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Analyzing efficacy of eLearning at IIT Kanpur and identifying salient features to blend it with existing classroom education

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Problem Definition

Education system all around the world is moved to online/ e-Learning platform with the current ongoing Covid pandemic. The pandemic forced the educational institutions to shut down in response to Covid control and containment. The case is no exception to IIT Kanpur. College was closed and students learn the concepts from the professors delivered either as recorded or live sessions through various platforms. They complete their assessments, projects with online submissions. Students no longer meet physically; all the interactions remain virtual. Freshers in college have neither seen the batchmates or their faculties in person. The perception on extra-curricular activities have changed its face. This shift in the mode of education has its merits and demerits compared with the classroom education. We conduct a **problem identification research** study to analyse the efficacy and salient features of eLearning at IIT Kanpur to blend it with existing classroom education.

Course structure and its evaluation framework is decided by each faculty. So, the faculty of each subject is the **decision maker**. We discussed the core idea of this project with our mentor, and they were happy to implement any key proposals to improve the course work, but it also depends on the financial investment and support from institution if required any.

Secondary data were collected from various **research journals** from **MDPI** (Multidisciplinary Digital Publishing Institute) and **Science Direct** platforms. The journals included contents on analysis of user satisfaction of online education in Covid 19 era, mental stresses faced by students, and student preferences in online education. The secondary data analysis gave insights on some salient features of eLearning education like Platform technology problems, improvement in two way interaction, preference by gender and so on. The **quantitative analysis** of secondary data provided hypothesis results from the journals implied that student satisfaction is dependent on interactive quality, service quality, personal factors, and access to technology. All these factors were considered while preparing the questionnaire.

Qualitative research study was done by conducting **Focus groups** and **depth interviews**. We used **Dual moderator group** study with eight students from IME MTech selected to participate online. The discussion extended for one hour duration focusing on ease of access to study resources, course content delivery methods & effectiveness, and assessments in online education.

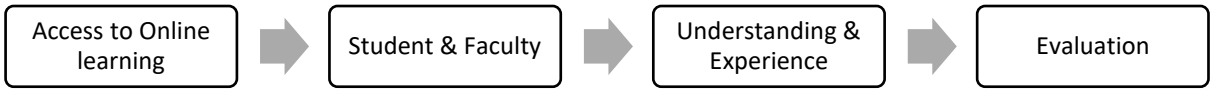
Management decision problem and the marketing research problem.

Management Decision Problem	Market Research Problem
What steps should management take to increase the effectiveness of online teaching?	What are the factors that contribute to the effective delivery of education to students?
What is the scope of the hybrid teaching method combining the factors of both eLearning and classroom teaching methods?	What are the difficulties faced by students and teachers during the online mode of teaching?
	What are the tools and methodologies involved in the online mode of teaching?
	What key components of online teaching can be blended with classroom education?

Approach to the problem

The **broad approach** includes identifying the salient factors of online education at IIT Kanpur with focus groups, depth interviews and review on research journals. The efficacy was identified conducting online survey (a MMR approach) from a sample of large IITK student population with quantitative data analysis. The details on scaling techniques, questionnaire development and pretesting, sampling techniques, and fieldwork are explained in later sections.

Graphical Model



Research Questions are the refined statements on specific parts of the problem defined. It helps us in framing hypothesis which provides guidelines on how, and what the data should be collected, and analysed. Following are the research questions and its hypotheses.

Research Question 1: Does the type of subjects decide the ease of understanding and learning in online mode of education?

Hypothesis 1: Students find the online learning experience to be same irrespective of number of quantitative/qualitative subjects per semester.

Hypothesis 2: Students having majority of quantitative subjects per semester would be having difficulty in understanding subjects in online lectures.

Research Question 2: How does various assessment methods contribute to good learning experience?

Hypothesis 3**:** Students who find offline evaluation comfortable does not find in-video quizzes helpful to find focus in online education.

Hypothesis 4: Students doing group projects/assignment find it difficult in online mode.

Research Question 3: Are there any mental stress faced by the students in online education?

Hypothesis 5: Students spending greater than 5 hours on the screen are experiencing mental stress during online teaching.

Hypothesis 6: Students having strong internet connectivity will not be afraid of losing connection during exams.

