0- 30) 2 – Average (31 - 60) 3- Good (61 - 80) 4 – Very Good (81 - 90) 5 – Excellent (91 - 100)
12	FIRSPI	First Semester SPI	SPI in percentile out of 10
13	SECSPI	Second Semester SPI	SPI in percentile out of 10
14	THISPI	Third Semester SPI	SPI in percentile out of 10

IV. ANALYSIS AND RESULTS

In this paper following analysis described in Table2 has been done. This analysis has been done by using excel tool and its advanced statistical analysis features.

Table 2: Data Analysis Table

Sr.no.	Title
1	Attendance vs spi correlation
2	Library usage vs spi performance
2.a	Weekly library usage
2.b	Library reading material
3	Computer lab usage vs spi performance
4	Area of interest vs spi performance
5	Impact of father's income , occupation and qualification on student's spi performance
5.a	Father's income vs spi performance

5.b	Father's occupation vs spi performance
5.c	Father's qualification vs spi performance

In this paper following result has been get by analyzing data as per the described in table 2.

1. Attendance Vs SPI Correlation:

Table 3: Attendance Vs SPI Correlation

SEMESTER	CORRELATION
FIRST	0.22
SECOND	0.47
THIRD	0.37

2. Library Usage Vs SPI Performance

Table 4: Library Usage Vs SPI Performance (First vs Second Semester)

FIRST VS SECOND SEM PEROFORMANCE			
LIBRARY USAGE	SPI INCREASED	SPI DECREASED	TOTAL
Poor	10	16	26
Average	8	19	27
Good	3	2	5
Excellent	-	2	2
TOTAL	21	39	60

Table 5: Library Usage Vs SPI Performance (Second vs Third Semester)

SECOND VS THIRD SEM PEROFORMANCE			
LIBRARY USAGE	SPI INCREASED	SPI DECREASED	TOTAL
Poor	11	15	26
Average	5	22	27
Good	-	5	5
Excellent	1	1	2
TOTAL	17	43	60

Table 6: Weekly Library Usage Vs SPI Performance (overall performance)

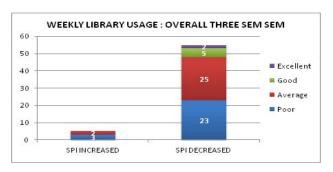| OVERALL THREE SEM PEROFORMANCE			
LIBRARY USAGE	SPI INCREASED	SPI DECREASED	TOTAL
Poor	3	23	26
Average	2	25	27
Good	-	5	5
Excellent	-	2	2
TOTAL	5	55	60

WEEKLY LIBRARY USAGE : OVERALL THREE SEM SEM

Fig I: Weekly Library Usage(overall performance)

2. B Library Reading Material

Table 7: Reading Material (First to Second Sem) vs SPI Performance

LIBRARY READING MATERIAL VS SPI PERFORMANCE			
FIRST VS SECOND SEM PEROFORMANCE			
LIBRARY READING	SPI INCREASED	SPI DECREASED	TOTAL
Newspaper, Magazines And Others	-	1	1
Others Or Newspaper And Magazines	5	7	12
Subject Books And Magazines Or Newspaper	4	11	15
Subject Books, Magazines And News Paper	3	3	6
Subject Books, Subject Books And Others	9	17	26
TOTAL	21	39	60

Table 8: Reading Material (Second to Third Sem) vs SPI Performance

SECOND VS THIRD SEM PEROFORMANCE			
LIBRARY READING	SPI INCREASED	SPI DECREASED	TOTAL
Newspaper, Magazines And Others	-	1	1
Others Or Newspaper And Magazines	1	11	12
Subject Books And Magazines Or Newspaper	5	10	15
Subject Books, Magazines And News Paper	1	5	6
Subject Books, Subject Books And Others	10	16	26
TOTAL	17	43	60

