

An empirical study on the effect of repeated online/offline transitions on student satisfaction

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Abstract- The disruption due to COVID has been two-fold due to the uncertainty of the pandemic. Once the first wave had subsided the academic activities resumed in offline mode. But due to the rise of the second wave of COVID the classes had to be again shifted to online mode. Such drastic changes in the teaching-learning process will definitely have an impact on the student satisfaction. Hence an empirical study was carried out to understand the mindset of the students and how these transitions have distracted the teaching-learning process from a student point of view. Student satisfaction analysis was conducted with the major scales namely 'Faculty support', 'Peer support', 'Student learning' and 'Assessment'. Each of these scales were further divided into subscales and the influence of each of these subscales on 'Student Satisfaction' is also discussed in detail. Analysis is carried out through stepwise regression analysis, analysis of variance and correlation. Apart from these a brief analysis on the impact of parent support on the student's learning process is also compiled for better understanding. The results and conclusions from this analysis give us an understanding of how the teachers could better understand the teaching-learning process and adapt themselves accordingly for better results.

Keywords- Likert, online teaching, correlation analysis, regression, student satisfaction

JEET Category - Research

I. INTRODUCTION

Education system all over the world was abruptly brought to a standstill due to the Covid-19 pandemic. So there has never been a more crucial time to adapt to various online modes of instruction to ensure that schools, colleges, and all educational institutions continue to impart education in a seamless manner. Students and teachers from all walks of life, all over the world have risen to the challenge and have quickly adapted to online teaching and learning methods, respectively.

Online courses are not completely new though; they have been available for a few years, although the current scale of synchronized online teaching and learning is completely unprecedented in the history of education. New tools for online teaching and learning are coming up every day and the tools that have existed for some time, are seeing substantial updates too. Faculty in our University, in tune with the rest of the world, have been keeping up to date on the teaching and learning tools, both old and new and have been able to successfully implement online mode of instructions for all our classes across all the colleges in the University. Student learning has continued to take paramount importance and we have ensured that learning continues in a seamless fashion by replicating and bettering the

Student learning experience via our online classrooms. Online teaching has been an excellent tool to ensure continuity to student learning, although there is a noticeable demerit to it in terms of teachers able to gauge Student satisfaction in their online classes. This paper deals with a study of student satisfaction in online mode of instruction. This paper deals with studying student satisfaction in online teaching.

There are extensive studies that have already been conducted by various authors on Distance and Online learning and some of them have been discussed here. A study related to online doctoral programmes describing the experience of the students was conducted (Ä, Kleiner and Hess, 2006). It was observed that students undergoing online mode of instruction had the same positive experiences as an offline classroom setting. A study was conducted on the multiple factors influencing student preferences in both online and traditional learning environments and the results were compared in detail (Beyth-Marom *et al.*, 2003). In this case, the students had the autonomy to select the mode of instruction and students were not forced into either online or traditional mode of learning. The results showed that students who opted for online teaching wanted more freedom in their daily affairs unlike the students who preferred traditional classrooms. There have been various discussions on the mechanisms to be used to collect data relating to Student Satisfaction and Student Participation through Online Discussion Forums for Distance Education (da Silva, Barbosa and Gomes, 2019). The results have shown excellent student interactions in the initial sessions, but were found to reduce in subsequent semesters. Hence, significant steps have to be taken to make sure that the student participation remains steady throughout the length of the programme. The instructor has been found to be the major factor influencing the student satisfaction along with the student perception of the technology (Hermans, Haytko and Mott-stenerson, 2009). A discussion on the implications of synchronous and asynchronous teaching techniques revealed that while faculty get a chance to interact with the students in synchronous learning, the same is not possible during asynchronous teaching. Some studies reported that Online and Offline teaching-learning methods were equally effective for individual courses where a comparison between the two was applied (Kalpokaite and Radivojevic, 2020). Empirical studies have been carried out to understand the student satisfaction in online tutorial. Multiple hypothesis were selected and surveys were conducted to study the 'Student satisfaction' (Harsasi and Sutawijaya, 2018). 'Student satisfaction' and student outcomes were also studied in offline mode where videos were used for the