Research Question 4: Does various content delivery methods help students find focus in online learning?

Hypothesis 7: Students who found pre-recorded lectures boring find online lectures and discussions of short duration comfortable.

Hypothesis 8: There exists an association between Lectures being boring and quantitative subjects in semester.

The **factors influencing the Research Design** include availability of secondary data, identifying right variables, unbiased responses to questionnaire, heterogeneity of sample.

Research design

The design technique used is **Single Cross-sectional Descriptive Research (Conclusive)**. Primary data for the research design is the responses collected through online survey (**Way**) using google forms, predominantly a **Mobile Marketing Research (MMR)** methodology.

The target population (**Who**) for the research is the IITK student community. The survey intended to find (**What**) the salient features of online education. As the survey being MMR, respondent can fill in the response (**When**) at their convenience. It was shared (**Where**) through the Whatsapp and mailing groups. The result from analysis is used to find (**Why**) the features of online education that could be blend in classroom education.

The **degree of control of the respondent environment** is very low as MMR is used for the survey. The total time taken (**speed**) for administering the survey to the entire sample was around 3 weeks. The total **cost** is creating and collecting the data was zero.

The **primary scales of measurement** included **nominal, ordinal** and **interval**. **Scaling techniques** included both **Comparative** and **Non-comparative** scaling techniques. Comparative scales included **Paired comparison scale** which is used in questions related to quantitative and qualitative subjects. Non-comparative scaling included **Continuous Scale Rating** to collect rating of various factors in online learning and **Itemized Rating Scale** that included **Likert** and **Semantic differential scale** as well. It can be found in the questionnaire given in Appendix.

Questionnaire was created using the inputs focus groups, depth interviews, and secondary data analysis. The questionnaire is divided into four sections with contents on personal information, content delivery, assessment, and some general information on online mode of education. The questions were arranged in a **logical order** with the simple questions as the opening questions. **Structured questions** were used whenever possible, and some **Unstructured questions** were also included. The questions were **pre-coded** for easy analysis. The wordings used were ordinary and neutral. Each question was carefully examined to ensure it has relevance in the analysis.

Pretesting of the questionnaire was done on 7 students from the sample of respondents. This helped in identifying and eliminating some potential errors and problems in the questionnaire.

Sampling requires defining target population. The **target population** for the study is the entire IITK students. They were defined in terms of elements, sampling unit, extent and time as following:

Element	Student
Sampling Unit	Program enrolled, Department
Extent	IITK
Time	3 weeks

The **Probability sampling technique** namely **Simple Random Sampling** were deployed to collect the responses to the questionnaire. Each element in the sample has equal probability of getting selected independently of any other element.

Fieldwork is conducted **internally** using online Google form survey as the students were doing the coursework online. No external resources were used in collecting data.

Data Analysis

The sample size is the number of total responses collected through the survey. Hence the **sample size is 150**. The response had a variety in respondents. The following tabulation provides the basic statistics:

Sample Size	150
Gender	
Male	90%
Female	10%
Age group	
15 – 18	10.7%
19 – 22	18.7%
23 – 26	57.3%
27 – 30	13.3%
Program	
MBA	10.0%
PG	51.3%
PhD	16.7%
UG	22.0%

Department	
Aerospace	7.3%
Chemical	10.7%
Chemistry	2.7%
Civil	6.7%
Computer Science	3.3%
Earth Sciences	4.0%
Economic Sciences	5.3%
Electrical Engineering	4.7%
IME	35.3%
Mathematics & Statistics	5.3%
Mechanical	10.0%
Physics	4.7%
Home Locality type	
Rural	19.3%
Urban	80.7%

The online mode of education has some salient features. These were asked to rate on a scale between 1 and 5 based on student experience. The following were the average ratings:

Factors	**Rating** (on scale of 1 – 5)
Learning Convenience & Flexibility	4.44
Student-Tutor Interaction	2.82
Learning Platform	1.28
Collaboration with peers on group activity	2.73
Assessment Submissions	3.78

Following are the hypotheses to the research questions with the tests used and values either leading to rejection or accepting of null hypothesis.

