

# **Repercussions of Covid-19 on Education System and framework for Enhancement**

*A project report,  
submitted in partial fulfillment of the requirements for the B. Tech project*

**B.TECH**

*by*

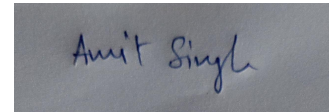
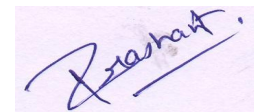
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# CANDIDATE DECLARATION

I hereby certify that the work, which is being presented in the report, entitled **Repercussions of Covid-19 on Education System and framework for Enhancement**, in partial fulfilment of the requirement for the award of the Degree of **Bachelor of Technology** and submitted to the institution is an authentic record of our own work carried out during the period June 2021 to October 2021 under the supervision of **Dr. Arun Kumar**. I also cited the reference about the text(s)/ figure(s)/table(s) from where they have been taken.

A rectangular photograph of a handwritten signature in blue ink on a dark grey background. The signature reads "Amit Singh".A rectangular photograph of a handwritten signature in blue ink on a light pink background. The signature is stylized and appears to read "Dr. Arun Kumar".

Date: 23rd Oct, 2021

Signatures of the Candidates

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Date: 23rd Oct, 2021

Signatures of the Research Supervisor

## **Abstract**

The Indian educational sector has experienced a significant disruptive change due to the COVID-19 Pandemic. Now online learning has become a popular platform in addition to traditional learning methods. Since the existing models are still lagging and unable to address the enablers and barriers of online education, there is a need to revisit the existing model. Through interviews, surveys, and framework creation, this study will propose an e-learning framework from students' perspective in higher education institutes in India. A standard methodology will be adopted for proposing the e learning framework from students perspective. Looking into the current scenario the online learning platform will play a vital role in the upcoming years, proposing a framework from students perspective will help the higher educational institutes in getting better outcomes. This study will consider the unpredictability of pandemic in future and address the untouched aspects of drastic shift in learning methods.

## ACKNOWLEDGEMENTS

We are highly indebted to **Dr Arun Kumar** and are obliged to forgive us for functioning autonomy and experiment with ideas. We would like to take this opportunity to express our profound gratitude to them for their academic guidance and their interest in our project and constant support coupled with confidence-boosting and motivating sessions, which proved very fruitful and were instrumental in infusing self-assurance and trust within us. The nurturing and blossoming of the present work is mainly due to their valuable guidance, suggestions, astute judgment, constructive criticism and an eye for perfection. Our mentor always answered a myriad of our doubts with smiling graciousness and prodigious patience, never letting us feel that we are novices by always lending an ear to our views, appreciating and improving them and by giving us a free hand in our project. It's only because of their overwhelming interest and helpful attitude. The present work has attained the stage it has.

Finally, we are grateful to our Institution and colleagues whose constant encouragement served to renew our spirit, refocus our attention and energy and helped us in carrying out this work.

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# 1. Introduction

In the beginning of 2020 India witnessed SARS-CoV-2 (or covid-19) outbreak, in the fear of huge casualties in terms of lives and looking at the seriousness of the matter a nationwide lockdown was imposed in the country. Around 1 billion students are affected worldwide due to school and university closures during COVID-19 Pandemic[1]. Due to educational institutions' closures this outbreak caused an exceptional impact on education globally[2].

According to the National Statistical Office survey, almost 12.6 percent of all students drop their studies. Dropouts at the secondary level are the highest, being 19.8 percent. Since face-to-face traditional teaching is prohibited, the government gave instructions to all educational institutions to shift from traditional methods to online learning using digital platforms[3]. Higher educational institutions are adopting online learning platforms with different capabilities and strategies to facilitate learning[4]. This shifting to online learning adversely impacted educators, learners, and learning performance[5].

Third wave is a matter of concern for the education system and in the current scenario online academic support is the only solution. Knuckling down towards the uncertainties of the third wave it is the need of the hour to give concrete and practical ideas to enhance online learning.

Online learning methods are more cost-effective than traditional classroom learning methods, but many issues emerge within the context of the effectiveness of e-learning from the perspective of the end user i.e. respondent. There is a need to analyze and observe these situations to discover areas of improvement. This study will theoretically and empirically assess how online learning programs and methods can be managed more effectively in Higher educational institutions.

# 2. Motivation

If we look at the broad or macro level (nation's perspective), the ongoing education system is entrenching a deep mark on future aspects of education. It may affect employment adversely, R&D. A careful, urgent, and well evidence based planning is required to alleviate this pandemic impact on education.

Digital technology is the driving force in today's world, the internet has equipped both the education seeker and the education provider, bringing them together under one virtual roof. The NEP 2020 has a special focus on online education, it emphasizes the creation of virtual labs wherein students can practice their theoretical knowledge. Online tools and platforms like DIKSHA and SWAYAM will be upgraded with new insight to training content, assessment aids, in-class resources, profiles, etc. that will allow seamless interaction and more emphasis will be given to online assessment and examinations.

Students are one of the critical victims of this pandemic. Mainly underrepresented, endangered and disadvantaged students who are facing notable challenges other than academics including financial burden, family responsibilities, they find themselves at a crossroad in their career.

However, there is a plethora of literature and models on online education; still, none of the studies provided a concrete framework to improve the effectiveness of online education. So there is a need to revisit the existing model and literature to propose a framework to enhance the effectiveness of e-learning for higher education.

### 3. Literature Survey

Premier academic databases like Science Direct, Springer, IEEE, Elsevier etc. were explored and 40 papers were downloaded. After going through all the papers a few research studies were selected which addresses the issues regarding the impact of pandemic on the education sector. To explore the various factors of e-learning in higher educational institutes, 9 studies were selected which are mentioned in Table 1.

