

An Extended Study on the Impact on Teaching Methods and Students during this Pandemic using Educational Data Mining

Vishal Gupta¹, R. Vaishnavi²

SRM IST Delhi-NCR Campus, Delhi - Meerut Expy, Modinagar, Uttar Pradesh, India

¹vgguptago9[at]gmail.com

²rvaish1234[at]gmail.com

Abstract: *The process of digging out useful information from unprocessed raw data is the interpretation of data mining. When we apply data mining techniques in data for the benefit of the students, the field of education is commonly known as Educational Data Mining (EDM). In this paper, we will analyze the different teaching methodology adopted by teachers for teaching on online platforms and understand what kind of teaching method students would prefer. We infer that most students gain knowledge in offline methods of teaching.*

Keywords: Educational Data Mining, Teaching, Students, Quality of educational processes

1. Introduction

Pandemic was the period when no one was prepared for the new upcoming challenges ahead and didn't know how to proceed further. Even in unfavorable conditions we always have a solution to step ahead. All the countries in the world are attempting to overcome this challenge. We all are aiming for comfortable living, and thus we get going with online mode.

This was a great challenge for teachers as well as students for teaching and learning at the very beginning of the pandemic. The education sector was significantly affected during this pandemic. The lockdown left us with no choice but to move ahead with the online mode of teaching. Time has forced us to change our traditional method of education.

Online teaching techniques provide students with independence, convenience, efficiency, accessibility, time flexibility, and lower costs. New techniques mean new advantages come with new disadvantages.

Although online teaching provided everyone with the knowledge of new technologies and skills, the teaching was not appropriate for students to learn and understand. The online mode was lacking in the physical and practical way of teaching in which students can interact with the faculties directly and visualize the topic.

The online platforms which were rapidly in use during lockdown were:



The online methods for learning were wise for a short period of time. Some issues faced by students in the online mode were poor internet connectivity, software compatibility issues, trouble with the computer devices, lacking a practical approach to learning, etc. Online mode also leads to health-related issues such as straining eyes, back pain, workload leading to stress. It is also difficult for us to spend time with our own family. Although there are many resources to gain knowledge virtually, it is not the same as physical mode.

Educational Data Mining: With the advancement in technology and the fast-moving world, a large amount of data is produced. It is difficult to arrange these data. And thus, we apply data mining techniques in data for the benefit of the students in the field of education. It is the process of digging data automatically from web documents and services.

Clustering: In clustering, we try to group similar items or make clusters of similar items from unlabeled row data. Clustering is one of the strategies for unsupervised learning.

Classification: In classification, data is classified into different classes. These classes are predefined which are made from labeled row data. It belongs to the supervised learning technique. This technique can be used for both structured and unstructured data.

Regression: Regression helps us find the correlation between different variables. This technique is used when output is a real or continuous value.

Association Rule Mining: It is an approach for finding patterns in data mining. It is the process of finding the common relationship between a large set of distinct data.

$$Gain(S, A) = Entropy(S) - \sum_{v \in Values(A)} \frac{|S_v|}{|S|} Entropy(S_v)$$

Entropy formulae:

$$Entropy = \sum_j -p_j \log_2 p_j$$

Decision tree: When we need to build the classification models, we use the Decision tree. It's far one of the data mining strategies used to construct classification models in the shape of a tree-like structure, preprocessing, and many others.

ID3: It is one of the many core algorithms used to build decision trees. In this algorithm, the features are divided into two or more groups at each step. It uses a top-down greedy approach.

The Problem Statement: -

When the Novel Coronavirus disease which is a highly communicable disease spread across the countries many people were infected. To control the spread of COVID-19 the government of India declared a lockdown in March 2020. This highly affected many people's lives and businesses. This led to a disturbance in student's education too. In this situation to continue students' education everyone moved to online mode and continued with their studies. The way of learning has changed since the adoption of new teaching methods by teachers. Due to such drastic changes every institute wants to know about the students' opinion so that in the future they can provide better facilities and make the learning experience more similar to the

classroom experience. It is important for us to know whether students can grasp easily in an online mode similar to offline mode.

Statistics of Data:

We acquired and observed the records from the SRM Institute of Science and technology. The record we come up with is 150 (approx.) for sessions 2020-21. It's essential for the institutions to the overall performance of the academics which would entice greater and higher students in the future.

