Original Research Paper

An Analytical Survey of Difficulty Faced in an Online Lecture During COVID-19 Pandemic Using CRISP-DM

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Abstract: COVID-19 has greatly disturbed life in many ways and has changed the way we live. Various surveys have been conducted in different fields, and the teaching-learning process has been affected to a great extent. During this pandemic, various online tools and technologies have been available for guiding students without attending school. Many governments, corporations, and research fields have officially ordered to use of online media for the teaching-learning process. Platforms such as Google Meet, Microsoft Team, and Web-e-X have allowed and arranged for online video conferencing mediums to achieve the goal of the teaching-learning process. However, as mentioned above, there are some serious issues with the online teaching-learning process. These include problems with continuous network bandwidth during sessions, physical and mental presence in the class, difficulties handling mathematics classes, and the potential for non-sense activities that may disturb the entire class. In order to discover knowledge, I am using a new approach to data mining technology called CRISP-DM. This study addresses the effectiveness of online teaching mode and learning and the challenges faced by students and teachers who are taking online classes during COVID-19. According to this study, 88.2% of students did not have proper internet or technology facilities, 58.30% of students were not satisfied with online learning, 85.3% of students complained about eyesight issues from taking online classes on devices, and 50.01% of students were unable to manage university affairs.

Keywords: COVID-19, Online Teaching Learning, Data Mining, Data Warehouse, Big Data Analysis, CRISP-DM

Introduction

The CRISP-DM is the most commonly used analytics model. CRISP-DM suggests a step-by-step formation of the data mining process to maximize the success of the research and minimize the common faults happening in related to any object-oriented process. Basically, CRISP-DM provides a uniform structure for planning any data mining project (WHO, 2020; UJH, 2019; Wrycza and Maślankowski, 2020; Sirinaovakul *et al.*, 2020). It is a reliable and well-proven process (Weiss *et al.*, 2020). We are evangelists of its high flexibility and usefulness when using analytics to solve thorny business issues. It is the golden thread that runs through almost every client engagement using the CRISP-DM model shown on the right (Cadena *et al.*, 2018).

The model is an idealized step-by-step process. Practically more tasks can be performed in a different sequence and it will often be necessary to backtrack to previous tasks and repeat the certain process. This model does not try to capture all the possible routes

through the mining methodology. You can immediately refer to more information about each phase of the process here:

1. Business understanding
2. Data understanding
3. Data preparation
4. Modeling
5. Evaluation
6. Deployment

Step 1 understanding business and its objective are to give context to the target and use data so that the developer gets a notion of the relevant information in that particular business model. It is composed of online meetings, documentation view, specific field understating, and a long list of ways that help the development team, make questions about relevant context. The product of this step is that the development team understands the context of the related project. The goals of the project should be defined before the start of the project (Chapman *et al*., 2000).

In this study, the problem performs a survey on facing difficulties while taking an online class with video conferencing technology. To understand and take input one questionnaire is prepared that is included in this study. The document link is circulated through emails, social media, and personal phones as text messages (Kurgan and Musilek, 2006).

Step 2 is data understanding and its objective is to know what can be expected and achieved from this data. All so checks the quality of the data, in several terms, such as data completeness, value distributions, and data governance compliance (Almakki *et al*., 2022). In these steps, data scientists in the data mining process are covered data mining models, Steps, and challenges involved in the data extraction process., how the current state of the use of full data is and how it should be, in order to be useful to the algorithm and process involved (Mariscal *et al*., 2010). The collected data is to be stored and arranged in a data repository. Various useful data mining techniques like cluster analysis, market basket analysis, association rule detection, and outlier analysis were performed on collected data. Data cleansing and data recovery are also performed in demand (Jensen, 2012).

Step 3 data preparation and involvement in the ETLs that turn the usefulness of the data. Sometimes data governance policies are not respected by the organization and to give true meaning to information some algorithms perform better under certain parameters, someone doesn't accept no-numerical values and others don't work ok with a large variance

in values. Then again, it is up to the development team to normalize information (Piatetsky, 2014).