**Table 1:**

**Select Studies pertaining to e-learning framework on online education in higher education.**

| S.No. | Author/Year | About the study |
|-------|-------------|-----------------|
|-------|-------------|-----------------|



|    |                                 |  |
|----|---------------------------------|--|
| 1. | Aristov <i>et al.</i><br>(2020) | The study presents the perception of higher education students regarding the impacts of covid-19 on education. Its findings show that students in specific areas like Africa and Asia were significantly less satisfied with online mode of education. Most important concerns of students were identified as future professional career, and practical knowledge, anxiety, and frustration. Although it has covered multiple aspects, it does not provide any framework for improvement.[6] |
| 2. | Caldera <i>et al.</i> (2020)    | This study identifies the enablers and barriers of emergency education that can guide engineering teachers to make timely, appropriate decisions for effective learning and teaching outcomes in difficult times. Various categories of barriers of online learning are identified as individual, administrative, financial, practical, social and technical.[7]   |
| 3. | Agariya and Tikoria<br>(2017)   | This study presents a reliable and valid measure consisting of exploratory and confirmatory factor analysis regarding the effectiveness of ICT-responsive classrooms from the perspective of higher education students. The results presented the effectiveness of ICT-responsive classrooms as a multidimensional structure consisting of four elements: class design and infrastructure. Reservations and Adjustments. technical support staff; and availability of resources.[8]          |
| 4. | Mahmoud <i>et al.</i> (2020)    | This article assesses the impact of the shift from traditional offline to online learning due to the COVID19 pandemic on undergraduate students. It also looks at the positive and negative aspects of online learning from the student's perspective. It  |

|    |                               |   |
|----|-------------------------------|---|
|    |                               | shows that more than a third of students are extremely dissatisfied with their online learning experience.[9]   |
| 5. | Marcus L. George (2020)       | This study presents the effective strategies for teaching and examination for undergraduate students during covid and demonstrates different teaching methodologies that avoid degrading of student performance since the last 5 years.[10]   |
| 6. | Richard, <i>et al.</i> (2020) | Research focuses on describing and identifying different strategies of self-regulated learning framework for higher education students learning in an online environment to enhance remote learning with digital and online tools during pandemic. But some important elements for young learners that account for digital well being and satisfaction are uncovered.[11] |
| 7. | Netta <i>et al.</i> (2020)    | This study put forward the impacts of digital transformation in higher education of the young generation due to this pandemic, including the variety of emerging digital divides and possible reported barriers. This study does not provide the enhancement strategy or concrete solutions to overcome the digital divides.[12]  |
| 8. | Leili, <i>et al.</i> (2020)   | This study determines the factors related to higher education students' satisfaction with online education during the pandemic on the basis of dimensions of online learning. And it concluded that the satisfaction of students had decreased significantly. The   |

|    |                                 |  |
|----|---------------------------------|--|
|    |                                 | study has not addressed the scope of improvement in e-learning.[13]  |
| 9. | Mishra, <i>et al.</i><br>(2020) | This study portrays the different modes adopted by the Mizoram University for the teaching-learning evaluations process and evaluation. This address required potentials of online learning but there is no concrete framework to improve the effectiveness of e-learning.[14] |

During the Pandemic, shifting to e-learning by higher education institutions affected learners, teachers and students' learning performance[15]. Higher educational institutions are using a variety of online learning platforms with different features and strategies to facilitate learning.[16]. But to gain a more effective learning process, improvement in the infrastructures and the new policies are required.

Although a plethora of research papers are available, from the literature review no study has been found to provide a concrete framework to improve the effectiveness of online education.

## 4. Objective

Objective of this project is to :

1. Identify the value drivers of e-learning from literature review.
2. Proposing a framework to enhance the effectiveness of e-learning from the student's perspective.

## 5. Methodology

### 5.1 Data Collection

Data collection was done mainly via survey which was consists of three phases:

1. Exploration of major factors deciding the effectiveness of online learning.
2. Interaction with experts and in depth Interviews of respondents to explore and reassure the factors e-learning.
3. Pilot survey was conducted then final responses were collected via web based survey.

## **5.2 Measures**

The questionnaire mainly consisted of closed-ended questions/questions, covering the respondents' demographic and socio-geographical profiles as well as various aspects of e-learning.

The questionnaire was mainly divided into two sections. In which the first section consisted of eight questions on the socio-demographic and academic profile of students such as name, mail ID, Gender, Age, Discipline, College Name, Current Semester, Area of residence. The second section contained various aspects of online education such as Scheduling and Planning, Assessment and Evaluation, Infrastructure, Resource availability, Engagement and Interaction, Industry-Academia Collaboration.