Hypothesis 1	
Null Hypothesis, $H_0: \mu_1 = \mu_2$	Alternate Hypothesis, $H_a: \mu_1 \neq \mu_2$
The mean of response for experience of content/lecture delivery using online resources of students with majority courses as quantitative or qualitative is same.	The mean of response for experience of content/lecture delivery using online resources of students with majority courses as quantitative or qualitative are different.
Interpretation: Using **two independent sample t-test** we found the **p value=0.001** which led to rejection of null hypothesis thereby stating that there exists a difference in opinion for students having majority courses as quantitative and qualitative.	

Hypothesis 2	
Null Hypothesis, H_0: μ $\geq$ 3	Alternate Hypothesis, H_a: μ $<$ 3
Students having quantitative subjects as the majority courses do not find difficulty in understanding subjects through online teaching resources.	Students having most subjects as quantitative subjects find difficulty in understanding subjects through online teaching resources
Interpretation: From **one sample t test**, we found that **p value(0.000351)** is <0.05 so we reject our null hypothesis which means people find it difficult in understanding quantitative subjects.	

Hypothesis 3	
Null Hypothesis, H_0	Alternate Hypothesis, H_a
Students who find offline evaluation comfortable does not find in-video quizzes helpful to find focus in online education.	Students who find offline evaluation comfortable find in-video quizzes helpful to find focus in online education.
Interpretation: From **crosstab**, we found that most students(~65%) who prefer offline assessments found in-video quizzes effective. Also, **chi square test** proved statistically that people preferring offline evaluation find in-video quizzes helpful. Hence, we reject our null hypothesis.	

Hypothesis 4	
Null Hypothesis, H_0: μ $>$ 3	Alternate Hypothesis, H_a: μ $\leq$ 3
Students had a good learning experience doing group activities/projects online.	Students had a bad experience doing group activities/projects online.
Interpretation: Using **one sample t test**, we found that **t statistic = -9.014** suggesting that null hypothesis should be rejected and to accept the alternate hypothesis. This concludes that student faced difficulty and had a bad experience doing projects/group activities online.	

Hypothesis 5	
Null Hypothesis, H_0: μ $\leq$ 3	Alternate Hypothesis, H_a: μ $>$ 3
Students spending greater than 5 hours on the screen are not experiencing mental stress during online teaching.	Students spending greater than 5 hours on the screen are experiencing mental stress during online teaching.
Interpretation: First we filtered data for only those records where students have filled that they devote more than 5 hours on the screen. From **one sample t test** we found that **p value is <0.05** so we reject our null hypothesis which means that students spending greater than 5 hours on the screen are experiencing mental stress during online teaching.	

Hypothesis 6	
Null Hypothesis, H_0: $\mu \leq 3$	Alternate Hypothesis, H_a: $\mu > 3$
Students having strong internet connectivity will not be afraid of losing connection during exams.	Although students have good connectivity, still they are afraid of losing connection during exams.
Interpretation: From **one sample t test** we found that **p value(0.000052)** is <0.05 so we reject our null hypothesis which means that despite having good internet connectivity, students are afraid of losing connection during exams.	

Hypothesis 7	
Null Hypothesis, H_0: $\mu \geq 2$	Alternate Hypothesis, H_a: $\mu < 2$
Students who found pre-recorded lectures boring find online lectures and discussions of short duration comfortable.	Preferred duration of pre-recorded lectures should be less than 30 minutes
Interpretation: **Cross-tab** for response related to recorded lectures being boring and preferred duration of video lectures suggested that people who found recorded lectures boring(70.3%) preferred short duration of video helpful.(i.e. less than 30 minutes).On further using **one sample t-test** to find the mean of preference of duration we found that the null hypothesis was rejected, i.e., preferred duration should be less than 30 minutes.	

Hypothesis 8	
Null Hypothesis, H_0	Alternate Hypothesis, H_a
There is no association between quantitative subjects and pre-recorded lectures being monotonous	There is association between recorded lectures being boring and quantitative subjects in a semester.
Using **chi square test**(chi square value- 17.609, **p value-0.007287**), we found that there is **association** between quantitative subjects and pre-recorded lectures being monotonous. Hence, we reject the null hypothesis	

Also, association strength value:

Phi	**Cramer's V**	**Contingency Coefficient**
0.343	0.242	0.324

Hypothesis 9	
Null Hypothesis, H_0: $\mu_1 = \mu_2$	Alternate Hypothesis, H_a: $\mu_1 \neq \mu_2$
The mean of response for students experience related to project/group activity doing online with majority courses as quantitative or qualitative are same.	The mean of response for students experience related to project/group activity doing online with majority courses as quantitative or qualitative are different.
Interpretation: Using **two independent sample t-test** we found the **p value=0.001** which lead failure in rejecting null hypothesis. This suggests that there exists no difference in opinion for student having majority courses as quantitative and qualitative.	