Step 4 although it is the glamorous part of any project, it is also the shortest in time, as if everything previously is done correctly there is little to adjust (Chapman *et al*., 1999). In case, the results are improvable the methodology is set to step back to data preparation and improve the available data. Some algorithms such as web mining, text mining, k-means, hierarchical clustering, time series, linear regression, association mining, block-chain, a round robin database, k-nearest neighbors, an amount many several others, are the core code lines of this step in the model, (Singh *et al*., 2022).

Step 5 is modeling evaluation where it is up to verify that the results are strongly valid and knowledge full. In case the results are not satisfactory or useful then, the methodology permits the review back start from the step first, to understand why the results are mistaken, the data scientist divides the data into training and testing models. In this step, the testing data is used, and its objective is to verify the model is accurate to reality (Azevedo and Santos, 2008) the context of supervised learning, with the task of classifying items, one way to verify the result is using by the confusion matrix (Chapman *et al*., 1999) in unsupervised learning to make evaluation becomes harder, as there is no static value to separate "correct" from "incorrect", example, the task of classifying items would be evaluated by calculating the inter and intra distance between elements in a (some) cluster (s) (Kurgan and Musilek, 2006) any case of its conspicuousness to determine some source of error measure. This error measure tells the user how they can have confidence in the results, either: "For sure this will work" or "for sure it won't". If somehow the error measure happens to be "Zero" for all cases, it would define that the model is overfitting and reality might perform differently (Kurgan and Musilek, 2006; Colin Shearer, 2006).

Step 6 is deployment or arrange and it consists of presenting the results in a convincing manner and by conclude the goal. It is the only step, not affinity to the CRISP-DM model, conditional on whether the final user a useful or not, higher education analytics (WDHETFC, 1998; Chapman *et al*., 1999). Example: If the final user is another piece of software, as in the sales website program asking its recommendation system what to suggest for a buyer, a useful manner would be a JSON carrying the response to a specific query (Haffar, 2015). In another case like a top executive who requires projected information for better decision-making purposes, the best manner to represent the findings is to store them in an analytical database and present them as a dashboard on a business intelligence model (Forbes, 2015).
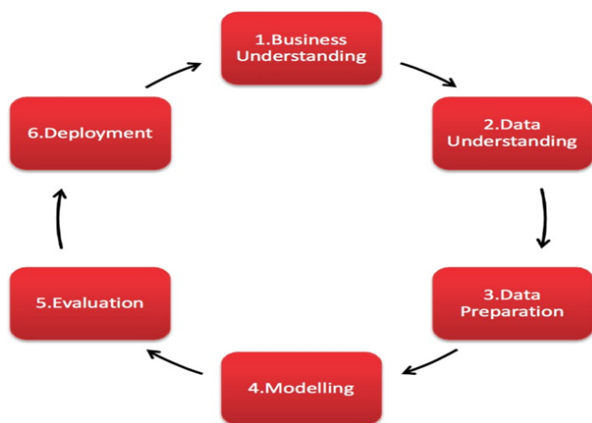
Fig. 1: CRISP-DM model

In this Fig. 1 CRISPDM or cross industry standard process for data mining is a process model with six phases that naturally describes the data science life cycle. It's like a set of guardrails to help you plan, organize, and implement.

- Business understanding-what does the business need
- Data understanding-what data do we have/need? Is it clean
- Data preparation-how do we organize the data for modeling
- Modeling-what modeling techniques should we apply
- Evaluation-which model best meets the business objectives
- Deployment-how do stakeholders access the results

Materials and Methods

The purpose of the current study is to find out the challenges confronted by learners in Chamli Devi group of college Indore M.P India, during the transition to online learning in the second year students in Computer science and electronics and communications students of 2020 due to the COVID-19 pandemic and explore possible solutions and suggestions for future virtual learning.

