PANDEMIC CHALLENGES IN UNDERGRADUATE EDUCATION – CREATIVE SOLUTIONS

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Abstract
The pandemic unpleasantly affected all the walks of life, all the sectors, all ages of people. With no exception Education sector too affected by this lethal pandemic. The researchers, the teachers, the students the main stake holders of this education sector were considerably affected in doing their prime activity. Fear of pandemic propagation and government regulation forced these stake holder's associated institutions, colleges, and universities to shut the doors for their prime activity but made them responsible to prove their mettle. An attempt is made in this paper to uncover the challenges faced by all the stake holders at these colleges belonging to science group and how creatively they learnt to overcome these challenges.
The four major heads of discussion are
1. Challenges faced by the Researchers.
2. The concerns of the Teachers
3. The hurdles of the student community
4. Stake holders 'Creative solutions
The creative solutions sought by these stakeholders in the days to come may convert into saleable creative product solutions which can be in physical, technological or any other form. The environment raised of this pandemic not only created scope for research but also resulted in new thinking, new ideas new theory and new direction in research in all the fields.

Introduction:
Covid-19 the pandemic affected all the sectors may be a manufacturing sector, a service sector, an IT sector, a FMCG Sector globally. Their growth started showing downbeat. Level of Employment in all these sectors started moving in negative direction. People in all walks of life found difficulty in sponsoring their basic needs. Medical emergencies were hit very badly because of lack of medical infrastructure, health insurance covering all sections of public, funds to pay medical expenses.
The pandemic also resulted in new issues and concerns, challenges, opportunities, and prospects in different sectors. Education sector toofaced lot of challenges worldwide during this Covid -19 pandemic. Offline classes have been barred suddenly as maintaining social distancing is not possible in this type of knowledge offering.to student community. A shift was made in the form of online teaching an alternative mode of knowledge offering. Uncertainty was prevailing about restoring of normalcy. All the stakeholders faced lot of challenges during pandemic be it a first lockdown or be it a second lockdown. They never expected this type of situation and therefore fore never prepared to face it.A recent online survey conducted by Learning Spiral revealedthat about 84% of teaching community faced challenges during online classes. Most of the teachers lacked necessary tools, equipment, and devices to teach digitally a requisite to teach online effectively. Though the condition is bad in most of the states, the situation was even worst in states like UP and Chhattisgarh where two out of five teachers lacked requisite devices to deliver online lectures.
The present study tries to bring upfront the various challenges during lockdown faced byUndergraduate teachers, Researchers and Students and how this pandemic state resulted positively. The various creative methods developed by teachers at undergraduate colleges to overcome these challenges will be discussed at length in this paper.

Review of Literature:
Number of studies were conducted numerous research papers were written by the researchers about the pandemic and its consequences the resulting environment opportunities created and change in the rules of the game. The research work can be studied as under

The requisites for online teaching learning in education system amid the COVID-19pandemic and how hands on resources of educational institutions effectively transform the formal education into online educations was addressed by Lokanth Mishra, Tushar Gupta andAbba shree in their paper.[1]

Online mode of learning from teacher viewpoint, challenges faced by teachers when migrating toonline platform, online platforms available for teaching,Experiences and suggestionsto improve the online mode of teaching in future was discussed by Malik Mubasher Hassan,Tabasum Mirza and Dr. Mirza Waseem Hussain in their research work.[2]

A case study was conducted by Hasan Al Zubayer Rony and Sheikh Tahmina Awal to findthe changes in perception of the university teachers on online teaching-learning platformsand the issues of teaching learning and training using these onlineplatforms.[3]

Impact of lockdown on teaching learning process, how fast teachers adopted to online modeof teaching, what are various benefits, challenges, and reasons for non-adoption for virtualclasses was studied by Amit Kumr Arora and R Srinivasan.[4]

Through survey the various problems faced by students during lockdown in attending online class werecollected and an assessment on the impact of lockdown on undergraduate andpostgraduate student of various colleges and universities of West Bengal was made. The results ofsurvey was presented in paper by Nanigopal Kapasia, Pintu Paul, and others,[5]The study foundmost of the students used android mobile for online classes and faced many problems relatedto mental health, internet connectivity and hostile atmosphere for attending online classes.The study also suggested targeted intervention to create a positive space for studyamongstudents from the vulnerable section of society.

An article by Shivangi Dhawan describes the importance of online learning's strengths,weakness, opportunities, and challenges and analyses online teaching methods during pandemic.[6]This article also discusses the growth start-ups in education sector andsuggestions foracademic institutions to deal with challenges of online learning.