Results

1. *Ease of learning with respect to different course types in online education*
   Students with difference in majority of course types (either quantitative or qualitative) have different learning experience in the online mode of education.
   Students having most subjects as quantitative subjects find difficulty in understanding subjects through online teaching resources.
2. *Contribution of various assessments in online learning experience*
   Students who find offline evaluation comfortable find in-video quizzes helpful to find focus in online education.
   Students find it difficult to collaborate with peers for group activities/projects in online mode.
3. *Factors affecting mental state in online learning.*
   Students spending greater than 5 hours on the screen are experiencing mental stress during online teaching.
   Although students have good connectivity, still they are afraid of losing connection during exams.
4. *Factors making content delivery effective.*
   Preferred duration of pre-recorded lectures should be less than 30 minutes.
   There is association between recorded lectures being boring and quantitative subjects in a semester.
5. The mean of response for students' experiences related to project/group activity doing online with majority courses as quantitative or qualitative are same.

Limitations and caveats

1. The research only studies the online learning experience from the perspective of students due to the tine constraint. The opinions of teachers and parents are also critical for a quality research.
2. The study broadly categorizes the experience of online education on quantitative and qualitative subjects. Future studies can comprehensively analyse the from the perspective of individual subject. This will help the course mentor to implement the results better.
3. The survey shared with entire student community could not capture the equivalent representative sample in the responses gathered. PG students had a greater representation than UG students in the sample. This skewness was also observed in terms department as well with Department of Industrial & Management recording the largest responses. This could be separated by collecting the responses at different sampling unit level in future.
4. Decision maker is identified as the faculty advisor of each course. Any financial investments required for a result implementation will need approval from DOAA and other various levels. Hence, multiple decision makers should be considered in future.
5. Due to the current pandemic scenario, all the analysis were done using MMR technique and we could not reach in-person level to capture more responses in the survey.

Conclusions

Online education was never an option for the students at IITK due to the pandemic. They enjoyed a part of it while they could not bear with some factors. Students find convenience & flexibility of learning, and the assessment submissions in online mode of education to be easy while they struggle with the learning platform (MOOKIT), student tutor interaction and to collaborate with peers on group activities.

Students with majority of subjects as quantitative find it difficult to understand the concept compared to qualitative courses. This implies it requires a revision in the content delivery or use of tools to ensure students can grasp the subject well. The mental state of students is not at a very comforting stage as well. Longer duration of their everyday time is being spent on the system that leads to eye strain and

other physical distress. Students not able to meet the colleagues physically also add to the increased mental stress. Students admits misconducts in exams have increased in fear of losing grades as the control of exam environment with invigilators are very limited. Students fears lose in internet connectivity irrespective of the quality of network strength during exams.

Recommendations

1. Recording of classroom lectures should be initiated and should be made available after the lecture hours. This helps students with a slow learning rate or the students who miss classes to go through at their convenience.
2. Content delivery for quantitative subjects should be improved with better tools in online learning.
3. All the assignment and project submissions should be online in the offline education system as well. The submission task for students and collection task for faculties are eased.
4. A system like in-video quizzes should be in place in classroom lectures to engage and to bring focus for every student in the classroom.
5. Online discussion forums (like in Mookit Platform) should be used and encouraged among students and faculties.
6. MOOKIT platform should be improved to user friendly design and the technology service team should be active to ensure students and faculties can reach out as and when required.
7. Online lectures of duration greater than 30 minutes should be divided into multiple videos of duration less than or equal to 30 minutes. In-video quizzes can be included to help find student focus in the online lectures.
8. Quizzes of objective type should be conducted in online platforms while descriptive exams should be conducted offline only when classroom education comes back in place.