Table 9: Reading Material (overall performance) vs SPI Performance

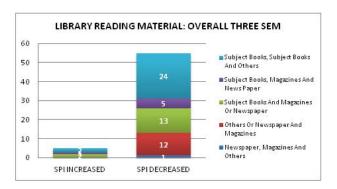| OVERALL THREE SEM PEROFORMANCE			
LIBRARY READING	SPI INCREASED	SPI DECREASED	TOTAL
Newspaper, Magazines And Others	-	1	1
Others Or Newspaper And Magazines	-	12	12
Subject Books And Magazines Or Newspaper	2	13	15
Subject Books, Magazines And News Paper	1	5	6
Subject Books, Subject Books And Others	2	24	26
TOTAL	5	55	60

LIBRARY READING MATERIAL: OVERALL THREE SEM

Fig II: Library Reading Material Usage (overall performance)

3. Computer Lab Usage Vs SPI Performance

Table 10: Lab Usage (second vs third performance) vs SPI Performance

SECOND VS THIRD SEM PEROFORMANCE			
COMPUTER LAB USAGE	SPI INCREASED	SPI DECREASED	TOTAL
Poor	11	25	36
Adequate	-	3	3
Average	2	7	9
Good	3	5	8
Excellent	1	3	4
TOTAL	17	43	60

Table 11: Lab Usage (First vs Second performance) vs SPI Performance]

COMPUTER LAB USAGE VS SPI PERFORMANCE			
FIRST VS SECOND SEM PEROFORMANCE			
COMPUTER LAB USAGE	SPI INCREASED	SPI DECREASED	TOTAL
Poor	15	21	36
Adequate	1	2	3
Average	3	6	9
Good	2	6	8
Excellent	-	4	4
TOTAL	21	39	60

Table 12: Computer Lab Usage (overall performance) vs SPI Performance

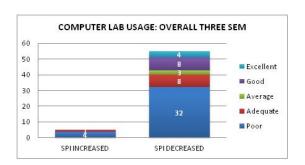| OVERALL THREE SEM PEROFORMANCE			
COMPUTER LAB USAGE	SPI INCREASED	SPI DECREASED	TOTAL
Poor	4	32	36
Adequate	1	8	9
Average	-	3	3
Good	-	8	8
Excellent	-	4	4
TOTAL	5	55	60

Fig III: Computer Lab Usage(overall performance)

4. Area of Interest Vs SPI Performance

Table13: Area of Interest (First to Second sem) vs SPI Performance

AREA OF INTEREST VS SPI PERFORMANCE			
FIRST VS SECOND SEM PEROFORMANCE			
AREA OF INTEREST	SPI INCREASED	SPI DECREASED	TOTAL
Database	2	6	8
Designing	2	3	5
Mobile Application Development	2	3	5
Networking	2	7	9
Others	3	2	5
Research	2	2	4
Web Application Development	8	16	24
TOTAL	21	39	60

Table14: Area of Interest (Second to Third sem) vs SPI Performance

SECOND VS THIRD SEM PEROFORMANCE			
AREA OF INTEREST	SPI INCREASED	SPI DECREASED	TOTAL
Database	3	5	8
Designing	-	5	5
Mobile Application Development	2	3	5
Networking	3	6	9
Others	1	4	5
Research	-	4	4
Web Application Development	8	16	24
TOTAL	17	43	60

Table15: Area of Interest (overall three sem) vs SPI Performance

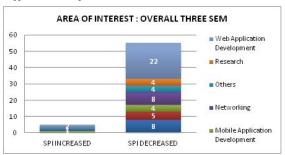| OVERALL THREE SEM PEROFORMANCE			
AREA OF INTEREST	SPI INCREASED	SPI DECREASED	TOTAL
Database	-	8	8
Designing	-	5	5
Mobile Application Development	1	4	5
Networking	1	8	9
Others	1	4	5
Research	-	4	4
Web Application Development	2	22	24

Fig IV: Areal of Interest (overall performance)

5. Impact of Father's Income, Occupation And Qualification On Student's SPI Performance

5. A   Father's Income Vs SPI Performance:

Table16: Father's Income (First to Second sem) vs. SPI Performance

FATHER'S INCOME VS SPI PERFORMANCE			
FIRST VS SECOND SEM PEROFORMANCE			
FATHER'S INCOME	SPI INCREASED	SPI DECREASED	TOTAL
0-1,00,000	5	11	16
1,00,001 – 2,00,000	1	3	4
2,00,001 – 3,00,000	-	2	2
3,00,001 – 5,00,000	10	14	24
Above 5,00,001	5	9	14
TOTAL	21	39	60