teaching-learning process. Different types of lecture video styles were used to study the student behaviour through surveys (Choe *et al.*, 2019). Higher order techniques such as machine learning were used to predict the student satisfaction for understanding the success of online courses (Hew *et al.*, 2020). ‘Student satisfaction’ was studied as an outcome teaching quality during online sessions for medical students. Positive results were reported as the student satisfaction was extremely high and they were satisfied with the interactive way the classes were conducted (Fatani, 2020). A similar study was conducted for the faculty and student satisfaction in medical education. Technical problems during classes and the higher workload was identified as the reasons for reduced productivity (Elshami *et al.*, 2021). The instructors ability to create interest in a subject, availability of the faculty to have discussions were some of the major factors that were observed as the key indicators affecting the Student Satisfaction (Payne and Hamzaee, 2011). Instructors quality and student expectation were identified as the two most important factors affecting the ‘Student satisfaction’. The study was conducted on management students where the mode of teaching had been changed to online due to the pandemic (Gopal, Singh and Aggarwal, 2021). Research has also been carried out related to Student Satisfaction prediction (Kuo *et al.*, 2013). The reports showed that the major contributors to Student Satisfaction were learner-instructor interaction, learner-content interaction, and internet self-efficacy. The above-mentioned factors also seemed to be influenced by gender and duration of online engagement. Student Satisfaction has been successfully measured by employing various software tools (Mahmud, Khan and Lima, 2018). Student satisfaction was revealed from the reports to be dependent on teaching quality and learning resources. The article also brought forth a poor relationship between curriculum satisfaction and student satisfaction. The interactions contributing to Student Satisfaction were discussed and the most critical interactions were found to be in Learner-Learner interaction, Student-Student interaction and Student-Content interaction (Moore, 1989). The dependency of multiple factors on Student Satisfaction has been successfully studied using Regression and other statistical methods. (Palmer and Holt, 2009), Palmer and Holt (2009) reported such an article where it was found that 5 items significantly contributed to the development of the student satisfaction model. Authors have studied such interactions in detail. Learner-Learner interaction was the focus of a study by (Sharp and Huett, 2005) for distance education, where there was an emphasis on the significance of interaction on Student Satisfaction. A few factors have carried great weightage in motivating effective teaching among the students, some of which are adapting to student needs, using meaningful examples, motivation, facilitation, delivery and effective communication (Young, 2010). To understand student behaviour, surveys have proved to be one of the most effective ways of gathering information from students. Different questionnaires have been shown in several literature. The questionnaires are typically designed in the Likert scale and then converted into numbers for further analysis (Strong, 2012). Distance Education Learning Environment Survey is also one of the commonly used parameters for deciding the sub-scales in each of the factors affecting student satisfaction (Walker and Fraser, 2005). Along with Regression and other statistical

techniques which are frequently used to study Student Satisfaction, Machine learning has started being useful to improve the Online Education Model (Villegas-Ch, Román-Cañizares and Palacios-Pacheco, 2020). Integration of Machine Learning with Learning Management Systems was proposed by the authors as a measure to improve Student Satisfaction.

II. METHODOLOGY

The basic constructs which were used for the purpose of the survey were ‘Faculty support’, ‘Peer support’, ‘Student learning’ and ‘Assessment’. Each of these scales were further divided into subscales and these subscales have been represented in the surveys. The surveys were delivered online through Google Forms. The link for the surveys were shared through student groups. A total of 275 responses were expected from the students. The empty and incomplete responses were removed and the total number of responses for this survey stood at 112. Hence 75% of the total responses were considered for the further analysis. Each of the questions were posed to the students in a 5 point Likert scale in the form 5 – Always, 4 – Often, 3 – Sometimes, Seldom – 2 and Never – 1. Faculty student interaction consisted of 8 subscales. ‘Faculty support’ consisted of 5 subscales, ‘Peer support’ consists of 3 subscales, ‘Student learning’ consists of 3 subscales and ‘Assessment’ consists of 4 subscales. Table I indicates the mean and standard deviation of the various responses collected for the individual factors. Assessment had the highest rating with a mean of 4.12 and that indicates the students were satisfied with all the subscales of assessment.

TABLE I
STATISTICS FOR FACTORS USED IN THE SURVEY

Constructs	No. of subscales	Surveys collected	Mean	S.D.
Faculty support	5	251	3.46	1.27
Peer support	3	251	3.48	1.35
Student learning	3	251	3.66	1.07
Assessment	4	251	4.12	1.03

Table II shows the various statistics for the subscales of faculty support. “Class discussions” during the lectures was the first subscale. ‘After class discussions’ between the faculty and student is the second subscale. ‘Doubt clearing sessions’ conducted in the class is the third subscale. ‘Frequency of discussions’ is the fourth subscale. ‘Tips and tricks given by faculty’ during the class sessions is the fifth subscale. ‘Doubt clearing sessions’ had the highest response of 3.98 and ‘after class discussions’ had the lowest rating among the subscales.

TABLE II
STATISTICS FOR FACULTY SUPPORT

Factors	N	Mean	S.D.
Class discussions	251	3.37	1.24
After class discussions	251	2.99	1.32
Doubt clearing sessions	251	3.98	1.10
Frequency of discussions	251	3.08	1.28
Tips and tricks given by faculty	251	3.85	1.08

Table III shows the subscales used in peer support. “Class discussions” during the lectures was the first subscale. ‘After class discussions’ between the faculty and student is the second subscale and the students rated it the most at a mean of 3.89. ‘Group work’ among students is the third subscale under consideration.