Team members and their contribution

Name	Contribution	Rating (out of 10)
Mayank Umrao	Data Analysis, Depth Interviews, Questionnaire Design, Hypothesis Formulation, Report Making, Data cleaning	10
Nitesh Sharma	Data cleaning, Focus Groups, Secondary Data Analysis , Questionnaire Design, Hypothesis Formulation, Report Making	10
Razi Haneef	Data Interpretation, Secondary Data Analysis, Questionnaire Design, Research Question Formulation, Report Making, Depth Interviews	10
Shubham Awasthi	Data Analysis, Focus Groups, Data Interpretation, Questionnaire Design, Research Question Formulation, Report Making	10

APPENDIX A – Questionnaire

Program :_____ **Year of Study** :_____ **Department** :_____

Gender ◯ M ◯ F ◯ Other

On a scale of (1 - 5) rate the Following –	1	2	3	4	5
How do you rate your internet connectively?	◯	◯	◯	◯	◯
How Stressful was you recent online Semester?	◯	◯	◯	◯	◯
Rate yourself in loyalty towards assessments during online mode of assessments.	◯	◯	◯	◯	◯
How effective was lab work in Online Mode (if applicable)?	◯	◯	◯	◯	◯
How many pre recorded Lectures you actually watched for a Course?	◯	◯	◯	◯	◯
Rate yourself to complete pre-recorded lectures on time.	◯	◯	◯	◯	◯
Rate yourself for Attentiveness in live discussions.	◯	◯	◯	◯	◯
Quantitative Subjects (e.g., Mathematics) Ease of study!	◯	◯	◯	◯	◯
Qualitative Subjects (e.g., Humanities) Ease of Study!	◯	◯	◯	◯	◯
Please rate on a scale of 1-5, How stressful was writing exams online?					
Fear of losing internet connection	◯	◯	◯	◯	◯
Laptop Issues	◯	◯	◯	◯	◯
Losing Track of time	◯	◯	◯	◯	◯
Converting handwriting sheets of pdf	◯	◯	◯	◯	◯
Submission on time	◯	◯	◯	◯	◯
Presenting/Submitting Project Online.					
Your attentiveness to listen to others?	◯	◯	◯	◯	◯
Reviewing presentation with coarse instructor!	◯	◯	◯	◯	◯
Your overall personality development?	◯	◯	◯	◯	◯
How often do you think people just read what is just written in their presentation?	◯	◯	◯	◯	◯
Doing Project in a group in online mode.					
Ease of group discussions!	◯	◯	◯	◯	◯
Ease of scheduling discussion with guide1	◯	◯	◯	◯	◯
Ease of project submission!	◯	◯	◯	◯	◯
Ease of time management!	◯	◯	◯	◯	◯
The online Lectures are delivered in the following ways. Please rate your experience in comparison with classroom teaching.					
Recorded Video Lectures	◯	◯	◯	◯	◯
Doubt Clearing in live session	◯	◯	◯	◯	◯
Live video Lectures	◯	◯	◯	◯	◯
Doubt clearing in discussion forum	◯	◯	◯	◯	◯
Rate the following Aspects of Online Learning Experience that you have!					
Convenience and Flexibility	◯	◯	◯	◯	◯
Student – Tutor interaction	◯	◯	◯	◯	◯
Learning Platform	◯	◯	◯	◯	◯
Collaboration with peers on Group Activity	◯	◯	◯	◯	◯
Assessment Submissions	◯	◯	◯	◯	◯

Details of Courses in Previous Semester!

	< 2	3	4	>=5
Total Courses you had	◯	◯	◯	◯
Quantitative Courses (e.g., Probability and Statistics)	◯	◯	◯	◯

What is your preferred duration for the following mode of content delivery?

	< 30 min	30 – 60	> 60 min
Pre-Recorded Videos	◯	◯	◯
Live Lectures	◯	◯	◯
Classroom Lectures	◯	◯	◯

How do you rate your colleague being loyal to the following assessment conducted in online mode?

	Disloyal	can not say	Loyal
Multiple Choice Questions	◯	◯	◯
Descriptive Exams	◯	◯	◯
Projects	◯	◯	◯

Choose Your Proffered Mode for the following assessments!

