A MACHINE LEARNING APPROACH TO ANALYSE AND PREDICT THE IMPACT OF WEB BASED LEARNING ON UNDER GRADUATE STUDENTS OF MUMBAI REGION

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Abstract: In the modern era of education, technology plays a significant role in the teaching and learning. By the advancement of information technology, learning can be accessible and more effective through online mode than traditional mode. Over the last few years, web based learning has shown a tremendous growth in India. This helps the learners to learn beyond boundaries.

According to the survey conducted, enrollment for online education has increased by 170% from 2021-2022.This shows the positive impact of web based learning. 20.3lakh learners from India opted for open and distance learning compared to last year 2020-21 where the total number opted was only 14.6 lakh.

This statistical figure shows the demand of web based learning and the need to do greater research in this area to implement web based learning in rural and semi-rural areas for functioning smoothly and effectively. But at the same time, it is important to understand whether there is a digital divide existing in rural and urban India or between privileged and deprived population.

Successful implementation of web based learning depends on varied factors and the need to understand the benefits of the same to maximum learners to rural, semi-rural and urban areas. This could depends on the demographic area, the interest in web based learning, the amount of time spent on web based learning, the electronic gadgets used for web based learning, the physical, social and psychological impact on web based learning.

This research aims in understanding the factors associated with successful implementation of web based learning in Mumbai region and try to come up with a model to using machine learning algorithms to implement the same in the best feasible way.

The literature survey helped in imparting inputs to this research study in coming up with the basic hypothesis on the various factors that can affect while implementing the web based learning. The study also covered the various parts of Mumbai region to understand the impact of web based learning and the various factors affected while doing web based learning and the area of improvement needed to ensure that the model is robust and can be used in various situations.

The research is carried out in two parts. The initial parts are mainly to understand the existing web based learning in rural and urban areas to understand the current situation and the requirements. The study then develops a new model which predicts the impact of web based learning in Mumbai region using machine learning algorithms.

Introduction

Web based learning has shown a significant growth over the last few decades, as the online education and Information and communications technology(ICT)combine to provide learners with the opportunity to gain different new skills. Since the pandemic out break started, online learning has become students centric in learners' lives. Due to the pandemic schools, university and organization are forced to work remotely, which increased the usage of online learning.

Online education allows students for learning something beyond the boundaries. Students can have access to unlimited topics and practical's. Online education allows students of wide age group to learn at their own pace.

India will experience its growth in digital revolution due to the outreach of the internet

which is not limited to the urban area alone, but also reached to the rural area. This leads to a large scope of e learning in India and educational sector .Research forecast that the online education demand may raise up to $350 Billion by 2025.

Because it involves online course content, web-based learning is also referred to as online learning or e-learning. This also features email-based discussion boards, video conferencing and the ability to watch live lectures online.

The adaption of communication technology to support web-based learning and the introduction of significant improvements in remote learning for the delivery of online courses are the two primary developments in web-based learning. When providing and designing web-based learning, both should be taken into account.

In an educational setting, face-to-face instruction and traditional methods are combined with online learning. This is typically accomplished using an intranet, which is typically "password protected" and available to registered users only.

According to research article published in Time of India, the online education enrollment had seen a tremendous increase from 2021 to 2022 by 170% and the distance and open learning has increased from 41.7%.

The statistics show that 20.3 lakh students have opted open and distance learning from India in the academic year 2021-22 against 14.6 lakhs in 2020-21.This statistics shows the demand of online courses.
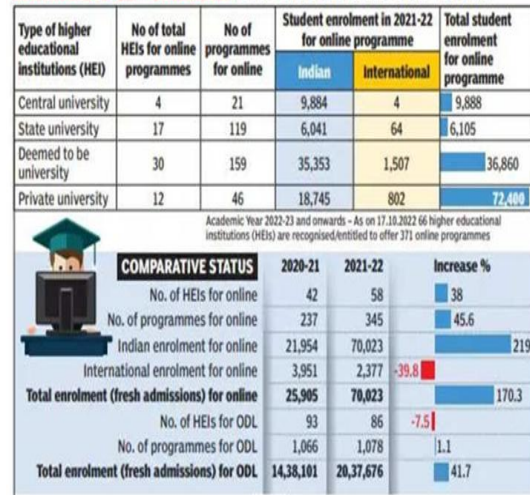
Figure 1. Statistics of data showing the demand of online course