[Table17: Father's Income (Second to Third sem) vs SPI Performance]

SECOND VS THIRD SEM PEROFORMANCE			
FATHER'S INCOME	SPI INCREASED	SPI DECREASED	TOTAL
0-1,00,000	5	11	16
1,00,001 – 2,00,000	1	3	4
2,00,001 – 3,00,000	1	1	2
3,00,001 – 5,00,000	5	19	24
Above 5,00,001	5	9	14
TOTAL	17	43	60

5. B Father's Occupation Vs SPI Performance

Table18: Father's Occupation (First vs Second sem) vs SPI Performance

FATHER'S OCCUPATION VS SPI PERFORMANCE			
FIRST VS SECOND SEM PEROFORMANCE			
FATHER'S OCCUPATION	SPI INCREASED	SPI DECREASED	TOTAL
Government Employee	5	6	11
Private Employee	3	11	14
Others	13	22	35
TOTAL	21	39	60

Table19: Father's Occupation (second vs. third sem) SPI Performance

SECOND VS THIRD SEM PEROFORMANCE			
FATHER'S OCCUPATION	SPI INCREASED	SPI DECREASED	TOTAL
Government Employee	2	9	11
Private Employee	5	9	14
Others	10	25	35
TOTAL	17	43	60

5. C Father's Qualification Vs SPI Performance

Table20: Qualification (First vs Second sem) vs SPI Performance

FATHER'S QUALIFICATION VS SPI PERFORMANCE			
FIRST VS SECOND SEM PEROFORMANCE			
FATHER'S QUALIFICATION	SPI INCREASED	SPI DECREASED	TOTAL
Upto Higher Secondary	7	15	22
Diploma or Graduate	9	19	28
Post Graduate	5	5	10
TOTAL	21	39	60

Table21: Qualification (second vs third sem) vs SPI Performance

SECOND VS THIRD SEM PEROFORMANCE			
FATHER'S QUALIFICATION	SPI INCREASED	SPI DECREASED	TOTAL
Upto Higher Secondary	4	18	22
Diploma or Graduate	10	18	28
Post Graduate	3	7	10
TOTAL	17	43	60

This paper described following result by observed above analysis.

1. Attendance impact on students' performance can be easily determined by the table 2.B. We can see attendance effects on students' performance in same fashion
2. Reverse impact of library usage can be seen from table 3.A and 3.B. around 50% of students' SPI decreased for a given library usage parameters. Students with poor library usage performed outstanding throughout all the semesters while students with average library usage performed un striking. Subject Books And Others study materials helped students to achieve best results rather than study materials like magazines , news papers etc.
3. Usage of computer lab of 50% of the students is poor which says that students are not much focused in using computer lab for practical training.
4. Students with area of interest database and designing worst performed semester by semester. Students with area of interest in web application development performed outstanding compare to all other area of interest
5. It is observed that there is not supplementary impact on SPI by Parents' qualification, occupation and salary

V. CONCLUSION AND FUTURE WORK

This study was based on some selected input variables collected through questionnaire method. After analyzing different influencing factors affected on student performance we obtained some useful results. As per that parameters like attendance, Subject Books and Others study materials, usage of computer lab and area of interest in web application development performed are helped students to achieve best results in the examination. Analyze result also show that fathers' education also impacts on the students' overall performance but would not impact that much as computer lab usage, library usage and attendance impact on the SPI of each student since students are matured at this age and can build their future by their own though parent's supports and guidance also needed along with professors. As a result, having the information generated through our experiment, institution would be able to identify effected parameters on student performance, and students results can be increased by taking suggested action in the paper.   Furthermore, we intent to enlarge the experiments by giving rank on the highly affected parameters on student performance and apply data mining techniques on student's demographic and examination data to find the hidden information among.

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