

**INTERPRETATION BASED ON EFFECTIVENESS OF BLENDED
MODE LEARNING AMONG STUDENTS USING MACHINE
LEARNING TECHNIQUE**



ABSTRACT

Education is a key for everyone's success. Education builds one's career, life skills and personality. The beauty of education is its face to face communication. This environment makes teachers and students to interact with each other which would be highly effective since a study proved that face to face communication will be much effective than communicating through any other forms. Considering the past two years, there was an unexpected change in mode of education. Due to Covid-19 pandemic, everybody needs to shift for online mode of education from offline mode. This method of learning is new to all and everyone has different intention about this mode of education. This paper aims to describe about the concept of crowd learning process, an effective process to make online education useful. This paper also includes the survey of statistical measures of College students about some of performance metrics between both online and offline education and blended mode education. Here the survey from students was also studied with a questionnaire and predicted the mindset of students about online education through a Machine Learning Algorithm.

Keywords: *Online learning, Offline learning, K Nearest Neighbour [KNN], Blended Mode, Impact among students.*

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I Introduction

The process of education is growing parallel with raise in technology. The education system was different in different corners of the world. Concentrating on our country India there were three main different stages of education namely Ancient, Medieval and modern. During Ancient times the

education was of Brahmanas, Upanishads and Dharmasutras. Those educations were on forests, under the nature and outside environment where students mind will be fresh and active. This education given to students was about personality, characteristics, culture and noble ideas.

As everyone knows Muslims invaded India in medieval period, the education was only about Islamic Religion and their beliefs. Coming to Modern education, this becomes a way to what proper education system is. The aim of modern education was to be educating students in terms of new ideas, new technologies, equality etc., by which they can lead their own life independently.

Not only studies, sports, extracurricular activities played major role in Modern education. Students came up as professionals after their modern education. These were happened in long years of gap between them. Then the modern education tends to grow bigger along with the modern era.

At this period of time everyone is having their education in their hand. Technology makes distance to disappear between people and education. By the Start of 2000s, online education step into student's life. Many foreign countries initiated this online education from early 2000s itself. Our country wasn't sure about that and rarely at some of the ends of the country nearly 100 people out of 1000 people learned through the online education those times.

Covid-19 Pandemic situation made a drastic change in everyone's life. Due to the strong communicating virus, people were shuttered in their home itself. Education stepped into online mode in all parts of the world. Technology emergence became a boon for all educational institutions at that time with which education is given to the hands of students.

Students can learn from their place itself through any of smart device, meanwhile Teachers can teach from their place itself. Online education has more pros and cons from different views of different people. It helped a lot during this crisis.

The process called Crowd Learning is introduced on digital learning. This process simply defines collaborative learning. It is also called Crowd wisdom. The process is making an individual to improve more with respect to every aspect in his/her education by working together as a team. In

other words Crowd Learning process is sharing work among participants or teachers and make individual to gain education in efficient manner.

Table 1: Comparison among Online Education and Offline Education

S.no	Performance Metrics	Online Education	Offline Education
1.	Location	Can learn from anywhere	It is location specific
2.	Communication	Happens Digitally	Happens Face to Face
3.	Mode of Learning	Digitalized tools	Traditional tools
4.	Time	Saves lot of time	Huge loss of time
5.	Clearing Doubts	Inconvenient for doubt resolution	Convenient for doubt resolution
6.	Cost	Cost Effective	More expensive than Online Education
7.	Pace of Learning	Students determines this learning	Teachers determines this learning
8.	Level of Commitment	Students are less serious and committed	Students are more serious and committed
9.	Interaction between students and teachers	Less interaction	More interaction
10.	Faculty Student Ratio	1:1, less attention	1:40, more attention
11.	Soft Skills	Very less soft skills was developed	All soft skills was developed
12.	Internet Connection	Internet Connection & technology is needed	No Internet Connection & technology is needed
13.	Social Interaction	Very less	Will be more and enhance social interaction
14.	Missing sessions	Not a big issue	Missing face to face lecture will be difficult
15.	Charges	Reasonable Cost	Might be High fees.