Results and Discussion

Based on the problem statement mentioned in the above discussion on a survey of an online survey of how effective the online teaching and learning process is, what level of difficulty is going to be faced by teacher and student simultaneously? The questionnaire contains a few questions and is uploaded in google form. The student of various universities and schools and colleges takes participates in the survey. The link is shared on WhatsApp groups and other social media like Facebook, twitter, personally, etc. There is also data collected offline from students and teachers who are near the area. The google form screenshot is given Table 1.

Data Collection and Result Analysis

The data collection process scope is very large. Google form allows us to collect data from a far distance and store recorded data in a data repository (Database). Thousands of records are collected online. The result analysis is done on each question one after another. Several universities, which may use a different platform for conducting online classes, contributed their response to this survey. The data analysis also made use of graphs and chart for easy consideration. The following section shows the result and discussion.

One major question nowadays is what about the network connection. Every day we heard that when class starts and suddenly the network discontinues, that affects the teaching-learning process. The question asked how you feel about network continuity at the time of the teaching-learning online process. The result is below. It suggests that students and teachers are not satisfied with the current network speed. Almost 65% of students are dissatisfied with their current network service provider even though they are paid very high.

This is one of the hottest questions during this pandemic time. How teacher came to know whether students are constricted on each topic that is delivered by the teacher? What about students' login and then they are constricting properly or even moving around or go for walk? Teachers can't care about student study and the same result is reflected in the survey. Almost 80% believe that it's one way of communication. You start the lecture, don't care about the student, the students are enough wise, and the lecture finishes. The result confirms the situation.

The results show that it is an average mixed opinion on the usefulness of online courses, seminars, and webinars. It is a time requirement that forces us to adapt to changing requirements. Many people believe that new technology is quite efficient in saving time and money as well as also many hurdles.

Students' mischievousness and misbehaving while online courses are one of the biggest problems nowadays. Many tools allow expelled of the non-sense student. But applying strict rules and protocols sometime may block even disciplined students. It's again a debatable question that may not get solved so easily. Survey confirms it. It is still unclear how to handle such things.

70% of student confirms it could be an alternative for the teaching-learning process in near future. It also makes it possible to save time and money. It may be a future alternative for the teaching-learning process.

The videos, audios, charts, and graphs are very useful for the student to understand the contents of the course. "The picture worth a thousand words" is proven here. The traditional teaching-learning class contact may be lacking from this multimedia presentation. Online

learning might be one of the biggest advantages one can see during these pandemics time. It may be the revolution in the teaching-learning process.

For the student, it is another beneficial aspect. One can record lectures with the help of online tools, then one may use any time for reading and understanding the contents. Even the teacher feels free to explain the course again and again. Single-time recording can serve multiple classes. So, there is some advantage of new techniques adapted.

The course like arts and drama can easily be expressed in words and emotions. Even the course content that is purely theoretical can be expressed in words and does not require any further practice. "practice makes man perfect". But a subject like mathematics is really hard for a teacher to explain and a student to understand. Even after understanding if you are not practicing well, it is really difficult to remember for a long time.

The same is the case with the practical subject. The subject in which hands-on practice is required cannot be much understood by only lecture delivery. It is like we cannot swim by watching a swimming video. To swim properly we must dive deep into the water and then by experience swimming can be learned.

Online tools like Google Meet, Cisco Web-e-X, Google Classroom, and Microsoft team can provide a platform for the virtual class. It is an exact online activity tracker that we can do in a physical class. One may utilize this platform for the reduction of damage done due to COVID-19.

Both physical as well as Online is necessary to achieve target it is common to see that in a class room, only few students learn actually they want. If student in class room is physically present that doesn't mean that he can learn what ever subject is taught by teacher.

The COVID-19 pandemic and the prolonged lockdown induced by it has made working as well as studying from home the new normal. Though the concept of online learning existed even during the pre-pandemic, the phenomenon has certainly reached an altogether different level and intensity in these trying times.