TABLE III
STATISTICS FOR PEER SUPPORT

Factors	N	Mean	S.D.
Class discussions	251	3.22	1.38
After class discussions	251	3.89	1.18
Group work	251	3.33	1.37

Table IV shows the statistics for student learning. 'Self-revision' by students, teaching through 'power point presentations', teaching through 'Interactive board' are the three subscales here. Students were most satisfied with the teaching using Interactive boards as the mean was the highest at 3.87.

TABLE IV
STATISTICS FOR STUDENT LEARNING

Factors	N	Mean	S.D.
Self-revision	251	3.48	1.12
PPT	251	3.64	1.03
Interactive board	251	3.87	1.01

Table V shows the subscales which are a part of the assessment process. 'Honesty during submissions' of assessment / assignments, 'Honesty during exams', competency of 'Multiple choice questions (MCQ)' and preference for 'Multiple choice questions (MCQ)' were the subscales.

TABLE V
STATISTICS FOR ASSESSMENT

Factors	N	Mean	S.D.
Honesty during submissions	251	4.37	0.87
Honesty during exams	251	4.24	0.91
MCQ competency	251	3.92	1.11
MCQ preference	251	3.96	1.12

Student satisfaction is studied through multiple subscales as shown in Table VI. Overall 'Learning experience', preference for 'online sessions for next semester', experience of 'Transition from offline to online', 'Happiness with online classes', 'Satisfied with lecture duration' of 50 minutes, preference for 'Online mode of teaching for all the subjects' are the various subscales used.

TABLE VI
STATISTICS FOR STUDENT SATISFACTION

Factors	N	Mean	S.D.
Learning experience	251	3.23	1.19
Online sessions for next semester?	251	3.20	1.50
Transition from offline to online	251	3.04	1.34
Happiness with online classes	251	3.09	1.42
Satisfied with lecture duration	251	3.83	1.10
Online mode of teaching for all the subjects	251	3.70	1.21

The Cronbach coefficient was determined in order to test the reliability of the survey and is shown in Table VII. It was observed that the correlation and consistency between the survey results was adequate as all the values were between 0.7 and 1.0. Figure 1 also shows the reliability analysis and positive correlation was observed between the survey results.

TABLE VII
RELIABILITY STUDY OF THE SURVEY RESPONSES

Constructs	Cronbach's Alpha
Faculty support	0.8074
Peer support	0.8410
Student learning	0.7744
Assessment	0.8187
Overall Satisfaction	0.7959

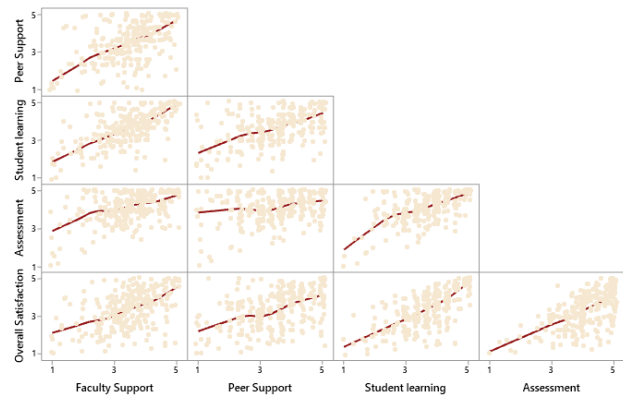


Fig. 1. Reliability analysis of the survey results

The results from the survey are further analyzed in Table VIII in order to understand the student preferences for the various subscales.

TABLE VIII
LIKERT SCALE FREQUENCIES

Scales	Subscales	Likert Scale				
		5	4	3	2	1
Faculty support	Class discussions	52	74	71	26	29
	After class discussions	38	58	66	44	46
	Doubt clearing sessions	102	81	41	18	10
	Frequency of discussions	41	59	69	46	37
	Tips and tricks given by faculty	80	92	55	12	13
Peer support	Class discussions	61	51	63	36	41
	After class discussions	103	63	55	17	14
	Group work	65	59	60	30	38
	Self-revision	54	72	79	34	13
Student learning	PPT	53	100	63	28	8
	Interactive board	75	100	53	17	7
Assessment	Honesty during submissions	144	69	28	9	2
	Honesty during exams	124	77	42	5	4
	MCQ competency	96	79	49	17	11
	MCQ preference	101	79	46	13	13
Satisfaction	Learning experience	36	77	80	28	31
	Online sessions for next semester?	67	53	53	21	58
	Transition from offline to online	41	57	75	29	50
	Happy with online classes	50	61	57	29	55
	Lecture duration	82	86	55	17	12
	Online teaching preference	77	81	57	15	22

III. OVERALL STUDENT SATISFACTION ANALYSIS

Analysis of variance of the student satisfaction is conducted using the Analysis of variance and the results are shown in Table IX.