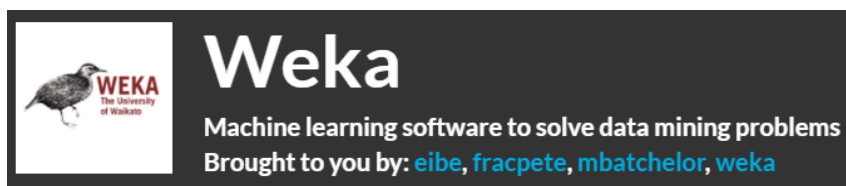
The dataset is as follows:

S.no.	Questions	Possible Answers
1	Are online classes for all subjects organized	Yes/No
2	Are online classes interactive enough?	Yes/No
3	For theoretical topics, are online lessons enough?	Yes/No
4	Are online lectures good to understand Technical/Practical subjects?	Yes/No
5	Does online lecture make you more interested in the respected subject?	Yes/No
6	Which method of teaching would you prefer the most?	Online teaching / Classroom teaching
7	According to you, in which mode of teaching do you find easy to learn and understand the concepts?	Online teaching / Classroom teaching

Model Construction:

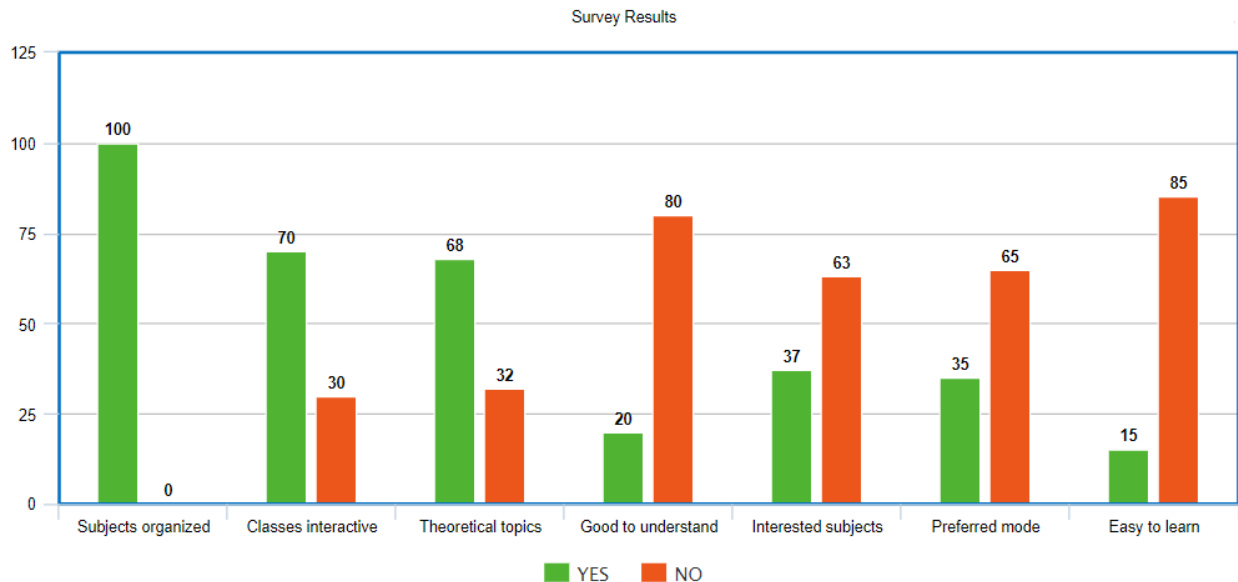
There are various open-source tools present for data mining like WEKA, Orange, KNIME, Rapid miner, Orange, etc. Out of all these tools, WEKA is a very popular tool due to its simple GUI. It covers nearly all essential information mining strategies like category, clustering, affiliation, preprocessing, and many others. WEKA was designed to analyze and make predictions for various data. Nowadays, it is used for different types of applications ranging from medical, telecommunication, E-commerce to the education sector. It can easily handle different kinds of data mining tasks like classification, preprocessing, regression, clustering, and many more.

WEKA is Machine Learning (ML) Software written in Java Programming language which is a collection of ML Algorithms and supports deep learning. This model helps us in data analysis and produces absolute results. It allows us to directly upload the datasets, and it starts developing models. Regression datasets can also be downloaded from the WEKA webpage.



For the above questionnaire, 150 samples are collected with the help of google form and then converted to CSV format "online_feedback.CSV". Then this file is uploaded to WEKA where different kinds of decision tree algorithms are

present, in this study we have used the J48 classification algorithm.



We also asked one of our professors regarding the teaching methods that according to them which mode is better for students to learn, his response was “We should not decide from the results of the exams conducted in online mode. There are many resources from which students can find the solutions, it doesn’t matter how hard the questions are, students find a way to solve the solutions. The original gain of knowledge in students is gone in virtual mode”.