	Online	Offline	Both Ways
Mid Semester	◯	◯	◯
End Semester	◯	◯	◯
Quizzes	◯	◯	◯
Assignments/Projects	◯	◯	◯

Other Questions

Which mode helps you learn Quantitative Courses Better?	◯ **Classroom Lectures** ◯ **Classroom Lectures with recordings Available** ◯ **Pre-Recorded Lectures** ◯ **Live Lectures**
Which mode of education helps you learn Qualitative Subject better?	◯ Classroom Lectures ◯ Classroom Lectures with recordings Available ◯ Pre-Recorded Lectures ◯ Live Lectures
Attending Quizzes is easy to attend in online mode at your own comfort as compared to classroom quizzes!	◯ Agree ◯ Disagree ◯ Maybe
Do short Quizzes at Regular Interval Keeps you engaged in the course?	◯ Yes ◯ NO ◯ Not Sure
Do you think misconducts have increased during quizzes and term exams conducted during the online mode of teaching?	◯ Yes ◯ No ◯ Can't Say
Some may use unethical ways in online way of assessments. Do you appreciate that?	◯ Not at all! ◯ I don't care
What made you do misconduct in exams?	◯Fear of losing grades ◯ Preparation was poor for the exam ◯ Assessments used to be difficult
More Questions in a short span of time can be helpful controlling misconducts in exams?	◯ Agree ◯ Disagree

Do you think in video quizzes are helpful in having focus in the lectures?	◯ Yes ◯ NO ◯ Some times ◯ NA
How boring are pre-recorded lectures?	◯ Very ◯ Somewhat ◯ Not at all ◯ I have them.
How much time does it take you to create a single pdf and submit for al your answer script?	◯ less than 5 min ◯ 5- 10 min ◯ more than 10 min
Which factors contributed to mental stress during our online mode of education if any?	◯ Working for more hours online (eye strain) ◯ lack of regular interaction with friends. ◯ Lack of extracurricular activities ◯ Other:_____
Your locality types?	◯ Urban ◯ Rural
How much time do you spend each day on an average studding online?	◯ less than 3 hours ◯ 3 to 5 hours ◯ more than 5 hours

APPENDIX B – Visualization of Data

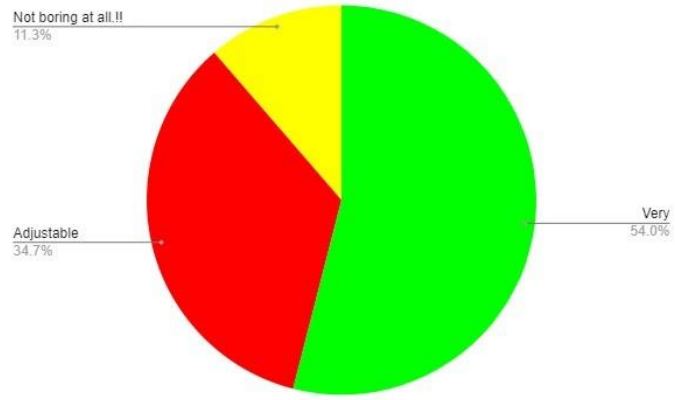


Figure 1: Opinion on pre-recorded lectures

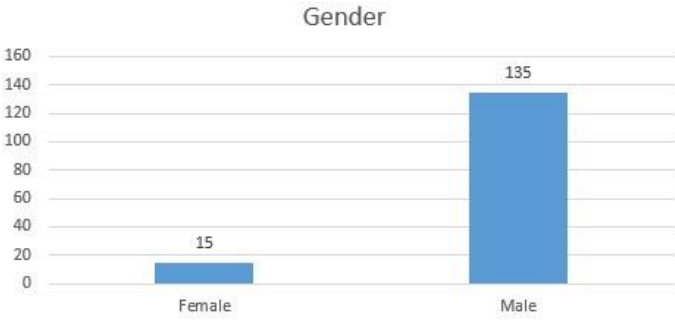


Figure 2: Gender proportion

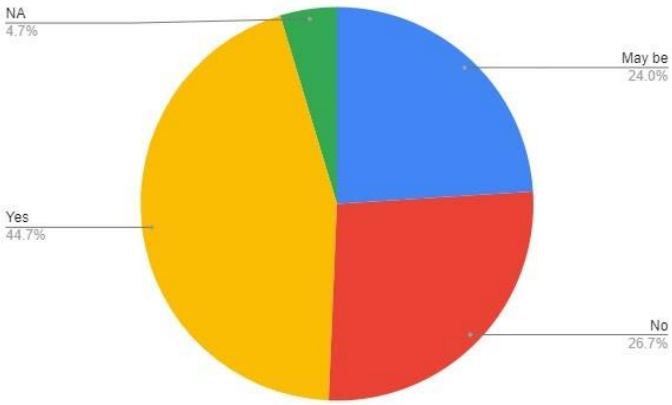


Figure 3: Invideo quizzes opinion (helpful)