II Literature Survey

A. Khattar, P. R. Jain and S. M. K. Quadri in "Effects of the Disastrous Pandemic COVID 19 on Learning Styles, Activities and Mental Health of Young Indian Students - A Machine Learning Approach," let to know the thoughts of Indian students about online education, their adopting nature and in their lives in lockdown. [1]

F. Hegyesi, J. Velencei constructed a paperwork named "On the Impact of Online Courses on Engineering Education", focuses on positive side of the online learning among students and initiated more number of online courses for the efficient learning from their place itself. [2]

Hai Zhang, Luyao Yu, Mengxue Ji, Yulu Cui, Dongping Liu, Yan Li, Haiqiao Liu & Yining Wang in their paper," Investigating high school students perceptions and presences under VR

learning environment”, studied about mindset of high students on online education and had drawback of surveying only among students and can be enhanced to teachers and students all over the world. [3]

Jiangfeng Li contributed a paper called Analysis of the “Impact of Online Courses on the college student learning habit” surveyed among students with a questionnaire said that online education should be optimized in order to make students benefit on digital learning. [4]

Joe Llerena-Izquierdo, Orlando Barcia-Ayala and Raquel Ayala-Carabajo on their paper “Faculty Training through Crowdlearning for Emerging Online Education” implemented a concept of Crowdlearning which means collaborative learning in online mode of education that ensures every people in the meet or class will be participated in the scenario of learning. [5]

L. Makkar, AbeerAlsadoonl, P.W.C. Prasad, A. Elchouemi in their paperwork called “Impact of e-Learning on Students: a proposal and evaluation of enhanced elearning model to increase the academic performance of university students”, proposed two frameworks for enhanced learning and career growth through E learning. [6]

M. Arora, L. M. Goyal, N. Chintalapudi and M. Mittal, in their paper called "Factors affecting digital education during COVID-19: A statistical modeling approach," describes about a survey about outcome and affordability of online education and observed that outcome has quite negative impact while on the other hand affordability has positive impact. [7]

PetarKolar , Filip Turcinovi , Dario Bojanjac proposed a paper work named “Experiences with Online Education During the COVID-19 Pandemic–Stricken Semester”, researched about the effect of online education in a semester of a students, their performance in that semester exams and the tracking performance were seen to be positive. [8]

R. M. Tawafak, G. Alfarsi, M. N. AlNuaimi, A. Eldow, S. I. Malik and M. Shakir together in “Model of Faculty Experience in E-Learning Student Satisfaction”, introduced a e-learning tool called PLS tool which could highly useful on online education of the students as if they were in face-to-face mode of education. [9]

Ram Gopal, Varsha Singh, Arun Aggarwal wrote a paper called “Impact of online classes on the satisfaction and performance of students during the pandemic period of COVID 19” where they described about the satisfaction of students, performance and factors affecting education via online mode. They surveyed among only students and that could be prolonged to teachers and other research scholars too. [10]

Shadi A. Aljawarneh in his paper called “Reviewing and exploring innovative ubiquitous learning tools in higher education”, described about the different types of tools used on E learning like Web 2.0, Web 3.0, Blackboard and MOODLE and its effectiveness. [11]

Shan Zheng, Liu Fudong and Zhang Ping in their paper called “Thinking and Practice of Online Teaching under COVID-19 Epidemic” dealt with the concepts to make online teaching efficient with problem-based learning [PBL] with “Data Structure” as example and worked out this design to be effective. [12]

Sumitra Pokhrel and Roshan Chhetri conducted a review with the paper called “A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning” which shows us about the impact of Covid 19 on digital education and insisted that digital learning may also continued even after resuming face to face education. [13]

III Proposed Work

Here is the simple architecture diagram for analyzing student’s mentality using K Nearest Neighbor technique.