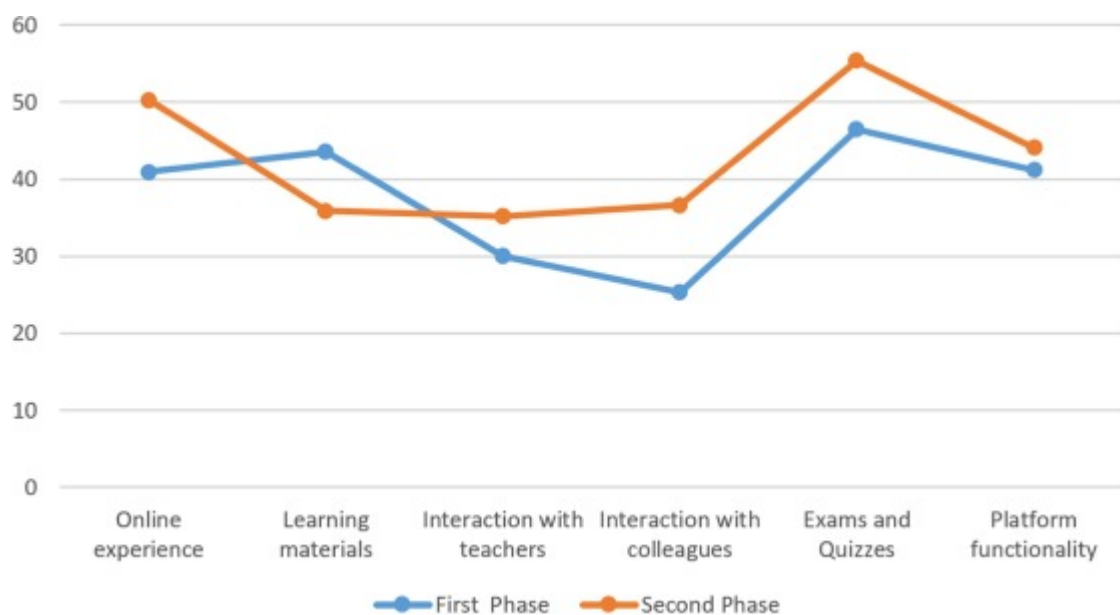
## **5.3 Statistical Analysis**

The data manipulation, compilation/aggregation, and cleaning was done in ms-excel. The data was imported to SPSS 26 and descriptive statistics was performed to present the socio-demographic characteristics of samples. Dimensions were reduced, reliability Of the data was checked and the KMO statistics were performed. In further analysis we carried out exploratory factor analysis with maximum likelihood rotation method: promax with Kaiser normalisation. And various Statistical tests were used to put forward the effective framework for e-learning.

## 6. Discussion

### 6.1 Background

Education sector all over the world has experienced a significant disruptive change due to the COVID-19 Pandemic. Now online learning has become a popular platform in addition to traditional learning methods. Study (Mahmoud et al., 2020) has examined the performance, assessment method and satisfaction of students during erratic duration of pandemic from students perspective. This study was conducted in multiple phases. The first phase, in which a survey to evaluate the shifting of learning methods from traditional to online, shows that the institute, students, and teachers were not ready for such experience that led to the partial coverage of syllabus and dissatisfaction of students.



*Fig. 01 shows that there are more dissatisfied students in the second phase.*

In the next phase of the study, results confirmed that this e-learning approach has multiple aspects i.e. positive and negative. Positive aspects were recognized as safety and convenience but there are a bunch of negative effects such as lack of concentration, distraction, infrastructure,

health issues, insufficient assistance, time management etc. Result of the study stated that the majority of students faced the problems of overburden, reduced focus, distraction and many health issues like spondylitis and psychological problems. More than 60% of the respondents reported that they face the problems of poor internet connectivity and lack of technological devices.

Finally, the study concluded that students encountered several issues like psychological, technical, time management etc. and were unsatisfied during online classes and this ratio increased over the last few semesters. But there is no statistically significant analysis of data that provides any concrete framework to increase the effectiveness. So our study will be putting forward the recommendations and model.

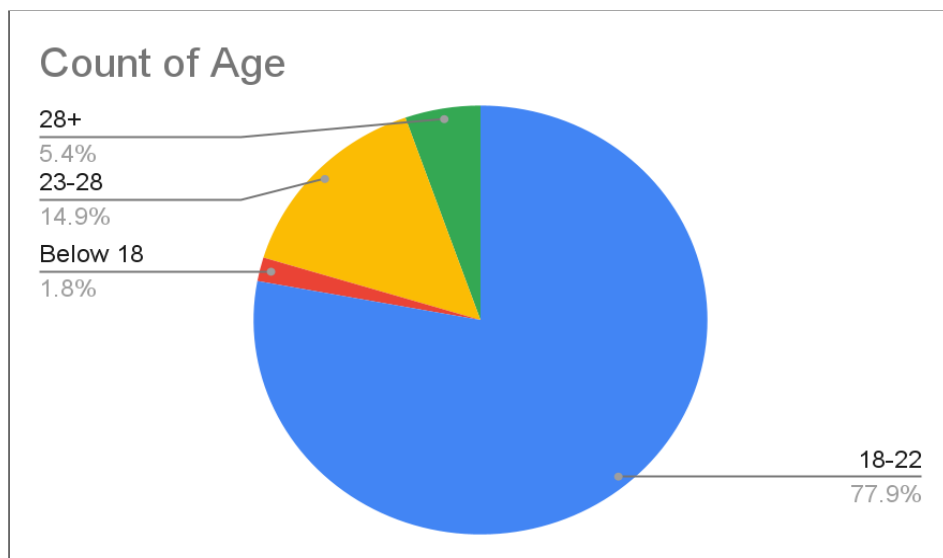
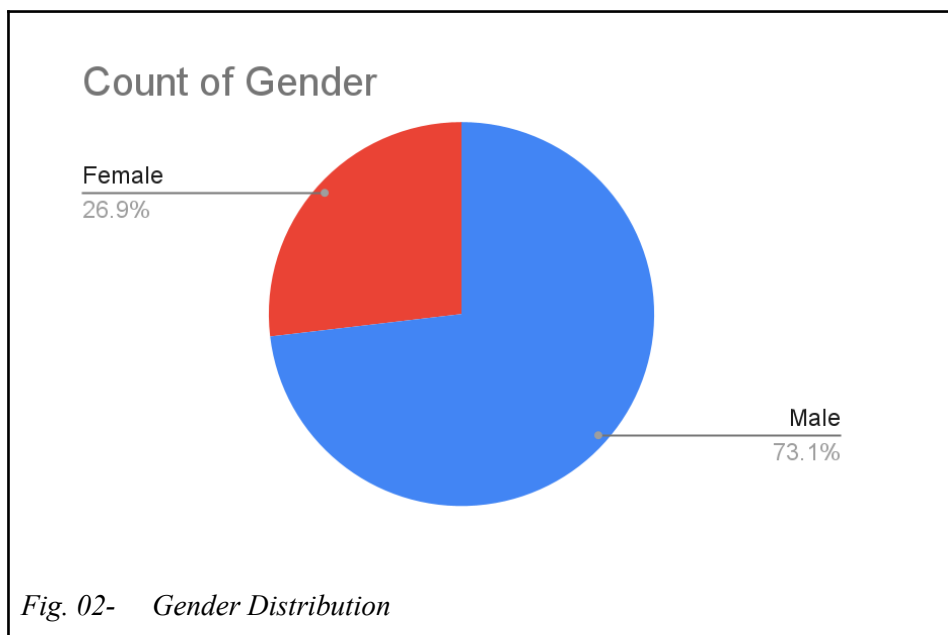
## **6.2 Questionnaire survey**

Interviews were taken to identify the problems of students and a questionnaire was created followed by a pilot survey to test the content validity. After taking the interviews of respondents we drafted a set of questions, and these questions were reviewed by experts. The questionnaire was assessed by a panel of experts and finally 24 items were selected. The respondents were requested to report their responses on a five point likert scale (From 1= strongly disagree to 5= strongly agree).