Online teaching in a virtual class is already challenging, let alone getting your students' attention and keeping them engaged. But things can be even more difficult when you have to handle bad student behavior.

It is not surprising that in-person courses are, on average, more effective. Being in person with teachers and other students creates social pressures and benefits that can help motivate students to engage. Some students do as well in online courses as in in person courses, some may actually do better, but, on average, students do worse in the online setting, and this is particularly true for students with weaker academic backgrounds students with weaker academic backgrounds.

Data exploration is the practice of using visualization techniques to find unforeseen relationships between data points or sets of points in large databases. Once a relationship has been found the same visualization can be used to communicate that relation to others.

Students today are using educational videos as a tool for learning everything, Abstract topics that once seemed difficult to teach and learn are now more accessible and understandable thanks to the availability of effective educational video platforms for online learning.

Online classes were first offered during this period because face-to-face learning sessions were suspended due to the COVID-19 pandemic. It was found that students owned the devices they were using for online classes. Internet connection and power interruption were the most problematic aspects of online learning.

Despite the adoption of online education gaining momentum, this mode of learning cannot compensate for classroom learning. This form of education is inherently flawed and lacks the basic elements of quality education such as the formation of a teacher-student relationship and the facility to carry out practical.

The best web, zoom other meeting software for audio/video, screen sharing, give control and recording. Enhance your business communications with meeting and teaching learning, video conferencing and webinar events. View events read blogs subscribe to newsletter.

The value of this study is to draw a holistic picture of ongoing online teaching-learning activities during the lockdown period including establishing the linkage between change management process and online teaching-learning process in education system amid the COVID-19.

Figure 2 both physical as well as online is necessary to achieve target. Shows that 95% of the students take mental not presence during online class, and now approx 17% student mental presence.

Figure 3 in during in online class necessary face difficulty in 98% of the students, and now approx 5% student do not face in difficulty.

Figure 4 in during in online class most of time mischievous by a student in class 90% of the students, and now approx 5% student do not face in difficulty.

Figure 5 in during in online class 92% in the majority of students have said that they can learn at their own pace comfortably and effective through online learning and now 4% of students do not understand effective class.

Figure 6 in during in online class 98% of students have said that they cannot be visualization now 3% of students do not understand need of visualization during the class.

Figure 7 the majority of students agree that the video lectures delivered by his/her faculty teaching the subject help 98.5% to learn effectively now 3% of students do not understand need in video lecture class.

Figure 8 the majority of students agree that the contents of mathematic that level delivered by his/her faculty teaching the math's subject 85-92% students do

not learn effectively now 2% of students learn effective in math's subject.

Figure 9 in during in online class 98-93% of students have said that they cannot be Practical subject can be understood by the student now 1-2% of students is understand only.