TABLE IX
ANALYSIS OF VARIANCE OF OVERALL STUDENT SATISFACTION

Source	DF	SS	MS	F-Value
Peer Support	1	3.641	3.6408	7.75
Student learning	1	25.441	25.4412	54.19
Assessment	1	16.634	16.6336	35.43

Only the significant factors affecting student satisfaction are mentioned in the table and the other insignificant factors are removed. It is observed that 'Student Learning' is the most important factor that governs the 'Student satisfaction'. 'Assessment' is the second most important factor followed by 'Peer support'. Through further Regression analysis the results of the Analysis of variance are validated as shown in Table X. The VIF values shown in the Table indicate that there is very less collinearity between the predictors chosen for analysis.

TABLE X
VARIANCE INFLATION FACTOR

Term	Coef	SE Coef	T-Value	P-Value	VIF
Peer Support	0.1322	0.0475	2.78	0.006	1.32
Student learning	0.4857	0.0660	7.36	0.000	1.80
Assessment	0.4073	0.0684	5.95	0.000	1.53

As per the analysis the regression equation that best defines the relationship between the 'student satisfaction' and the control factors is given below,

$$\text{Overall Satisfaction} = -0.569 + 0.1322 \text{ Peer Support} + 0.4857 \text{ Student learning} + 0.4073 \text{ Assessment} \quad (1)$$

Figure 2 shows the Pareto chart for the standardized factors which affect the 'Student Satisfaction'. The results of Analysis of variance are validated through the Pareto chart as 'Student learning' is the most significant factor affecting the satisfaction of students.

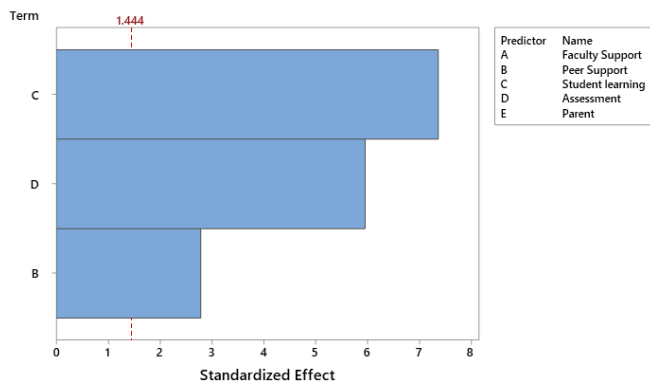


Fig.2. Pareto chart of the standardized effects

Correlation co-efficient between the all the survey responses was analyzed and is depicted in the Figure 3. A positive correlation between the various factors and the 'Student Satisfaction' is observed through the figure and it indicates that the data is reliable.

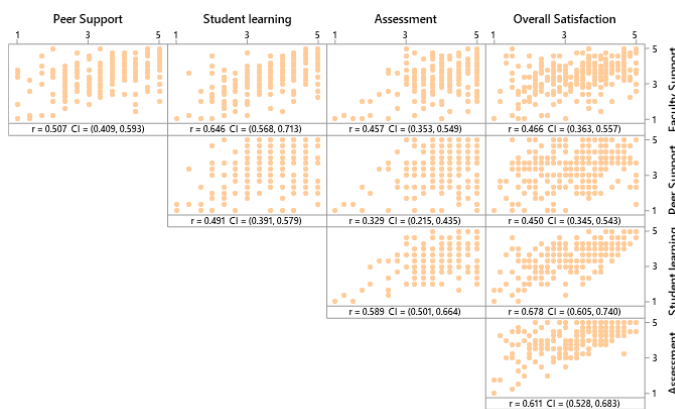


Fig.3. Correlation co-efficient between the variables

Effect of 'Faculty support' on 'Student Satisfaction'

The analysis is further conducted in order to observe the effect of 'Faculty support' subscales on the 'Student Satisfaction'. Analysis of variance is conducted and the results are depicted in the Table XI. The analysis concludes that 'Tips and tricks given by the faculty' had the highest f-value and with the least

p-value was the most significant factor affecting the 'Student satisfaction'. The second most important factor was 'After class discussions' followed by 'Frequency of discussions'.