An online as well as offline survey was conducted by Jyoti Agrawal in May 2021[7] to analyze andstudy the impact of online classes on undergraduate students of government collegesin Umarban, district Madhya Pradesh. The study reveals that around 15.47% of students wereinvolved in e-learning and most of them were attending online classes using smart phones.Also the study revealed that 60% of the students returned back to their home towns andvillagesand involved in farming. Issues related to having their own electronic gadgets needed foronline classes, favorable environment for online classes and internet connectivity werestudied andanalyzed.

A research paper by Mukesh Rawal[8] analyzed positive and negative effects of online classes duringCOVID-19 and to examine how to reduce the negative impact of COVID-19 on student community. The studysuggested that there is an urgent need to take maximum use of Online platforms and to developstrategies to ensure all students have access to learning as COVID-19 crisis may stretch longer.

Dr. Shabnam Gurung studied challenges faced by teachers, and change in the teachingmethodology during pandemic, teachers satisfaction level and various modes ofonline teaching.[9] The study revealed the relative importance of various platforms and identified the best suitable methods of online teaching.

A research paper written by Nurul Ashikin Izhar, Yahya M. Al-dheleai and Kew Si Naanalyzed thechallenges faced by teachers for planning lesson and designing oflecture before conducting onlineclasses.[10]

A study on Teaching and Learning during the COVID-19 by Ranjit Vijayan presented the challenges, solutions and knowledge gained during the pandemic by researchers.[11] Theresearcher encompasses varied scientific disciplines during the study.

Objectives of the study:
The various objectives set for the present study are as follows
1. To discover the challenges faced by the researchers
2. To find out the concerns and the challenges of the teachers at undergraduate colleges

3. To uncover the hurdles faced by student community during pandemic
4. To unearth the creative solutions developed opted and adopted by teaching community in a constrained infrastructure environment.

Methodology:

The researchers opted for unique methodology to study the above set forth objectives. The research problem at hand is exploratory in nature and its real scope is unclear. Thus, highly flexible, and unstructured informal research methods has to be used by the researchers to study the objectives.

The methodology adopted for the current study is presented and the approaches used are

1. Holding Discussions and collecting needed information from all the stake holders over phone and email about the challenges, issues faced by them during pandemic.
2. Observing the friends and colleagues about their offering of online classes during short period when teaching community started attending the colleges.
3. Collecting student responses about the difficulties faced by them in taking the online classes.
4. Listening and making note of various solutions created and developed by teaching community based on feedback given by student community and their own creativity.
5. Summarise all the feedbacks, observations, discussions, responses under the following heads and present it as findings of the study.
   - Challenges faced by the Researchers.
   - The concerns of the Teachers
   - The hurdles of the student community
   - Stake holders 'Creative solutions

Findings:

Based on the discussions held with all the stake holders, observation by the researchers, feedback from the student community, experiences of fellow teaching fraternity, learnings from newspapers and internet sources the findings are

Challenges faced by the Researchers

Lots of challenges were faced by the researchers working and pursuing research in various undergraduate colleges during this pandemic. The challenges faced by them are presented below.

- Lack of Access to Laboratory and major equipment:

During pandemic researchers could not be able to have access to resources like laboratory, equipment. Procurement of materials required for conducting experiments was another big challenge. Getting chemicals for chemistry experiments and components in electronics were also equally difficult. Few experiments in Optics need to be performed in dark room and experiments in Microbiology need to be conducted in certain temperatures. All these was not possible during pandemic. Most of the researchers returned to hometown because of financial constraints. During lockdown as they were living in non-conducive environment for performing experimentsconducting experiments and continuing with research during these difficult times was a real major challenge.

- Lack of Internet connectivity and electricity connectivity

The lack of consistent internet connection and electricity supply in their hometowns has become real challenge for the researchers to continue their research work. Sharing their research work and getting the inputs from fellow researchers and getting needed inputs from fellow researchers and working with them was a challenge.

- Collection of field data was another challenge

Biomedical research and other allied research require on field data collection. This was a real challenge as reaching out sample units during pandemic was difficult because of fear of being affected by Pandemic by both researcher and sample unit.

- Untimely receiving of stipends by researchers also resulted in their inability to get access to internet and the scholars' life has become miserable during these difficult times.

The concerns of the Teachers

Number of concerns were there for teachers at undergraduate level. Their concerns are presented below.

- Most of the teachers were not aware of online teaching at the beginning of the pandemic

Most of the UG Colleges were rarely using ICT tools for teaching. Colleges could not be able to provide training on online software to their teaching fraternity.

- In access to all features of On-line soft ware

As most of thecolleges could not offer paid version of software, they could not use all the features of software. Reaching all students was another major issue.

- Explaining derivations and circuit diagrams

Online teaching was more challenging for science teachers as it has very many derivations and needs explanation step by step. Teachers at colleges in rural areas were not equipped fully for online teaching as most of the students doesn't have even mail ids.Sharing subject content and step by step explanation with student community was a challenge. The undergraduate colleges could not provide graphic drawing tabs, iPad, digital slates etc.