Figure 10 the majority of 93-95% students faced technical difficulty, and now only 2% of students do not face any technical difficulty during the class.
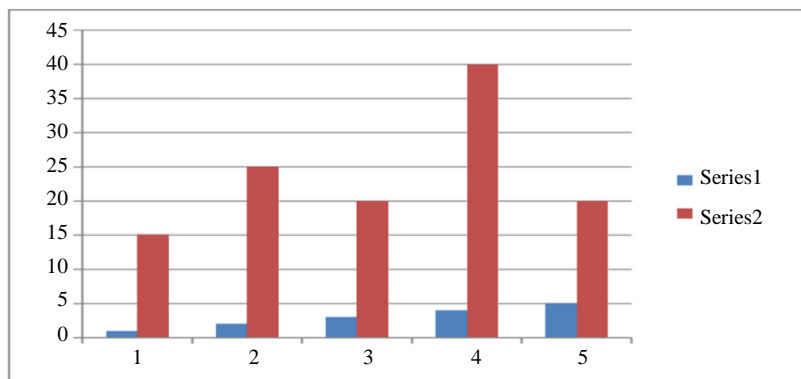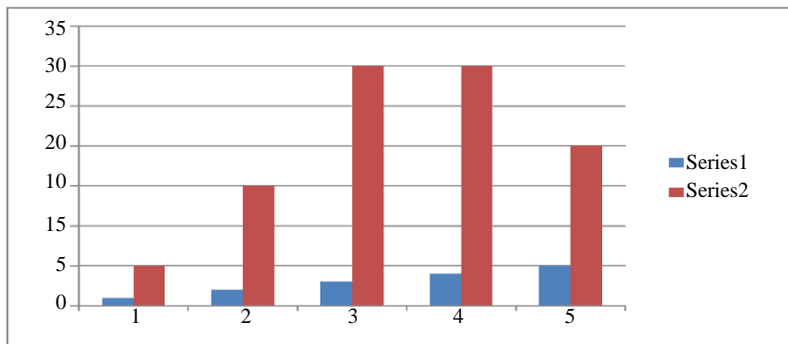
Figure 11 the majority of 92-95% students faced network difficulty, and now only 2 or 3% of students do not face any network difficulty during the class.
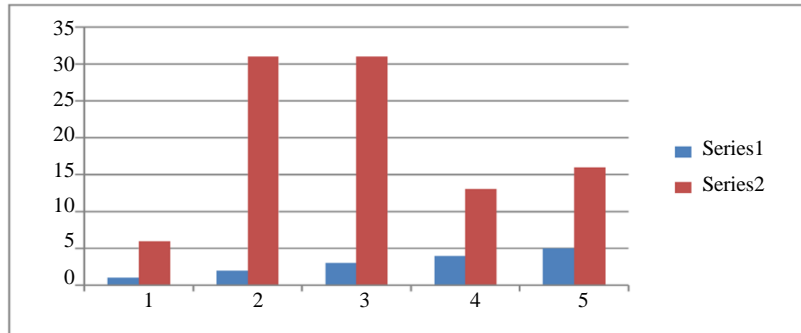
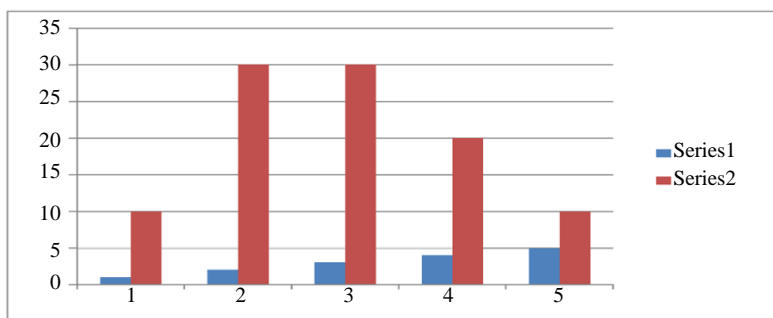**Fig. 2:** The physical and mental presence of student what about
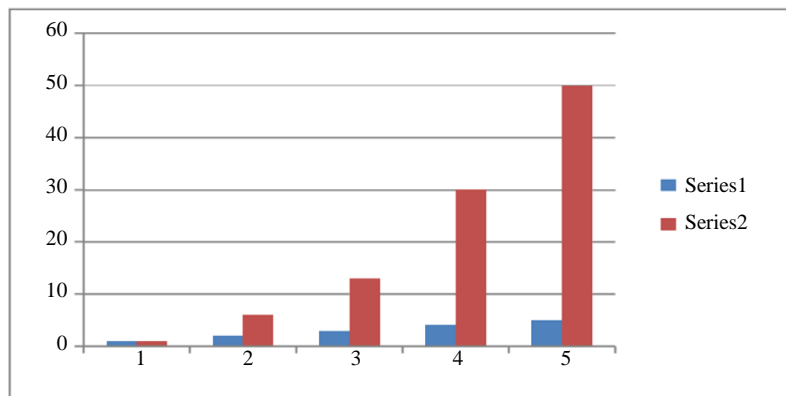
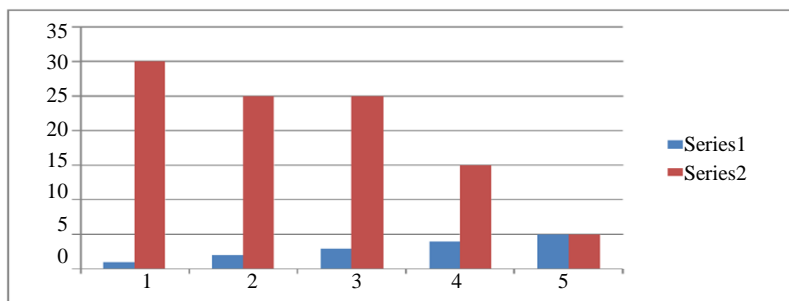**Fig. 3:** Difficulty faced in explanation of online course amount