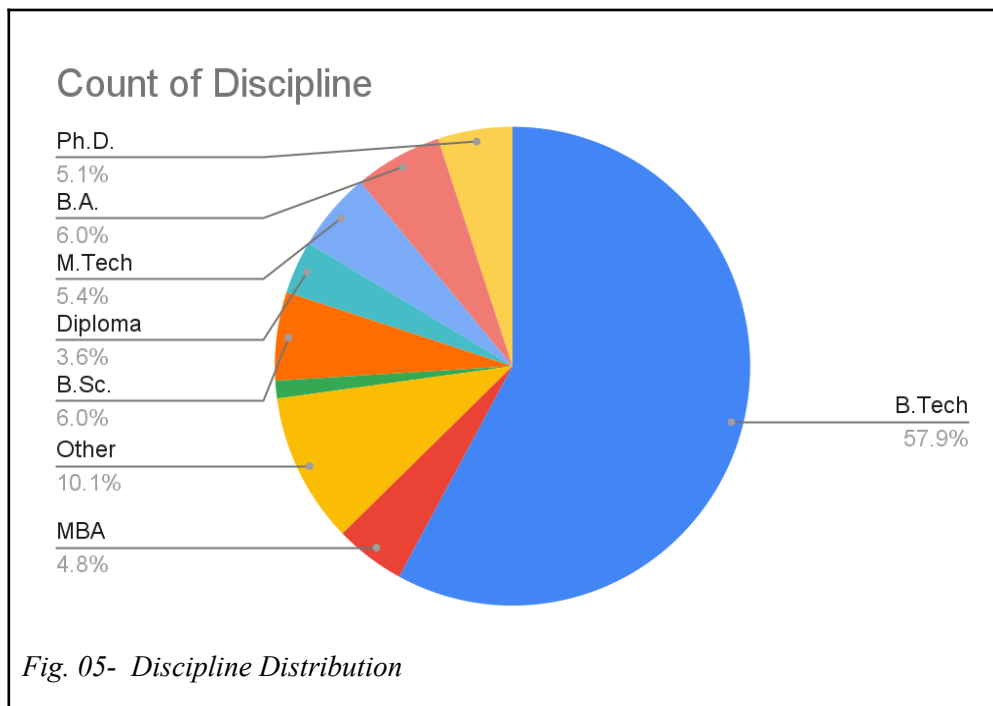
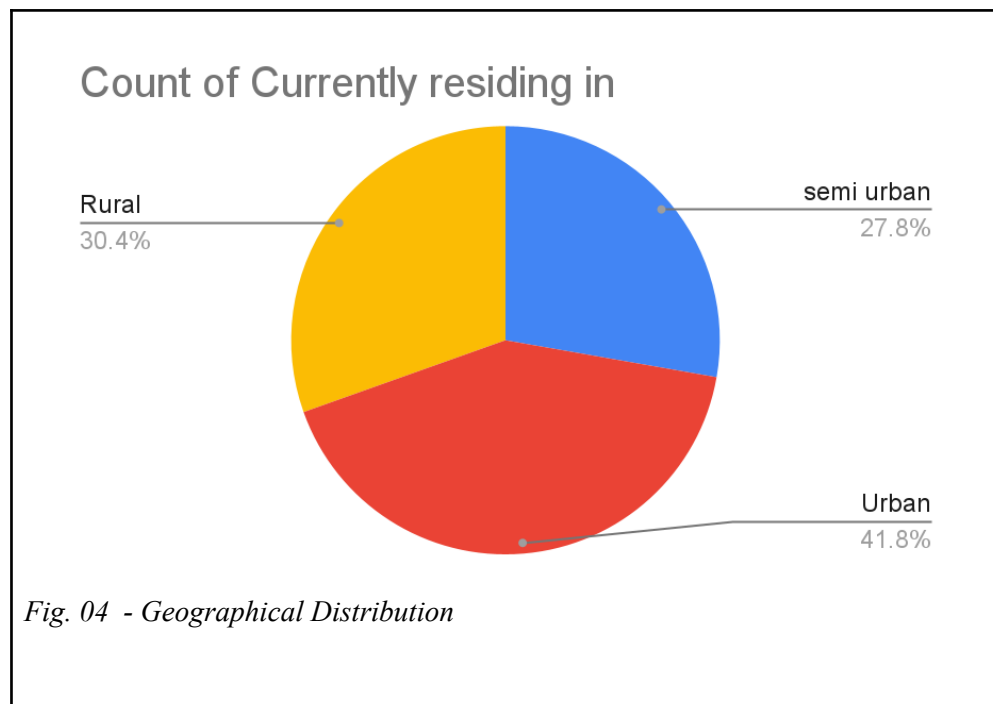
After receiving the responses data cleaning was performed in excel, and this data was exported to SPSS. Reliability analysis, multicollinearity test and exploratory factor analysis was performed in SPSS and major constructs identified using CFA. We used SPSS-26 and AMOS-26 for the statistical analysis. Socio-demographic characteristics of the respondents are listed below.

### 6.3 Socio-demographic characteristics

We collected 335 responses from all hindi heartland of india. Participants were predominantly male; 73.1% male and 26.9% female. There were 1.8% of the respondents under age of 18, 77.9% between 18-22 and 14.9% between 23-28 years. Among all the respondents 30.4% reported that they reside in rural areas, 27.8% in semi urban areas, 41.8% in urban areas. Discipline of the students is given in fig 05.