And so, we have come up with a model in which we have analyzed and taken responses from students themselves, and produced the results.

2. Results

From the above results, we found that the online mode of teaching does not provide any interest in the subject for the students. From taking interviews of few students on campus we found the reason why online mode was not up to the mark as compared to offline mode was that the offline mode provides the practical approach of learning concepts. Many issues were faced by students during the online mode of study. Sometimes they face challenges due to internet connectivity or trouble in the computer devices.

Issues faced by students are:

- 1) Absence of a stable internet connection in student’s respective areas.
- 2) Proper mic or camera facilities are not available with teachers.
- 3) Many students do not have proper devices.
- 4) No proper interaction between teacher and students which makes the session boring.
- 5) Understanding practical concepts is a bit challenging on an online platform.
- 6) Long hours of watching the laptop/mobile phone screen increase eye strain.
- 7) Sitting for a long time from morning till evening in front of the laptops leads to back pain.
- 8) Students are not able to concentrate properly on the session due reasons mentioned above.

Responses of the survey:

S. No.	Questions	Possible Answers	
1	Are online classes for all subjects organized?	Yes (100%)	No (0%)
2	Are online classes interactive enough?	Yes (70%)	No (30%)
3	For theoretical topics, are online lessons enough?	Yes (68%)	No (32%)
4	Are online lectures good to understand Technical/Practical subjects?	Yes (20%)	No (80%)
5	Does online lecture make you more interested in the respected subject?	Yes (37%)	No (63%)
6	Which method of teaching would you prefer the most?	Online teaching (35%)	Classroom teaching (65%)
7	According to you, in which mode of teaching do you find easy to learn and understand the concepts?	Online teaching (15%)	Classroom teaching (85%)

3. Conclusion

From our analysis, we can conclude that the traditional method of educating students in which there was direct communication and understanding between teachers and students was much better for the students to learn and interact with the teachers. Also, the teachers could understand what methods to be applied to students so that students could easily grasp the topic.

According to our research, we have found that we can make virtual classroom experience similar to the traditional method by:

- 1) By keeping sessions short and avoiding long sessions.
- 2) Have small quizzes between each session so that students do not get distracted and bored.
- 3) More one-to-one teacher and student interactions.
- 4) Proving students with the proper internet connectivity.
- 5) Create a solid and robust platform for taking exams.

References

- [1] Educational data mining and learning analytics: An updated survey <https://bookdown.org/chen/la-manual/files/Romero%20and%20Ventura%20-%202020.pdf>
- [2] Handbook of Educational Data Mining: Edited by Cristobal Romero, Sebastian Ventura, Mykola Pechenizkiy, Ryan S.J.d. Baker <https://books.google.co.in/books?hl=en&lr=&id=u5aWVw0uQJMC&oi=fnd&pg=PP1&dq=educational+data+mining&ots=KD-SBHX2bM&sig=JkmLeVtXJ2tIFXUz9lyiYC2Y2lg#v=onepage&q=educational%20data%20mining&f=false>
- [3] Educational data mining: A survey from 1995 to 2005 <https://www.sciencedirect.com/science/article/abs/pii/S0957417406001266>
- [4] Prediction and Analysis of Data Mining Models for Students Underlying Issues during Novel Coronavirus (COVID-19) <https://www.ijert.org/prediction-and-analysis-of-data-mining-models-for-students-underlying-issues-during-novel-coronavirus-covid-19>
- [5] Covid-19 – Effect On Student Life <https://timesofindia.indiatimes.com/readersblog/covid-19-effect-on-student-life/covid-19-effect-on-student-life-23470/>
- [6] An Educational Data Mining Model for Online Teaching and Learning https://www.researchgate.net/publication/308905548_An_Educational_Data_Mining_Model_for_Online_Teaching_and_Learning
- [7] Using Educational Data Mining Methods to Study the Impact of Virtual Classroom in E-Learning https://www.researchgate.net/publication/221570520_Using_Educational_Data_Mining_Methods_to_Study_the_Impact_of_Virtual_Classroom_in_E-Learning
- [8] Benefits of Educational Data Mining [https://researchleap.com/benefits-of-educational-data-mining/#:~:text=Educational%20Data%20Mining%20\(EDM\)%20is,collected%20during%20teaching%20and%20learning](https://researchleap.com/benefits-of-educational-data-mining/#:~:text=Educational%20Data%20Mining%20(EDM)%20is,collected%20during%20teaching%20and%20learning)