A Survey of Online Mathematics Learning during Pandemic- Opportunities and Challenges

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ABSTRACT

A time of crisis can be a generation of new opportunities. Covid-19 Pandemic is also opening new possibilities and approaches for learning from distance. There is extensive potential for online pedagogy and digital technology in the field of mathematics education. Today when online learning at every institute is spreading its footstep, we decided to find out what students in our college feel about online learning, specifically online mathematics learning. The purpose of this paper is to study students' views on online mathematics learning in higher education, benefits and challenges faced by them while learning from home and its sustainability in the future.

Introduction

An extremely infectious pneumonia coronavirus disease (COVID-19) was suspected in Wuhan, China in December 2019[1, 2]. World Health Organization (WHO) declared this outbreak of COVID-19 a "public health emergency of international concern"[2]. This led almost the whole world to implement a lockdown to prevent the spreading of disease[3]. Due to which almost all the sectors in the world like manufacturing, transportation, trade, tourism, construction, and education faced tremendous global impacts[4, 5, 6, 7].

With the quote 'Learning must continue', every institute made every effort to continue

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learning for generations and the online learning felt to be most relevant and unhazardous to the pandemic situation with expectation that institute/teachers would share learning material and modules to students[8]. But the implementation was not easy as the lockdown happened suddenly without giving a chance for preparation of facilities which raised many obstacles and efforts had to be made with available resources only with zero movement to continue and strengthen the concept of learning. This necessity urged the use of various forms of software and digital platforms including mobile technologies, tablets, touchscreens, digital library, Google classrooms, LMS and many more in mathematics education to facilitate communication between students and teachers. Teachers in Haryana also participated in a program run by DGHE to telecast video lectures via Utkarsh Higher Education Channel of Jio TV with schedules[9].

The viewpoints of students regarding their experience during online mathematics learning on content clarity, challenges and opportunities were collected through a questionnaire which was given via Google forms. The questions are framed with one or more options to select the answer for the respondent This study was conducted with the students of our college who have offered at least three semesters with online learning.

Almost 120 students participated in the study. The students may be classified into two groups- one who have access (fully or partially) of devices or network and second group who do not have any access and cannot be forced to attend online classes and submit assignments timely.

As together with students, Mathematics teachers were also facing the challenges to teach online mathematics like writing equations, lengthy calculations, drawing and explaining figures, so asynchronous, synchronous and hybrid online mathematics learning was conducted with various efforts via Google classroom., Whatsapp, Youtube, Google meet, Zoom, Learning Management System etc[10].

Responses

Content Clarity

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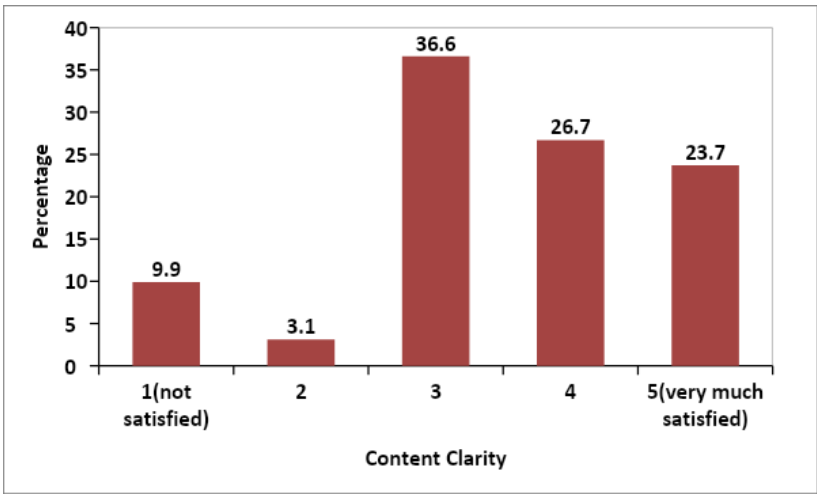

Figure-I

On linear scale of 5, the mean of responses received as shown in figure-I is 3.96 so we can say mostly students are although not very much satisfied yet satisfied with clarity of content imparted online. As necessity is the basis of experiments, the percentage of not satisfied is also expected.

Online learning of mathematics as comparison to other subjects 45.8% of students are in the favor that online learning of mathematics was more challenging as compared to other subjects but 54.2% accepted that there was no difference. The reasons why mathematics learning is challenging may be studied in the next question.