Fig. 4: Conduct/mischievous by a student in class
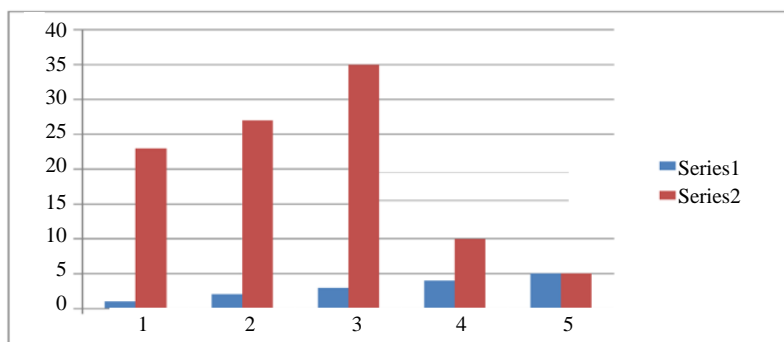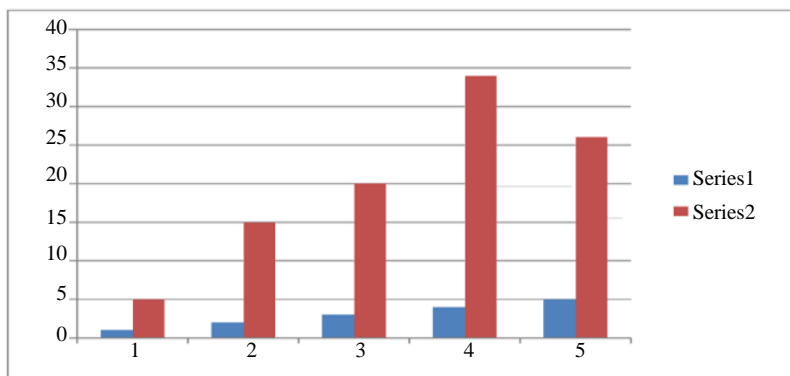
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Fig. 5: Effective is online learning

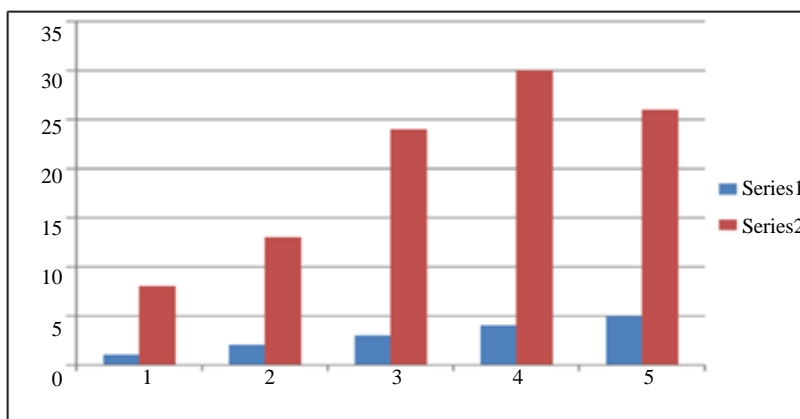**Fig. 6:** Visualization helps in students learning what level