*Fig. 03 - Age Distribution*



Majority of students were from technical institutes (57.9%). Among all the students, the majority of them are from the 3rd semester of their course.



## 7. Analysis of results

We found the reliability of data 0.944 which is in acceptable range ( $>0.7$ ) [17]. After that we calculated the Kaiser Mayer Oklin (KMO) statistics, which was 0.943 (acceptable range  $>0.5$ ). In further analysis we carried out exploratory factor analysis with maximum likelihood rotation method: promax with Kaiser normalisation. On the basis of pattern matrix 3 factors were obtained with 16 indicators contributing 60.92% of the variance. Based on these obtained factors a framework for the effectiveness is proposed. The pattern matrix is along with indicators is listed in table given below:

**Table 2:**  
**Exploratory factor analysis (pattern matrix)**

| Particulars  | Factors |      |     |
|--|---------|------|-----|
|  | PAS     | EIIC | TAD |
| PAS1: Assessment criteria<br>Assessment criteria should be based on multiple components of evaluation (if a student doesn't perform good in one criteria, he/she will still have a chance to perform in others). | .898    |      |     |
| PAS2: Planning of lectures<br>I feel that Proper planning of lectures with supplementary material will enhance the learning outcomes.  | .614    |      |     |
| PAS3: Uniform evaluation<br>Guidelines for the evaluation process should be made clear in the beginning of the courses.  | .602    |      |     |
| PAS4: Instant/timely communication<br>There should be instant/timely communication from the instructor regarding class cancellations, rescheduling or any other important announcements.                         | .552    |      |     |
| PAS5: Content availability after class<br>Teaching resources like PPTs and other supporting study material should be made available easily after the end of the class.   | .550    |      |     |

|   |      |
|---|------|
| PAS6: Privacy measures  | .532 |
| I think proper measures regarding privacy and security should be taken.   |      |
| PAS7: Recorded resources  | .523 |
| I feel that recorded lectures of different courses will increase the effectiveness of online education.             |      |
| PAS8: Flexible time slot for lectures   | .492 |
| Flexible schedules will definitely increase attendance in online lectures.  |      |
| EIIC1: Slot for consultation  | .702 |
| I think regular counseling and motivational lectures on one to one basis will prevent us from mental health issues. |      |
| EIIC2: Slot for peer learning   | .671 |
| I feel that there should be a special slot in the class for peer to peer interaction during lectures.               |      |
| EIIC3: Guest lecture delivery   | .638 |
| I feel a few lectures in every course by industry experts will give more practical exposure.                        |      |
| EIIC4: Industry Academia Collaboration  | .594 |
| I think industry academia collaboration will increase practical understanding of students.                          |      |
| EIIC5: Feedback platform  | .593 |
| There should be a feedback platform where students could report their problems.                                     |      |
| EIIC6: Academic Collaboration   | .589 |
| Tie-up with other e-learning sites will definitely enhance learning outcomes.                                       |      |
| TAD1: Attendance monitoring   | .746 |
| There should be monitoring of attendance to increase engagement of students   |      |
| TAD2: Assessment and Evaluation   | .708 |
| I think Regular Evaluation will increase attendance and reliability of online learning                              |      |

TAD3: Conducting training and tutorial

.434

Students and faculty members should be provided with training sessions for platforms to enhance learning methods.

---

*Note- Extraction method : Maximum Likelihood; Rotation Method: Promax with Kaiser Normalization.a, where a Rotation converged in 8 iterations; PAS: Planning and scheduling; EIIC: Engagement-Interaction and Industrial collaboration; TAD: Training and discipline*

In the figure below the effectiveness is portrayed as a measurement model; that is a multidimensional construct described by the three factors obtained through efa (exploratory factor analysis) from the students perspective. Second half of the data(Sample size: 335) is used to corroborate the measurement model by using confirmatory factor analysis. Because of the appropriate acceptable degree of fit based on the computed measurements, the measurement model is approved [18]. The statistics of the model are shown in Table number 3. Furthermore, all of the indicators are significantly loaded on the respective latent components. The fit indices show a good fit between the measurement model and the sample data [19].