REVIEW OF LITERATURE

Christof Imhof, Sorin Comsa, Martin Hlosta, Behnam Parsaeifard, Ivan Moser, and Per Bergamin -2022

In this research study, the authors' aimed to fill the research gap by evaluating the performance of different machine learning algorithms when predicting the performance of various methods. This research mainly targets on the dilatory behavior of the learners .Procrastination, irrational delay of task is a common behavior in online learning and due to the rise of learning management system and learning analytics, indictors of dilatory behavior can be detected in very early stage. In this research, the study focuses on involving different types of predictors and comparison of various predictors and its performance for this dilatory behavior. This study mainly aims to fill the various research gaps by evaluating the performance of varied machine learning algorithms while predicting the timely or delayed submission of online assignments in a higher education environment .

Xiongwei Lin Et al.-2022

Applying project-based learning in artificial intelligence and marine science is the topic of a research study. The major objective of an assessment research on a robotic sailboat platform is to help high school students learn about artificial intelligence and robotics, put

their project-based learning in practice, and create an integrated robotic platform to assist sailboat testing.

Shuo-Chang Tsai, Cheng-Huan Chen, Yi-Tzone Shiao, Jin-Shuei Ciou and Trong-Neng Wu-2020

In the research paper, Precision education with statistical learning and deep learning, the authors have taken a case study of Taiwan. According to the author, the major drawbacks of Taiwan is the lower birth rate which has led to severe challenges for many universities to admit sufficient number of students.one of the major consequences due to this is the large number of students who have been admitted to different universities regardless of whether they are eligible or have aptitude for this academic studies. By developing the prediction model, early diagnosis of students whose probability of dropouts are been identified and can help these students to complete their studies. According to the researchers, effective pre learning study is necessary, so learners learning background should be examined thoroughly.

The main objective of the study is to understand how big data and artificial intelligence can be used to help universities to understand the students background.to investigate this problem, the researchers had done a study of 3552 students data from a university in Taiwan.

A.S. Arunachalam, A. Thirumurthi Raja, S.Perumal-2019

The authors have explored the educational data mining which explains the exploration and involvement of the application of the data mining, statistical analysis and machine learning to the data generated from educational institution. Educational data mining is closely tied up with learning analytics. A comparison of various decision tree classification methods has been conducted by the authors. Employing academic achievement information for engineering students.By using educational data mining, we can extracts knowledge through different patterns. The authors have implemented the

analysis model in WEKA tool to compare the accuracy performance between different types of decision tree algorithms mainly J48, Enhanced random Tree and Entree. These three classifiers are widely used with weka for classifying the learning data sets and the results obtained are evaluated and compared to identify the best decision tree classifiers.

Monica Ciolacu, Ali Fallah Tehrani, Rick Beer and Heribert Popp -2017

The purpose of this paper is to understand the increase demand for online learning and understand the fourth revolution in education. Machine learning techniques have shown impressive development in data analytics. According to the researcher, they have conducted analysis based on support vector machine, neural networks and cluster analysis and decision trees to evaluate students' performance at examination. The researcher had done a prediction model based on the cluster analysis .They have used blended learning and complete virtual course. They have also used clustering algorithm, X-means algorithm which is used to automatically find the total number of cluster in a given training data. The study had considered two factors in both instances, primarily the overall clicks to a certain course and the overall number of clicks on a virtual exercise.

RESEARCH METHODOLOGY
Methodology

In the earlier chapter, a detailed literature review related to research topic was conducted. The important features required to analyze and predict the impact of web-based education has been noted. In this chapter different types of research were studied and the best suitable methodology is applied for the primary data sets. Research shows that though much research work has been done in the area of Web-based education and its effects, very limited study work has happened towards identifying the impact of Internet-based instruction for academic and practical and social impact in Mumbai region towards the students in rural and urban area. Hence this study address the parameters affected for web

based learning and this study will analyze and predict the effects of online education in the Mumbai area. This chapter deals with problem statement to understand the impact of web based in Mumbai region.