TABLE XI
ANALYSIS OF VARIANCE OF FACULTY SUPPORT

Subscales	DF	SS	MS	F-Value	P-Value
After class discussions	1	4.606	4.6058	5.98	0.015
Frequency of discussions	1	2.437	2.4371	3.16	0.077
Tips and tricks given by faculty	1	26.323	26.3231	34.15	0.000

Stepwise regression is conducted in order to validate the test of analysis of variance. The equation below represents the relationship between the 'Student satisfaction' and the sub-scales of faculty support.

$$\text{Overall Satisfaction} = 1.433 + 0.1278 \text{ after class discussions} + 0.0967 \text{ Frequency of discussions} + 0.3207 \text{ Tips and tricks given by faculty} \quad (2)$$

The stepwise regression analysis considers only the significant factors for developing the relational equation. Figure 4 shows the pareto chart for the standardized factors which affect the 'Student Satisfaction'. The results of Analysis of variance are validated through the pareto chart as 'tips and tricks given by faculty' is the most significant factor affecting the satisfaction of students.

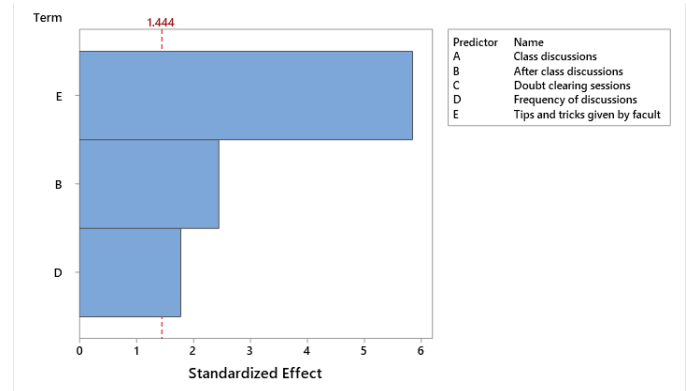


Fig.4. Pareto chart of the standardized effects

Correlation co-efficient between the all the survey responses was analyzed and is depicted in the Table XII. A positive correlation between the various factors and the 'Student Satisfaction' is observed through the table and it indicates that the data is reliable.

TABLE XII
CORRELATION COEFFICIENT FOR FACULTY SUPPORT

Subscales	Class discussions	After class discussions	Doubt clearing sessions	Frequency of discussions	Tips and tricks given by faculty
After class discussions	0.612				
Doubt clearing sessions	0.499	0.369			
Frequency of discussions	0.456	0.587	0.417		
Tips and tricks given by faculty	0.411	0.300	0.455	0.338	
Overall Satisfaction	0.301	0.343	0.335	0.338	0.437

Effect of 'Peer support' on 'Student Satisfaction'

Stepwise regression analysis of 'peer support' is conducted to get the relation between the 'Peer support' subscales and the 'Student satisfaction'. The insignificant factors are negated and the generated equation is given below. The effect of 'Peer support' on the 'Student satisfaction' is analyzed here further using analysis of variance and the results are shown in Table XIII. The table shows that 'Group work' among students is the factor which has the most effect on satisfaction.

$$\text{Overall Satisfaction} = 1.819 + 0.2080 \text{ after class discussions} + 0.2162 \text{ Group work} \quad (3)$$

TABLE XIII
ANALYSIS OF VARIANCE OF PEER SUPPORT

Subscales	DF	SS	MS	F-Value
After class discussions	1	12.23	12.2314	15.11
Group work	1	17.94	17.9377	22.16

The Pareto chart shown in Figure 5 shows the influence of the most significant factors on 'Student satisfaction'. The results from analysis of variance are consistent.

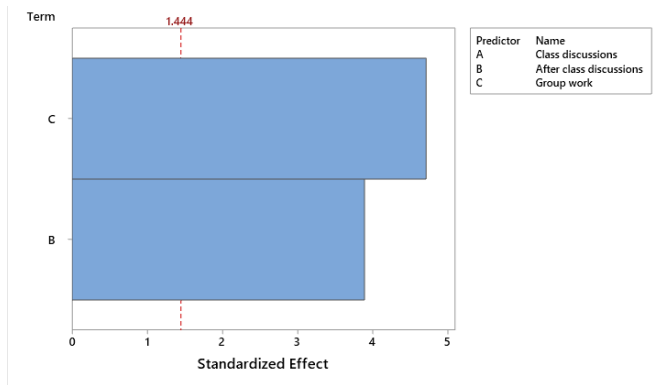


Fig.5. Pareto chart of the standardized effects

The Pearson's correlation co-efficient for the 'Peer support' subscales are shown in Table XIV. A positive correlation between the subscales and the 'Student satisfaction' was observed.