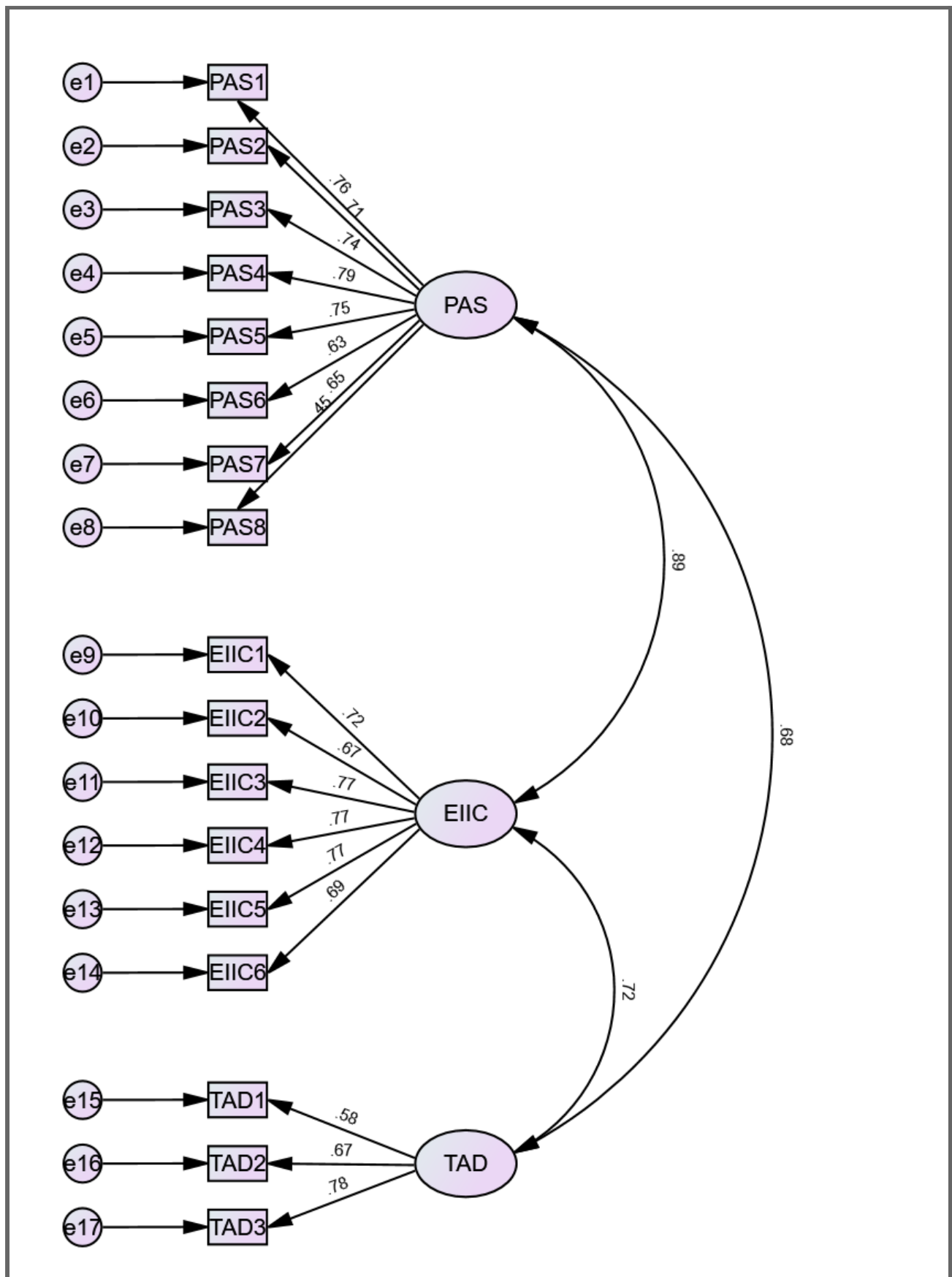


FIG-06 : Model 1 - Measurement model (3 Factor)

The calculated value of  $\chi^2/df$  is 2.76, which shows the goodness of fit of the measurement model, which is in acceptable range (2-5) [20, 21]. The obtained value of RMR is .070 which is also in the range of acceptance [22, 23, 24]. The value of GFI and AGFI is 0.894 and 0.861 respectively that is in the range of 0 to 1, in general best model fit values are  $\geq 0.80$ . CFI  $\geq 0.90$  is best for the model acceptance here 0.926. The value of PCFI is in between 0.5 to 0.8, here 0.7 indicates the acceptable fit [25, 26]. The obtained value of RMSEA is 0.07 which is in range (0-0.8) [27]. Here the values of fit indices measures are shown in Table 3.

**Table 3**  
**Calculated statistics for the Measurement Model**

|         | Model Fit   | Absolute Measures |      |      | Incremental fit Measures |      | Parsimonious fit measures | RMSEA |
|---------|-------------|-------------------|------|------|--------------------------|------|---------------------------|-------|
|         | $\chi^2/df$ | RMR               | GFI  | AGFI | CFI                      | TLI  | PCFI                      |       |
| Model 1 | 2.76        | .070              | .894 | .861 | .926                     | .913 | .790                      | .073  |

Composite reliability of the constructs is shown in Table 4. Here we can clearly see that values of composite values of all the three constructs are greater than 0.6., which lies in the acceptable range [28].

This study validates construct validity by demonstrating content validity, convergent validity, and discriminant validity. Content validity is assessed through existing literature support and expert interaction in the domain of e-learning effectiveness. The average variance extracted and factor loadings are used to determine convergent validity [29]. The discriminant validity can be analyzed by comparing the corresponding inter-construct squared correlation estimates with the average variance extracted (AVE), as proposed by [29]. As a

result, the measurement model has a high level of construct validity as well as acceptable psychometric characteristics [30].

**Table 4**  
**Composite reliability of the constructs**

| Construct | Composite Reliability |
|-----------|-----------------------|
| PAS       | 0.81                  |
| EIIC      | 0.79                  |
| TAD       | 0.67                  |

Measurement model comprise the weightage calculation, covariance and validation portion while the structural model inspect the interdependency and relation between independent and dependent constructs containing residual errors. Here below in the next figure the structural e-learning effectiveness model is presented. R1,R2,R3 are the residual errors and e1 to e17 are the error terms. The table 5 depicts the computed statistics for the same model. In brief, the structural model supports the three constructs model for e-learning effectiveness.

**Table 5**  
**Calculated statistics for Structural Model**

|         | Model Fit   | Absolute Measures |      |      | Incremental fit Measures |      | Parsimonious fit measures | RMSEA |
|---------|-------------|-------------------|------|------|--------------------------|------|---------------------------|-------|
|         | $\chi^2/df$ | RMR               | GFI  | AGFI | CFI                      | TLI  | PCFI                      |       |
| Model 2 | 2.131       | .070              | .894 | .861 | .678                     | .913 | .790                      | .073  |