- Conducting of Laboratory sessions

As the pandemic continued for whole semester laboratory sessions also need to be conducted online which was another challenge for the teachers. Though there were software like Virtual labs, it doesn't match exactly with curriculum. Though virtual labs can be used for few of the experiment's students could not be able to use it as the software get opened only in higher level laptops. Conducting experiments, though done in labs by teachers making students have on-hand experience of doing experiments was a genuine concern.

- Internals and evaluation

Conducting assessments has with limitation as subjective assessment is difficult to carry on unless supported by proper IT platform. Checking assignments is equally tough on online mode. All possible forms of questioning cannot be asked to assess students.

- Lack of IT support at home and at Undergraduate Institute for faculty during lockdown

Most of colleges do not provide IT support to faculty at colleges in the form of providing training to use ICT tools, training for conducting sessions, training for giving assignments in online mode. In ability to Provide IT support in clearing technical glitches arising during conduct of online sessions both at Institute and at home.

Hurdles of Students

There are number of hurdles faced by student community at undergraduate level during this pandemic in continuing with their learning objective. The hurdles are

- Adapting to an online learning environment

Most of the students never attended online classes before pandemic. The sudden change from offline to online mode of learning and getting to adopt to this new environment of learning was a real challenge.

- Technical Issues

The major challenges faced by student community is lack of internet connectivity and access to high-speed data packs needed for their online classes. As parents could not be able to offer laptops or desktops to their wards, most of the students continued to attend online classes using smart phones because of which they could not open simulation software, could not open study material. In rural areas access to internet was a challenge. Students living in rural areas sometimes need to come all the way to highway to listen to online class.

- Lack of classroom environment

The distractions were more at home while listening to online classes because of small living spaces.Continues usage of cell phones becomes essential to listen to online class in absence of laptops. This result in negative effect on the health of students.Few of the students who expect and need motivation from their teachers will be missing it in online mode.

Stake holders 'Creative solutions:

As teachers were not equipped with digital devices for teaching, most of the teachers used their creativity and tried to deliver their best. Few of the creative methods and technologies developed by teachers during these pandemic times to make teaching learning more effective are discussed below.

- Retard stand and Tripod Stand for Live Streaming of Physics experiments

Physics teachers used tripod stand to fix up mobile and in turn is fixed to retard stand resulting in mobile's camera facing horizontal plane to focus on board and is used to live stream the explanation of derivation and related numerical step by step.

- Bread Board- Live Streaming:

Electronics teacher created a standby using DC Power supplies and bread board to hold smart phone camera to teach various concepts of electronics like drawing circuits and analysing circuits.

- Retard Stand & Web Cam-Lab Demonstration:

The electronic teacher used web camera fixed to retard stand to demonstrate experiments to students which were not available in simulation software.

- Development of new software for sharing study Material

A new software was developed by a group of recently graduated engineering students using which any teacher can upload the study material and link can be shared via Whats app and by a click of the link by the students he/she can access to upload his/her assignments or can have access to uploaded study material. This software does not require registration by the student**.**

Conclusion:

Pandemic resulted in bundle of challenges for researchers and teachers at undergraduate colleges and lot of hurdles for student community. Apart from this, Pandemic not only created scope for research but also resulted in new thinking, new ideas new theory and new direction in research in all the fields.

- Development of vaccination could happen in very short period which would have been impossible to do had there not been an urgency created because of wild spread of pandemic.
- Mathematical models were developed to predict course of pandemic which was need of the hour to plan create and execute the medical infrastructure, planning and executing the Vaccination drive, predict the economic growth etc.
- Creation of innovative products like non-contact type Thermal screeners, ultraviolet technology to disinfect surface, face mask and other equipment
- Innovation of new technology has taken place to fight with Covid-19 The result of such innovative technology is very popular Arogya Setu app based on blue tooth technology. Other new technologies developed during Pandemic are
  1. Robotic Technology: This technology helped to provide communication between patients anddoctors though separated by a distance, disinfect surfaces, remind people of infection and preventionmeasures and many more.
  2. Drone technology: Drones were used to detect people with COVID-19 symptoms,monitor the social distancing norms, and in diagnosing the spread of infection etc.
  3. UV-C Disinfection: This new technology used to disinfectant the articles, documents, and equipment byexposing them to UV light for decent duration.
  4. Telemedicine and remote monitor
  5. PPE Kits: Personal protective devices such as protective clothing was designed andmade using surgical drapes and plastics. Lots of innovative solutions for face shieldswere developed

With the technological advancements in computing power, new materials, advancedmanufacturing, rapid prototyping, robotics, and state-of-the-art tools and techniques,one can provide much faster, more efficient, safe and effectivesolutions today and in the yearsto come.

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