TABLE XIV
CORRELATION COEFFICIENT FOR PEER SUPPORT

Subscales	Class discussions	After class discussions	Group work
After class discussions	0.500		
Group work	0.426	0.436	
Overall Satisfaction	0.306	0.372	0.401

Effect of 'Student learning on 'Student Satisfaction'

'Student learning' comprised of three subscales and it was designed based on the way we conduct our classes. Frequent self-revisions during classes were practiced during the classes. The two primary modes of teaching were 'PowerPoint presentations' and 'Interactive board'. For theory based subjects PowerPoint is the preferred method whereas for subjects that are problem oriented 'Interactive board' was the common tool used by faculty. The regression equation is developed based on these subscales and the equation below represents the same. The results from the analysis of variance (Table XV) show that classes taken through 'PowerPoint' had

the highest impact on student satisfaction followed by self-revision.

$$\text{Overall Satisfaction} = 0.592 + 0.2591 \text{ Self revision every 2 days} + 0.3980 \text{ PPT} + 0.1048 \text{ Interactive board} \quad (4)$$

TABLE XV
ANALYSIS OF VARIANCE OF STUDENT LEARNING

Subscales	DF	SS	MS	F-Value
Self-revision	4	15.108	3.7771	7.19
PPT	4	23.584	5.8960	11.22
Interactive board	4	7.108	1.7770	3.38

The Pareto chart shown in the Figure 6 below shows the amount of significance of the various factors that affect the 'Student satisfaction'. Table XVI indicates the correlation co-efficient between the different variables and a positive correlation is seen between the 'Student Satisfaction' and the control factors.

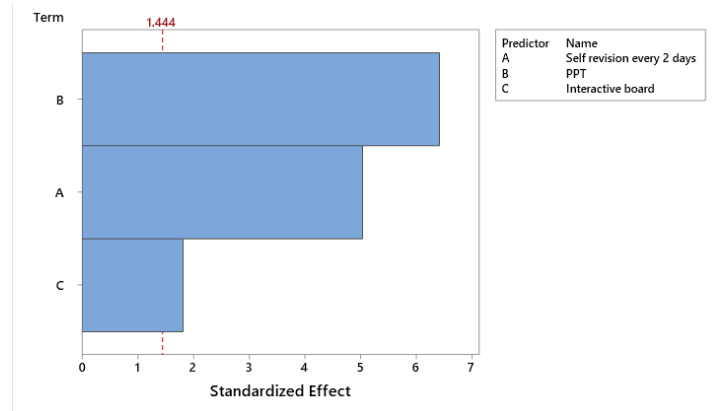


Fig.6. Pareto chart of the standardized effects

TABLE XVI
CORRELATION COEFFICIENT FOR 'STUDENT LEARNING'

Subscales	Self revision	PPT	Interactive board
PPT	0.586		
Interactive board	0.453	0.594	
Overall Satisfaction	0.576	0.640	0.478

Effect of 'Assessment on 'Student Satisfaction'

Assessments also play an important role in the 'Student Satisfaction' and hence it was considered in the analysis. During the online sessions the summative assessments were conducted for students through 'Multiple choice questions' in a proctored way. Initially the students faced some difficulty in adapting the process but later got accustomed to it. Hence it was considered in the analysis. There is also a concern regarding the effectiveness of multiple choice questions for engineering education as it may not have the ability to test the students' abilities to the desired level. Hence MCQ competency and the preference of MCQ for future examinations was also posed as a question in the survey. The overall 'Student satisfaction' equation as a representation of the subscales of assessment is shown in the Equation developed from stepwise regression.

$$\text{Overall Satisfaction} = 0.436 + 0.2209 \text{ Honesty during exams} + 0.2369 \text{ MCQ competency} + 0.2643 \text{ MCQ preference} \quad (5)$$

Analysis of variance results are shown in the Table XVII. All the three factors contribute significantly to the overall student

satisfaction with the MCQ preference for future courses as the main factor.

TABLE XVII
ANALYSIS OF VARIANCE OF 'ASSESSMENT'

Sub-scales	DF	SS	MS	F-Value
Honesty during exams	1	7.615	7.6148	12.15
MCQ competency	1	8.695	8.6953	13.88
MCQ preference	1	12.604	12.6043	20.11

The Pareto chart also validates the result of the analysis of variance as all the three factors can be seen to dominate as shown in the Figure 7. Correlation co-efficient of the various variables are shown in the Table XVIII and it shows a positive correlation between the output and the input.