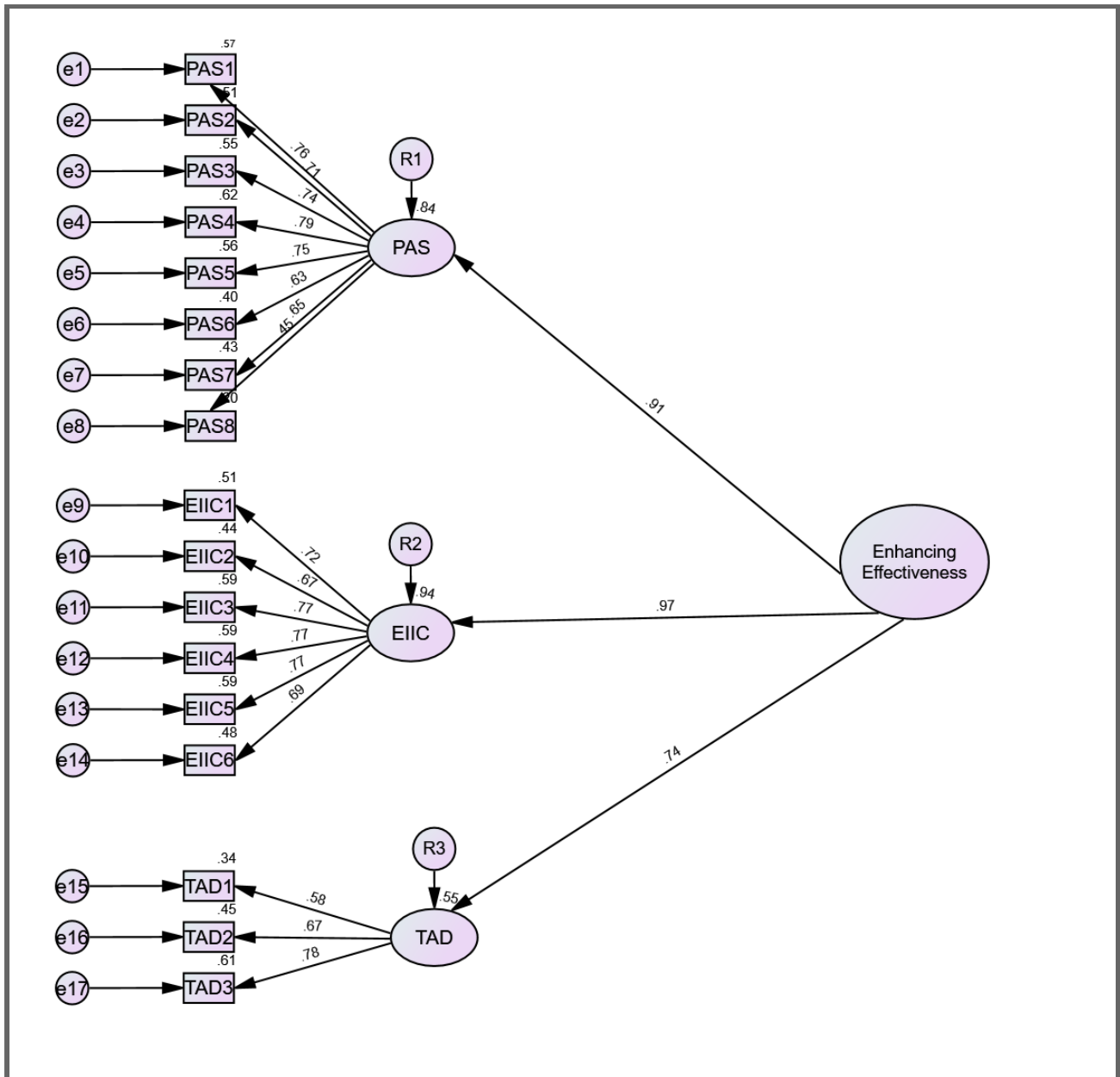


FIG-07 : Model 2- Structural model

Because of the acceptable degree of fit relying on computed incremental fit measures, parsimonious fit measures, and absolute measurements this measurement model (Figs. 06 ) and structural model (Figs. 07 ) is acceptable. Each of the models (Tables 3 and 5) demonstrated that the model fit the data well [31]. Furthermore, all of the indicators had a substantial impact on the associated latent components. The fit indices show a good match between the measurement model and the sample data [32].

## **8. Result and Conclusion**

### **8.1 Inferences & Strategic implications**

Effectiveness of e-learning has emerged as a multidimensional framework with three components named as planning and scheduling, engagement-interaction and industrial collaboration, and training and discipline. These three constructs are composed of many sub-indicators, which are addressed further down in this section.

#### **Planning and scheduling (PAS)**

This factor has emerged as the most critical factor contributing highest weightage towards e-learning effectiveness. This factor is inclusive of many sub indicators namely planning i.e. timely communication with educators, planning of lectures, flexibility in scheduling etc.; resources i.e. recorded lectures, content availability after class etc.; security measures for privacy; assessment criteria i.e. timely evaluation, evaluation procedure etc. As it consists of many dimensions of e-learning it has to be given due importance for enhancing the effectiveness of online learning.

#### **Engagement-Interaction and Industrial collaboration (EIIC)**

This factor has a crucial role in enhancing the effectiveness of e-learning. It is inclusive of many sub indicators namely interaction i.e. regular counselling on one to one basis, peer interaction etc.; collaborations i.e. guest lecture delivery, industry academia collaboration, tie ups with e-learning platforms etc.; and feedback mechanism so that students could give the proper feedback regarding delivered lectures directly to HOD.

#### **Training and discipline(TAD)**

This factor plays a significant role in enhancing the effectiveness of e-learning. It contains few sub indicators such as attendance monitoring which may lead to increase in engagement; regular assessment and evaluation to ameliorate the learning process; and training and tutorial for