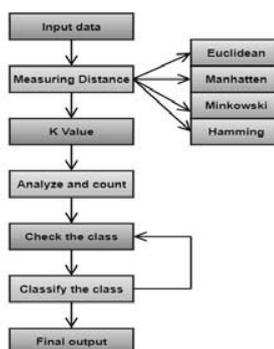


Figure 1: K Nearest Neighbour Architecture Diagram

The beginning every process should be with input document. This paper contains survey report of some students on performance metrics of mode of education as an input document. The aim is to predict the mindset of the student with respect to their answers given in the questionnaire survey. The mindset prediction is possible if the answers of students were combined as some of basic class and with those combinations, the high combinations could be their mindset. This could be done using a Machine Learning Algorithm called K Nearest Neighbour Algorithm. After the collection of input data, the measuring distance should be calculated. There are many different methods to measure distances among data like Euclidean, Manhattan, Minkowski and Hamming. Formulas for finding distances are in following table: [Table 1]

Table 1: Formulas for different distance metrics

S.No	Measuring Distance	Formulas
1.	Euclidean	$d(x, xi) = \sqrt{\sum (x_j - x_{ij})^2}$ Where d is distance, xi, xj are points.
2.	Manhattan	$d(X1,X2)=\sum \text{for } i \text{ to } N \sum \ X1_i - X2_i \ $ where d is distance, xi are points.
3.	Minkowski	$d(X,Y)=(\sum_{i=1}^n Xi-Yi ^p)^{1/p}$ where d is distance, xi and yi are points.
4.	Hamming	$d(x,y) = \sum d_{xy}$ where d is distance, x and y are different points.

The Euclidean distance metric is chosen for measuring distance since it is effective than other three distance metrics. After measuring distance, k parameter is fixed. Then the inputs are analyzed and counted according to class specifications. The next module is class checking and classifying the data into what class it should belong to. This process is done repeatedly for all the input data and final output is obtained. The output would be the class which has more number of classified data. With that the mindset of student could be predicted.

IV Experimental Evaluation and Results

A questionnaire forms, filled by nearly 200 students were taken as input. Its metrics and evaluations were given below.

Table 1: Performance Metrics on Comparing Online and Offline Education

S.No	Performance Metrics	Online/Agreed	Offline/ Disagreed	Both/ Moderate
1.	More Understanding	69	82	53
2.	More Creativity	67	99	38
3.	Logical Thinking	62	100	42
4.	Team Behaviour	57	115	32
5.	Performance Stability in Assessments	64	90	50
6.	Increase Self Learning	87	66	51
7.	Dynamic Mode Adoption is Hard?	54	77	73
8.	Highly Reachable	56	111	37
9.	Issues in Internet Connection	70	118	16
10.	Blend Mode Education	86	68	50

Table 1 discusses the mindset of students for different performance metrics of mode of education. The performance metrics used were creativity, understanding, logical thinking, blended mode, team work, network, issues in network etc.

Table 2: Mobile networks used by students

S.no	Mobile Network	No. Of Students
1.	Jio	67
2.	Airtel	57
3.	Vodafone	70
4.	Others	13

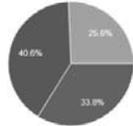
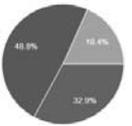
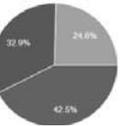
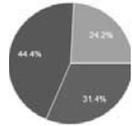
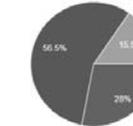
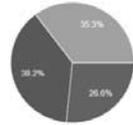
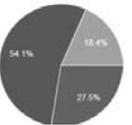
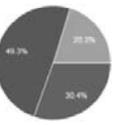
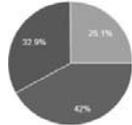
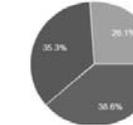
Table 2 describes us that which mobile network is used by students. It is clear that Vodafone network is used by many students followed by Jio, Airtel. Rarely 13 students use other type of mobile networks.