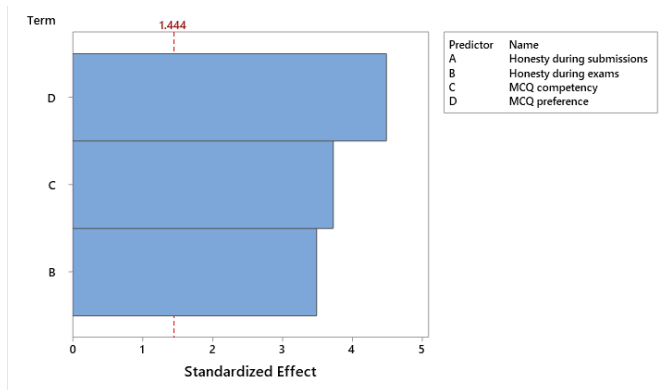


Fig.7. Pareto chart of the standardized effects

TABLE XVIII
CORRELATION COEFFICIENT FOR 'ASSESSMENT'

Subscales	Honesty during submissions	Honesty during exams	MCQ competency	MCQ preference
Honesty during exams	0.606			
MCQ competency	0.382	0.495		
MCQ preference	0.323	0.369	0.652	
Overall Satisfaction	0.342	0.437	0.552	0.538

Parent-Student Interaction

A survey on 'Parent-Student interaction' was also conducted in order to understand how much of a role parents have during online mode of teaching. The three subscales in 'Parent-Student interaction' that were used are 'Parents cooperation', 'Parents assistance required' and 'Study on own'. Basic statistical analysis on the survey data was carried out and the results are shown in Table XIX.

TABLE XIX
STATISTICS FOR 'PARENT SUPPORT'

Likert Scale	Parent-Student Interaction		
	'Parents cooperation'	'Parents assistance required'	'Study on own'
5	132	54	157
	52 %	21 %	62 %
4	70	52	51
	28 %	21 %	20 %
3	30	49	25
	12 %	19 %	10 %
2	15	27	12
	6 %	11 %	5 %
1	5	70	7
	2 %	28 %	3 %

'Parents cooperation' reveals that only 7% of the students were unhappy with the home environment and did not find it conducive productive learning. 'Parents assistance required' was the second subscale and it was observed that almost 40 % of students required the assistance of parents in their day to day learning activity. This question only points at the aspect of what the student expects and does not answer the question whether the parents are actually assisting the students or not. The third subscale 'Study on own' reveals that 92% of the students study on their own majorly and are not getting the expected assistance from parents.

V. CONCLUSIONS

An empirical study was conducted in order to understand the reaction of students towards the teaching learning process through the analysis of student satisfaction. The survey questions were developed based on the teaching environment of our university. Faculty support, Peer support, Student learning and assessment are the major factors that were considered to be influencing the 'Student Satisfaction'. The factors were further divided into subscales in order to study the influence of individual subscales on the 'Student Satisfaction'. It was observed that among the major scales 'Student Learning' and 'Assessment' had the most significant effect on the 'Student satisfaction'. Further analysis showed that in 'Faculty support', the subscale 'Tips and tricks given by faculty' was the most significant factor. In 'Peer support', subscale 'Group work' by students had the most significant impact on the 'Student satisfaction'. In the 'Student learning', the subscale 'Teaching through PPT' had the most significant impact on the 'Student Satisfaction'. Similarly the 'MCQ preference' subscale in 'Assessment' had the most significant impact on the 'Student Satisfaction'. The results obtained have been validated through correlation analysis, stepwise regression analysis and Pareto plots. Further an analysis on the 'Parent support' was carried out to determine the support structure required by the student in order to make the online teaching-learning process more efficient. It was observed that many students mentioned that they needed the assistance of parents but the number of students studying on their own was very high. This is an area which can be further analyzed through detailed questionnaire. Other than these further questions were asked in a descriptive form in order to further understand the challenges faced by the students. Some students raised concern regarding the duration of classes. Classes when conducted continuously for more than 5 hours may lead to strain to the students. Some of the common issues which are associated with online teaching such as accessibility to laboratories, lack of interest in theory topics, distractions in the surrounding and lack of interaction with fellow students were mentioned. The other major issue which was pointed out by many students was the inconsistency in network coverage which led to frequent disturbances in the flow of the classes and wastage of time. This article tends to highlight the various issues the student faces due to the continuous transitions from offline to online classes and vice versa. Based on these conclusions necessary steps could be taken by faculty to understand the problems of students and try methods to eliminate the problem at the start itself. These online sessions are bound to continue until the pandemic is completely under control and these articles may guide the faculty to lead the students better.