A good research is to search the knowledge through objective and systematically using a method to find a solution. It has the characteristics like the objective clearly defined, research procedure should be sufficiently described, It's important to verify the data's accuracy and dependability. Based on the research methodology used, research problem to be investigated and the knowledge hidden has to be discovered.

Research

Research is the search for knowledge. Research can be defined as the systematic and logical and scientific approach to find new knowledge and hidden information on a selected research topic. Research is usually a meticulous inquiry, especially when looking for novel facts in any field of study. Here, knowledge is information about a certain area of study. The required information can be derived from different origins like books, research journals, articles, internet, and experimental observations and by the use of different technology. Research is an original contribution given by a researcher to the existing knowledge and making it advancement. In a nutshell, research is the systematic, objective pursuit of knowledge in order to identify a fix for a particular issue.

In our research, we concentrated on descriptive research study to find the effect of online education on undergraduate students in Mumbai region which covers both rural and urban area. This study will help the educationalist, government and higher education sector to understand the infrastructure and technological advancement required to rural and urban area for the advancement of web based learning. Many researchers are doing research on educational system for enhancing solution for web based learning. Researcher contributes their knowledge systematically to solve technical

and logical problems in education. This research follows all proper steps and methods to produce better enhancive research outcomes. The propose research is the study of effectiveness in web based learning and to analyze the academic, physical and social impact of web based learning among undergraduate students in rural and urban sector of Mumbai region. We have selected the five regions of Mumbai region for research area and our research is exploratory and experimental base approach to follow all research steps of exploratory and experimental base investigation. Research is not only inventing or finding new things, but to enhance new approach to give advances vision and significance of online education among undergraduate students, as well as to suggest the technological infrastructure and training required for using the web based learning in an effective way.

Types of Research

There are many types of research, and researcher uses following techniques to evaluate their research in a systematic way to reach to their desired output to achieve specific results

Descriptive vs. Analytical research

Fact-finding and surveys of various kinds are the key components of descriptive research. The main goal of descriptive research is to explain the circumstances as they are right now. This method will be making survey base research of different research area. One of the main characteristics of this type of research is that the researcher has no control over the variables. In this case, researcher can only report what has happened or what is happening. Descriptive research is always survey methods of different kinds, which includes comparative and correlation methods.

Applied Vs. Fundamental

Research can either be applied or pure research. The main aim of this research is at finding an appropriate solution to a problem facing people or any educational or industrial organization. This type of research mainly deals to solve practical problems. While

conducting an applied research, researcher should identify a problem, develop the suitable hypothesis and test the results.

Fundamental research

Fundamental research is mainly concerned with development of a theory. An illustration of fundamental research is anything that relates to pure mathematics. Fundamental research, usually referred to as basic research, is an inquiry-based field of study. Fundamental research mainly targets to answer the question of what, why and how and mainly contribute to the basic knowledge in the research area.

Questionnaires and surveys

These research methods collect data from a large group of people. These questions are mainly used to do quantitative data analysis. After the data collection, researcher translate the survey details into numerical data so that different pattern can be generated. Questionnaire and survey helps to gather information from a large set of people who are not ready for personal interviews and experiments. Questionnaires contain several types of open ended and closed questions.

Research Motivation

Research is the systematic approach to get answer to a specified problem and is defined that research is a continuous process of finding a solution to a problem after doing a research analysis and conducting various studies of research factors. This includes the process framing the research methods, framing questionnaires and collecting data and finding the research conclusion. Thus any research could answer the uncertainties of a problem.

In this research, we are primarily examining whether web-based learning has affected undergraduate students. The main focus of our study is to find the effectiveness of web based learning and to study the impacts in physical, social and psychological health. For this purpose, we have made a questionnaire, which consisted of three primary parts. Initially we collected academic details, social impact, physical impact and psychological Impact on web based learning. We have collected 649

data set for our research in a systematic matter for web based learning.

Problem solving and troubleshooting

The primary goal of this is to conduct research and design problem-solving strategies to manage the process efficiently. Every research starts with a problem statement and problem solving techniques helps to ensure that the solution achieves with desired outputs.