Table 3: Whether their mobile data has Fast network in their Areas

S.no	Mobile Network	Total Count	Fastest	Slow	Moderate
1.	Jio	67	38	13	16
2.	Airtel	57	24	11	22
3.	Vodafone	70	17	36	16
4.	Others	13	2	2	9

If we consider the speed of mobile network on their respective areas as discussed in Table 3, Jio stands first along with Airtel and Vodafone. Though Vodafone network was used by large number of students, Jio becomes fastest network.

Table 4: Performance Metrics with its pie chart

Performance Metrics	More Understanding	More Creativity	Self-Learning	Performance Stability	Team Behavior
Pie Chart					
Performance Metrics	Hard to accept online?	Highly Reachable	Increase Logical Thinking	Blended Mode	High speed of Mobile Network
Pie Chart					

Online Education/Strongly Agree/Yes: Blue

Offline Education/Strongly Disagree/No: Red

Both/Moderate/May be considered: Yellow

Table 4 describes pie charts of some of performance metrics on comparison between online education and offline education. Nearly 41 percent students feel that offline education is highly understandable and 34 percent students feel offline is highly understandable and nearly 26 percent students feel both educations are highly understandable. It is seen that more than 45 percent students think offline education provides more creativity than online and both mode of education. Only 18 percent students feel that both mode of education provides more creativity. While analyzing self learning technique online education take precedence over offline education. Students feel online education provides more time for self education than offline education and both mode of education. Coming to performance Stability on tests, assignments offline education is highly preferable by students than offline and both education modes. Students think that team behavior between them will be increase in Offline education. Nearly 57 percent feel this and 28 percent students feel online education will increase team behavior while 15 percent students feel both education increase team behavior. Nearly 39 percent students think that adopting online education is not so bad. Quarter of students feel it is hard. Half of the students said that Offline education is highly reachable other than two, online and both mode of education. In the criteria of Increasing Logical thinking, 50 percent of students thought Offline education increases logical thinking, other than 20 percent of both education and 30 percent of online education. With respect to Blended mode of education which is combination of both online and offline mode of education, most of the students find out it will be good and only few students think it might not be possible. On comparing High speed of Mobile network 39 percent of students said it is in high speed and nearly 36 students feel it is less speed while moderate speed is voted by 28 percent students.

Figure 2 describes the network issues for the students in their areas. It is good that more than half of the students feel there is no issues on their network in their residence but some 34 percent students feel that they have issues. Some of the issues they said were no signal, tower problems and network issues. Many students feel that cost for data is too high. They say that the cost of net pack is too high, even though they get weak network in their residence.

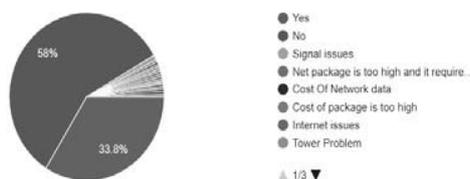


Figure 2: Network issues reasons

V Conclusion

The experimental evaluation and results in this paper let to know about the students opinions about mode of educations by analyzing its performance metrics. This paper also analyzed the issues faced by the students in their residence with their network. It is also analyzed with the help of K Nearest Neighbour algorithm which is one of the Machine Learning Technique to predict the mindset of the students with respective to their answers in the questionnaire. It is concluded that, in the students perspective Offline education tends to be more effective than online education. But online education also has positive impacts on students education and learning. The most important reason why students could not cope up with the online education is signal issues and cost of mobile data. As far as blended mode education (both online and offline learning) is concerned, many students are ready to adopt as analyzed in performance metrics statistics. So in future, blended mode of education can also acquire the place of current mode of education.

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