Challenges of online mathematics learning

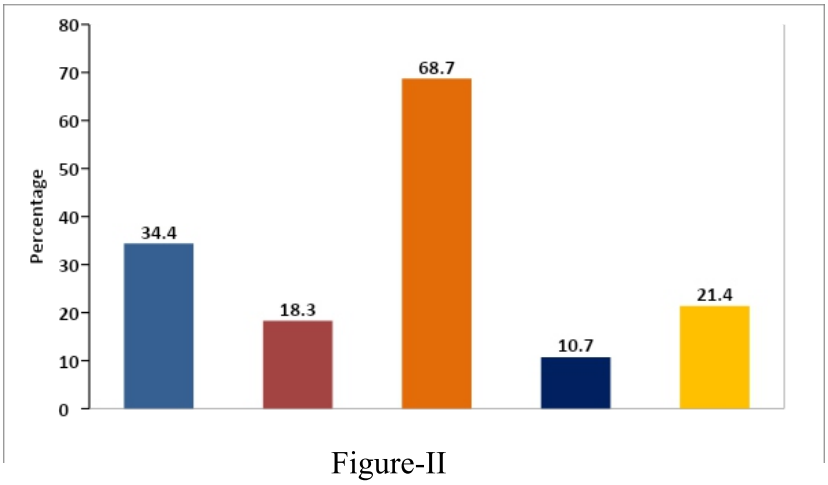

Figure-II

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The shift from face to face traditional chalk & board to online delivery through technology was a very tedious task for mathematics teaching as well as learning. It was very challenging to clear mathematics doubts through effective communication which led faculties to explore more pedagogies and technologies.

Though the most challenging part of unanticipated online learning include a number of factors like lack of communication/interaction, health factor, environment issue and delay in answering questions yet technical problems were considered by the maximum number of students. Technical issues may include network availability or accessibility, lack of technological gadgets, high-speed internet access, power supply, limited network data per day. Simultaneously concentration, attentiveness and time-management is necessary to shift the mind-set from traditional to online learning.

Self-Concept and Pre-Learning

With growing competitions in every field, for concept clarity and command on basics of mathematics topics, students should be promoted for self-concept and pre-learning. Almost an equal number of students acknowledged that yes they are doing it every time (48.5% & 37.1%) or occasionally (43.9% & 43.2%).

Maximum students are realizing the significance of self-concept and pre-learning. A little number accepted that they are not following.

Liking of online classes

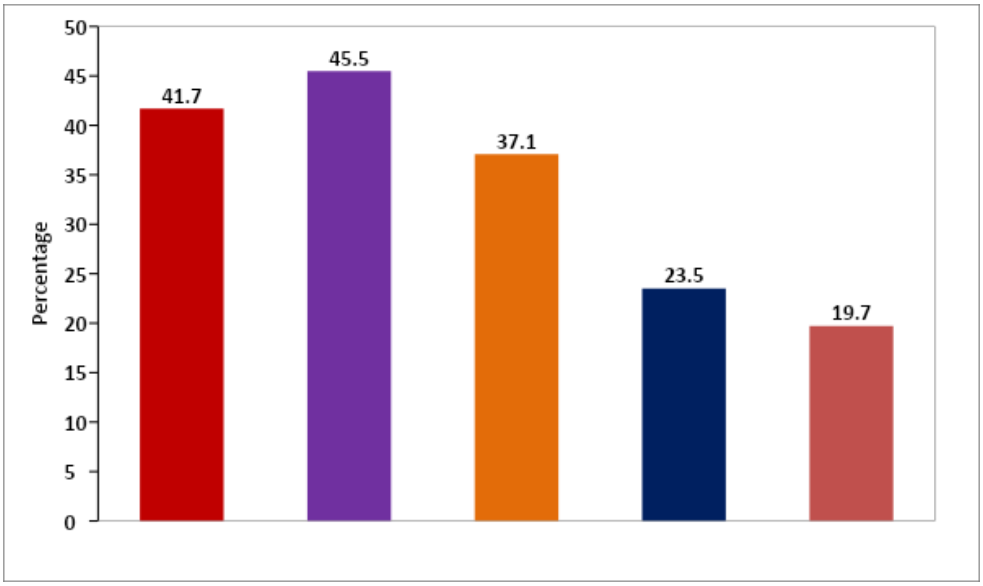

Figure-III

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The time saving (45.5%), Self-paced (37.1%) and convenient (41.7%) approach played a major role for attraction to distance learning. Also some students (23.5%) admitted the role of eLearning to develop more independent thinking. There are students (19.7%) who showed disliking for online learning totally.

Online, Offline or Hybrid

Though digital learning came to rescue in a critical time of pandemic and is now spreading its footstep because of its favorable convenient, time-saving and self-paced nature yet can't totally replace the importance of traditional learning. Responses indicate that while studying mathematics online there is not much difference between the choice of digital(28.8%) and traditional(31.1%) learning but the maximum number of students wants to take advantage of both (Hybrid learning). 40.2% have given preference to the blending mode. Some also suggested flip learning in which they want to learn online via asynchronous, synchronous courses and perform discussion, interaction, and assessments offline face to face.

Conclusion

We can't conclude whether offline or online learning is more effective. It all depends on the measurement factors. In this paper, the challenges and opportunities the students came up with in learning mathematics online during the COVID-19 pandemic were determined. On the basis of responses, we can at least observe that the blending of both traditional and digital learning can solve the purpose. While sharing material through technology, the remaining loopholes can be removed via face to face interaction. The study is an input to anticipate the impression and impact that might occur on students and the outcomes and results can be used to construct the future mathematics learning plan.

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