Work Plan of Research work

The proposed research will be conducted as follows

1. Identifying the problem Statement
2. Finalizing the research methodology and methods
3. Primary data collection with the help of questionnaire
4. Analyze the impact of web based learning in urban, semi-rural and rural area
5. Analyze the Physical, Social and Psychological impact of web based learning
6. Data Preprocessing and analysis
7. Data Virtualization
8. Pre Final drafting of thesis
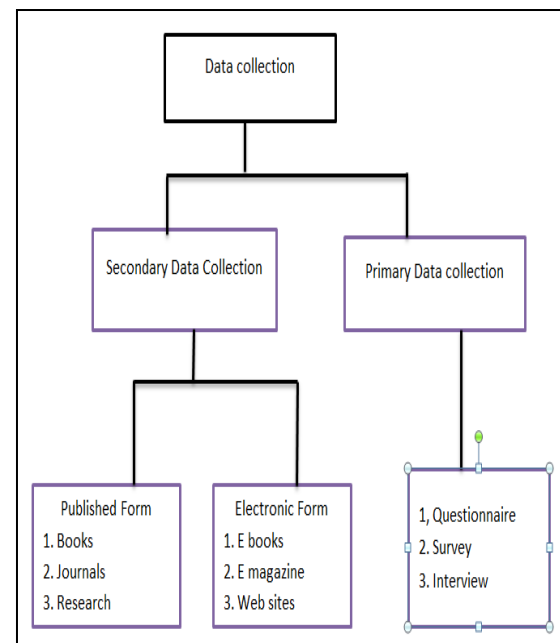9. Final Writing of thesis

Data Collection

Figure 2. Data Collection methods

Summary and Conclusion

This research study which is focused on analyzing and predicting the impact of web based learning on undergraduate students with

reference to the Mumbai region has shown a positive impact and manifested that it is very good move to shift from traditional teaching to web based learning using technologies. Most of the students preferred hybrid mode of learning where they could interact with the faculties in offline mode also.

This work covered two aspects of web based learning, the analysis part done by using SPSS 23.0 version and the prediction of impact of web based learning on undergraduate students is done using Python.

The survey was conducted using both online and offline mode. We have conducted the online survey through Google form and received a response of 649 from students from different parts of Mumbai region.

From the survey conducted to know the impact of web based learning among undergraduate students, it is very clear that the students are having awareness of technology, web based learning and various other digital tools, but the impactful usage of digital tool is very less and students are getting addicted to social media also due to over use of Internet. While interacting and taking interviews with students, the student's complaint that the students don't get any relevant content easily and personalization of content is not there while using internet This problem can be overcome by web based learning, where the user can get e-content in customized way.

The internet world is moving faster and the students are positive about taking web based learning. Studying within the curriculum and listening to lectures only will not suffice the students to prepare the students to compete the current world of information technology

It is necessary that learners get adequate guidelines and training with proper e-resources to get ready for competition. Web based learning with adequate assistant from faculties help the students studying in rural area and learners from metro city should get equal opportunity irrespective of the region they live.

Not only the higher educational institutions but also many IT companies are using web based learning as training platforms. Web based learning is becoming cost effective and easy to deliver. In spite of many advantages on the web based learning, the main concern is about basic technical knowledge required for students, how adaptable is new web based learning platform and the availability of good internet connection for learning.

Now a day most of the international university are using web based learning from long time and proved to be very successful. India had also shown its progress in web based leaning by introducing various online program, say for example MOOCS programs. But according to the researcher the main drawbacks is the awareness of various online programs. While conducting survey from different parts of Mumbai region, we came to know that many students are not aware of MOOC courses and its benefits. Educational Institutions needs to do some awareness program for the same for learners.

We have reached to the world where we can connect to the internet with a speed from 4G to 5G, where students can get information faster. But the main objective is to get the right data at right time and this is possible with web based learning. Because resources and content in Internet becomes filled with huge amount of data and choosing the right data is not an easy task. This is where the web based learning can help students to get the right data at right time.

The implementation of web based learning in rural, urban and semi-rural area is a requirement for higher education. Creating awareness and providing sufficient training programs is mandatory along with the training to the facilitators. Educational institutions should arrange and initiate various orientation programs and train the trainer programs and also to show them the different best case studies to motivate the students to take up web based education.

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