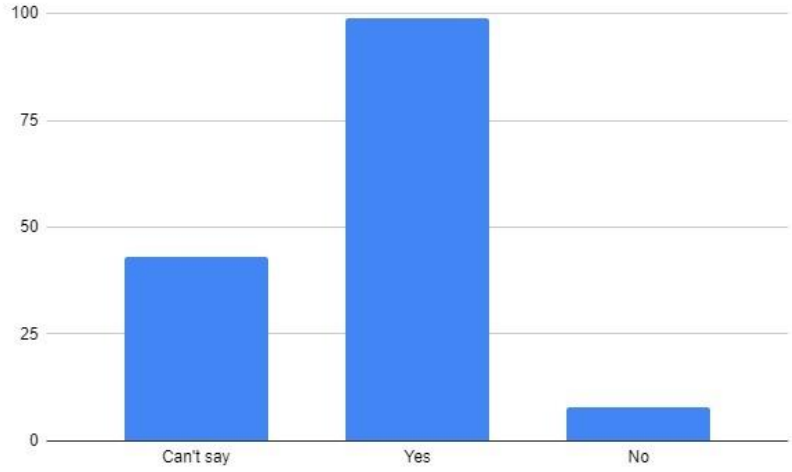


Figure 4: Do you think misconducts have increased in online semester

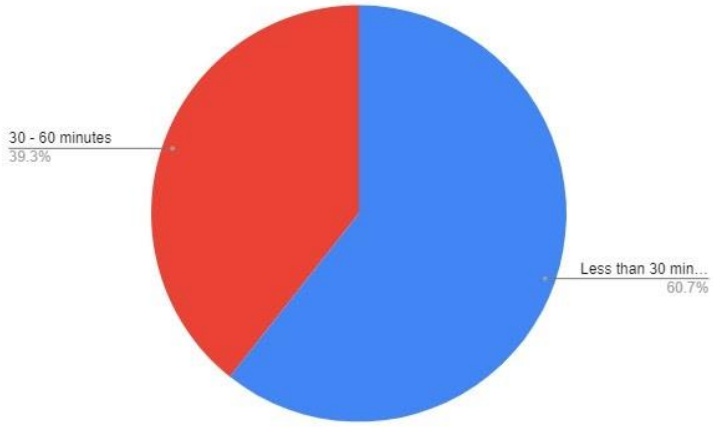


Figure 5: Preferred duration of pre-recorded lectures

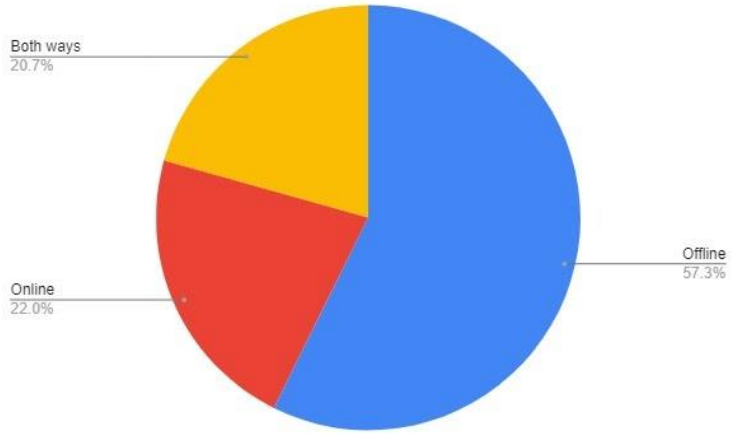


Figure 6: Preferred mode of examination

Figure 7: Content delivery of qualitative courses (opinion)