REFERENCES

- Ã, M. J. H., Kleiner, C. and Hess, R. F. (2006) 'The experience of nursing students in an online doctoral program in nursing : A phenomenological study', 43, pp. 99–105. doi: 10.1016/j.ijnurstu.2005.03.001.
- Beyth-Marom, R. *et al.* (2003) 'Internet-assisted versus traditional distance learning environments: Factors affecting students' preferences', *Computers and Education*, 41(1), pp. 65–76. doi: 10.1016/S0360-1315(03)00026-5.
- Choe, R. C. *et al.* (2019) 'Student satisfaction and learning outcomes in asynchronous online lecture videos', *CBE Life Sciences Education*, 18(4), pp. 1–14. doi: 10.1187/cbe.18-08-0171.
- Elshami, W. *et al.* (2021) 'Satisfaction with online learning in the new normal: perspective of students and faculty at medical and health sciences colleges', *Medical Education Online*, 26(1). doi: 10.1080/10872981.2021.1920090.
- Fatani, T. H. (2020) 'Student satisfaction with videoconferencing teaching quality during the COVID-19 pandemic', *BMC Medical Education*, 20(1), pp. 1–8. doi: 10.1186/s12909-020-02310-2.
- Gopal, R., Singh, V. and Aggarwal, A. (2021) 'Impact of online classes on the satisfaction and performance of students during the pandemic period of COVID 19', *Education and Information Technologies*, (0123456789). doi: 10.1007/s10639-021-10523-1.
- Harsasi, M. and Sutawijaya, A. (2018) 'Determinants of student satisfaction in online tutorial: A study of a distance education institution', *Turkish Online Journal of Distance Education*, 19(1), pp. 89–99. doi: 10.17718/tojde.382732.
- Hermans, C. M., Haytko, D. L. and Mott-stenerson, B. (2009) 'Student Satisfaction in Web-enhanced Learning Environments', *Journal of Instructional Pedagogies*, 1, pp. 1–19. Available at: <http://www.aabri.com/manuscripts/09147.pdf>.
- Hew, K. F. *et al.* (2020) 'What predicts student satisfaction with MOOCs: A gradient boosting trees supervised machine learning and sentiment analysis approach', *Computers and Education*, 145, p. 103724. doi: 10.1016/j.compedu.2019.103724.
- Kalpokaite, N. and Radivojevic, I. (2020) 'Teaching qualitative data analysis software online: a comparison of face-to-face and e-learning ATLAS.ti courses', *International Journal of Research and Method in Education*, 43(3), pp. 296–310. doi: 10.1080/1743727X.2019.1687666.
- Kuo, Y. *et al.* (2013) 'A predictive study of student satisfaction in online education programs | Kuo | The International Review of Research in Open and Distributed Learning', *The International Review of Research in Open and Distance Learning*, 14(1). Available at: <http://www.irrodl.org/index.php/irrodl/article/view/1338/2416>.
- Mahmud, M. S., Khan, A. G. and Lima, R. P. (2018) 'Measuring students ' satisfaction in the Universities of Bangladesh : An empirical analysis', *International Journal of Multidisciplinary Research and Development*, 5(6), pp. 30–38.
- Moore, M. G. (1989) 'Three Types of Interaction', *American Journal of Distance Education*, 3(2), pp. 1–7. doi: 10.1080/08923648909526659.
- Palmer, S. R. and Holt, D. M. (2009) 'Examining student satisfaction with wholly online learning', *Journal of Computer Assisted Learning*, 25(2), pp. 101–113. doi: 10.1111/j.1365-2729.2008.00294.x.
- Payne, A. and Hamzaee, R. G. (2011) 'An Empirical Analysis Of Student Satisfaction Influential Factors In Online Learning', *Contemporary Issues in Education Research (CIER)*, 2(1), p. 37. doi: 10.19030/cier.v2i1.1104.
- Sharp, J. H. and Huett, J. B. (2005) 'Importance of learner-learner interaction in distance education', *Information systems education journal*, 4(26). doi: <http://isedj.org/4/46/>.
- da Silva, L. F. C., Barbosa, M. W. and Gomes, R. R. (2019) 'Measuring Participation in Distance Education Online Discussion Forums Using Social Network Analysis', *Journal of the Association for Information Science and Technology*, 70(2), pp. 140–150. doi: 10.1002/asi.24080.
- Strong, R. (2012) 'Investigating Students' Satisfaction with eLearning Courses: The Effect of Learning Environment and Social Presence', *Journal of Agricultural Education*, 53(3), pp. 98–110. doi: 10.5032/jae.2012.03098.
- Villegas-Ch, W., Román-Cañizares, M. and Palacios-Pacheco, X. (2020) 'Improvement of an online education model with the integration of machine learning and data analysis in an LMS', *Applied Sciences (Switzerland)*, 10(15). doi: 10.3390/APP10155371.
- Walker, S. L. and Fraser, B. J. (2005) 'Development and validation of an instrument for assessing distance education learning environments in higher education: The Distance Education Learning Environments Survey (DELES)', *Phenomenology and the Cognitive Sciences*, 4(3), pp. 289–308. doi: 10.1007/s10984-005-1568-3.
- Young, S. (2010) 'Student Views of Effective Online Teaching in Higher Education', *American Journal of Distance Education*, 3647(December 2014), pp. 37–41. doi: 10.1207/s15389286ajde2002.