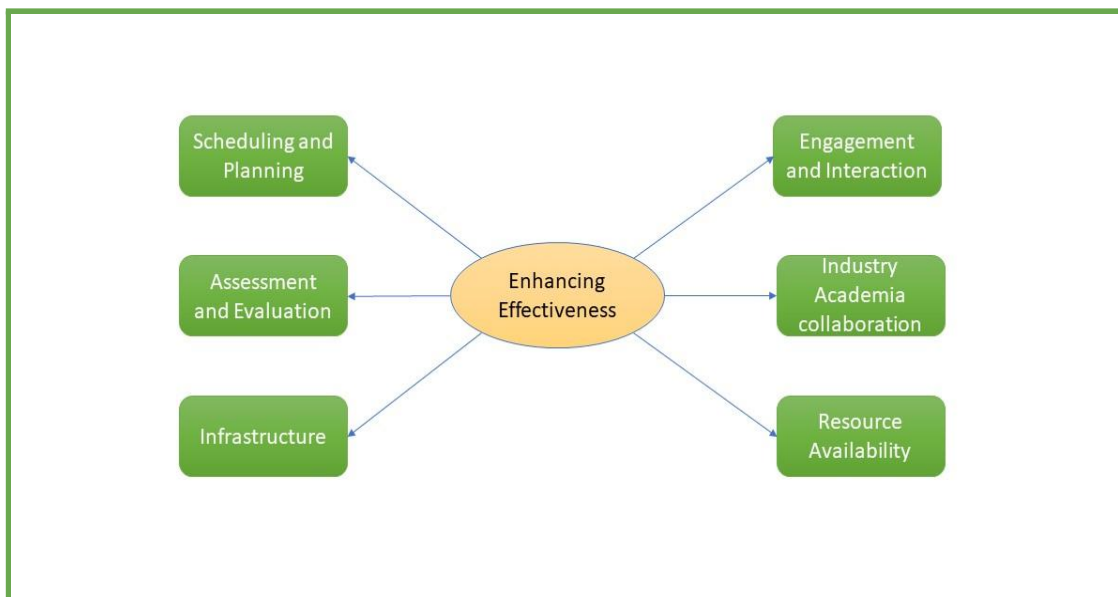


the smooth delivery of lectures in a proper fashion and to provide students with a deeper understanding of both academic and practical elements.

## 8.2 Conclusion

Due to the pandemic, the mode of delivering lectures is shifted to online platforms and e-learning is becoming more prominent every day. This study addressed the issues faced by learners and aspects that influence students satisfaction and contribute to escalating the effectiveness of the online learning environment. The outcomes of this study have derived few major factors from the students point of view. The key factors obtained in this study in terms of reliable and accessible online mode of education effectiveness scale will play an indispensable role in enhancing the effectiveness of e-learning.

Analysis results have shown that Planning and scheduling(PAS), Engagement-Interaction and Industrial collaboration(EIIC), Training and discipline(TAD) are major factors contributing to effectiveness of e-learning. All of these factors are constituted with sub-indicators which are shown in the block diagram below.



*FIG-08 : Block diagram of factors*

After analysing the results it was found that planning and scheduling plays the most effective role in enhancing the effectiveness of online learning and it requires maximum focus and effort. Planning and scheduling of the curriculum should be planned well and clearly stated. Ambiguous structure of course curriculum has caught students in the web of chaos during pandemic so the first step to make online education robust is proper planning and scheduling. Assessment criteria has also played a driving role; it should be based on multiple components of evaluation. Evaluation process should be uniform and regular; and proper guidelines for the same should be made clear in the beginning. Institutes with frail technical infrastructure have suffered a lot during pandemic which indicates that implementation of the planned course curriculum needs a robust technical infrastructure. Institutes should develop a secure and reliable platform for taking classes where attendance could be monitored with ease and resources (like PPT and recorded lectures) could be delivered effortlessly.

Engagement and interaction is also a major factor, it is directly proportional to the effectiveness. There should be instant-time communication for the class rescheduling-cancellation, slots for the peer interaction, open based discussion and vital motivation and counselling also should be there. A feedback platform can help for the same. Analysis of the result suggests that Industry academia collaboration could bring a dramatic change in the effectiveness of online learning. As students could not get exposure to labs and experiments at home so it is the need of the hour to collaborate with industries to fill this yawning gap. Resource availability is a key measure for the effectiveness of e-learning. Proper planning of course and suitable e-library resource design will help the students. Nowadays contents having enough visual and textual material are highly recommended so these should be easily available at the end of the lecture. As the edu-tech sector is booming and many educational platforms are developing simulation techniques, institutes should take advantage of such developments and collaborate with such organizations and platforms.

The factors proposed in this study could be used by any institute to improve the condition of the online education environment. The framework proposed to enhance the effectiveness needs minimal capital investment and is easy to implement so institutes should concentrate on these elements

in order to develop a successful online learning environment and improve effective tactics.

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## **Appendix I**

### **Items Inventory for Questionnaire**

- | <b>S. No.</b> | <b>Items</b>  |
|---------------|---|
| 1.            | Flexible schedules will definitely increase attendance in online lectures.  |
| 2.            | I feel that Proper planning of lectures with supplementary material will enhance the learning outcomes.   |
| 3.            | The strength of the classroom should be such that faculty could interact with each and every student (Not more than a fixed number of students).                                    |
| 4.            | I think holding regular doubt sessions instead of taking long traditional classes by faculty may reduce screen time.  |
| 5.            | I think Regular Evaluation will increase attendance and reliability of online learning.   |
| 6.            | Guidelines for the evaluation process should be made clear in the beginning of the courses.   |
| 7.            | Assessment criteria should be based on multiple components of evaluation (if a student doesn't perform good in one criteria, he/she will still have a chance to perform in others). |
| 8.            | I think a technically advanced platform with multiple features which is easy to use for both sides (faculty & student) would be more effective.                                     |
| 9.            | Students and faculty members should be provided with training sessions for platforms to enhance learning methods.   |
| 10.           | Robust technical Infrastructure from the institute side will enhance the effectiveness of online learning.  |
| 11.           | I think proper measures regarding privacy and security should be taken.   |

12. There should be monitoring of attendance to increase engagement of students
  13. I feel that recorded lectures of different courses will increase the effectiveness of online education.
  14. Teaching resources like PPTs and other supporting study material should be made available easily after the end of the class.
  15. Centralized digital library will enhance learning outcomes.
  16. I think the use of simulation based exercises/games will enhance learning outcomes.
  17. I feel that open discussion based online lectures will be quite effective in online learning.
  18. There should be a feedback platform where students could report their problems.
  19. I feel that there should be a special slot in the class for peer to peer interaction during lectures.
  20. There should be instant/timely communication from the instructor regarding class cancellations, rescheduling or any other important announcements.
  21. I think regular counseling and motivational lectures on one to one basis will prevent us from mental health issues.
  22. I think industry academia collaboration will increase practical understanding of students.
  23. I feel a few lectures in every course by industry experts will give more practical exposure.
  24. Tie-up with other e-learning sites will definitely enhance learning outcomes.
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