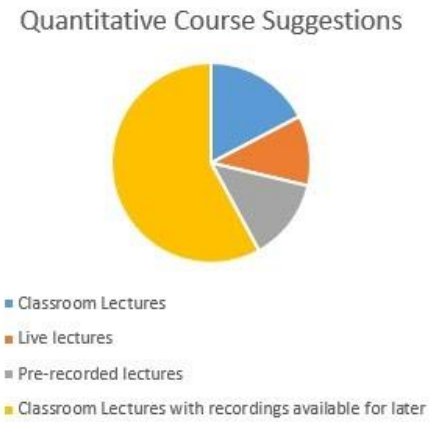


Figure 8: Content delivery of qualitative courses (opinion)

% within Details of courses in previous semester [Quantitative courses]

		How boring are pre-recorded lectures?			
		Adjustable	Not boring at all.!!	Very	Total
Details of courses in previous semester [Quantitative courses]	3	38.6%	7.0%	54.4%	100.0%
	4	42.9%	25.7%	31.4%	100.0%
	5 or more			100.0%	100.0%
	less than equal to 2	27.8%	7.4%	64.8%	100.0%
Total		34.7%	11.3%	54.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.609[a]	6	.007
Likelihood Ratio	18.194	6	.006
N of Valid Cases	150		

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .45.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.343	.007
	Cramer's V	.242	.007
	Contingency Coefficient	.324	.007
N of Valid Cases		150	

Figure 9: Hypothesis 8

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
CousreContentDelivery_ Experience	96	2.7109	.76376	.07795

One-Sample Test

	Test Value = 3					
					90% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
CousreContentDelivery_ Experience	-3.708	95	.000	-.28906	-.4185	-.1596

Figure 10: Hypothesis 2

Figure 10: Hypothesis 6

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Please rate on a scale of 1-5, how stressful was writing exams online? [fear of losing internet connection]	95	3.653	1.5001	.1539

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
ExamStressFactor(Fear of losing connectivity)	4.240	94	.000	.6526	.397	.908

Crosstabs

Figure 11: Hypothesis 7

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
How boring are pre-recorded lectures? * What is your preferred duration for the following modes of content delivery? [Pre-recorded]	150	100.0%	0	0.0%	150	100.0%

How boring are pre-recorded lectures? * What is your preferred duration for the following modes of content delivery? [Pre-recorded] Crosstabulation

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
StressRating	44	3.93	.950	.143

Figure 12: Hypothesis 5

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
StressRating	6.507	43	.000	.932	.69	1.17

Crosstab

% within Do you find in-video quizzes helpful in having focus in the lecture?

		Do you find in-video quizzes helpful in having focus in the lecture?				Total
		May be	NA	No	Yes	
PreferredAssessmentMode(Mid Sem)	Both ways	50.0%	57.1%	10.0%	7.5%	20.7%
	Offline	38.9%	42.9%	65.0%	64.2%	57.3%
	Online	11.1%		25.0%	28.4%	22.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.574[a]	6	.000
Likelihood Ratio	34.300	6	.000
N of Valid Cases	150		

Figure 13: Hypothesis 3

Crosstab

% within Do you find in-video quizzes helpful in having focus in the lecture?

		Do you find in-video quizzes helpful in having focus in the lecture?				Total
		May be	NA	No	Yes	
PreferredAssessmentMode(End Sem)	Both ways	25.0%	57.1%	10.0%	7.5%	14.7%
	Offline	63.9%	42.9%	65.0%	65.7%	64.0%
	Online	11.1%		25.0%	26.9%	21.3%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	19.191[a]	6	.004
Likelihood Ratio	17.502	6	.008
N of Valid Cases	150		

Figure 14: Hypothesis 3

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
CourseProject_Experience	150	2.4800	.70656	.05769

Figure 15: Hypothesis 1

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
CourseProject_Experience	-9.014	149	.000	-.52000	-.6155	-.4245

Figure 10: Hypothesis 6

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Please rate on a scale of 1-5, how stressful was writing exams online? [fear of losing internet connection]	95	3.653	1.5001	.1539

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
ExamStressFactor(Fear of losing connectivity)	4.240	0.000052	.000	.6526	.397	.908

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Preference of duration for pre-recorded lectures	150	1.39	.490	.040

Figure 11: Hypothesis 7

One-Sample Test

	Test Value = 2					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
ExamDurationPreference	-15.160	149	.000	-.607	-.67	-.54