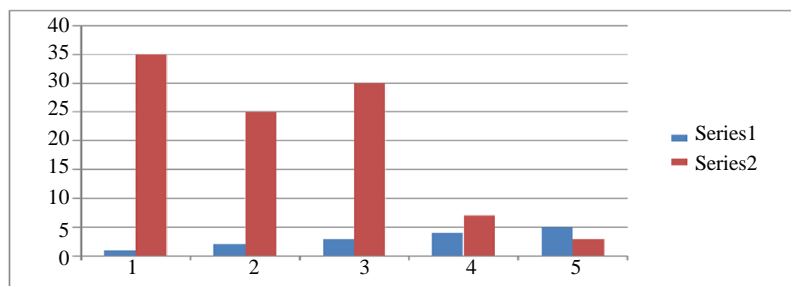**Fig. 7:** Recorded video can help student revision

Fig. 8: Contents of mathematic that level

Fig. 9: Practical subject can be understood by the student

Fig. 10: Online tools like Web-e-X, Meet, and other tool, at level

Fig. 11: A network that is used by students continuously whether

Table 1: Online survey

	1	2	3	4	5	None
Whether network that used by students continuously available	1	2	3	4	5	None
What about the physical and mental presence of student	1	2	3	4	5	None
Amount of difficulty faced in explanation of online/contents	1	2	3	4	5	None
Level of miss conduct/mischievous by a student	1	2	3	4	5	None
How to effective online teaching	1	2	3	4	5	None
What level visualization helps in students learning	1	2	3	4	5	None
What level recorded video can help student revision	1	2	3	4	5	None
What level the contents of mathematics can be explained?	1	2	3	4	5	None
What level of the practical subject can be understood by the student?	1	2	3	4	5	None
What level online tools like web-e-X, meet, and other tools helpful	1	2	3	4	5	None
What level a network that is used by students is continuously available?	1	2	3	4	5	None

Rate the following question: (1) Excellent (2) good (3) medium (4) below average (5) poor

Analysis of the survey included questionnaire base analysis of valid responses, For the questionnaire in 11 question, all missing responses were removed and only valid responses were included in the final "range of response is "1 to 5" or sample for that question 1 is Excellent and 5 is Poor; For all questions or response in online options, the content of each response was reviewed, summarized, and organized by common overarching themes. In this questionnaire, descriptive statistics numerical base answer was used to analyze the basic data, the online difficulty faced in an online lecture and the first research question is whether network that used by students continuously available. The second research question was analyzed through a lag sequential what about the physical and mental presence of student and third amount of difficulty faced in explanation of online/contents face explanation difficulty due to problem in contain deliver and fourth Level of miss conduct/mischievous by a student during the online teaching and fifth is how to effective online teaching methodology is efficient or not , now sixth what level visualization helps in students learning is used not only to explore a continuous sequence of behavioral and seventh what level recorded video can help student revision in future understanding purpose now eighth question is what level the contents of mathematics can be explained? in this question using math' formula and explanation understand by the students in ninth question What level of the practical subject can be understood by the student? Now tenth, what level online tools like web-e-X, meet, and other tools helpful for teaching process and last question is what level a network that is used by students is continuously available? in which an initial online tools are followed by a student for visualize and understanding purpose, researchers have mainly applied this method to the analysis of education difficulty faced in an online lecture.

Conclusion

In this study, survey has been conducted on the online teaching and learning process due to the COVID-19 situation. The results clearly mention that the platform offers several advantages to teachers and students in terms of multimedia content, recording lectures can help the student to learn and understand better. At the same time, there are several hurdles it is quite difficult to explain contents like science mathematics, and computer science based on technology in which a large amount of practical work is involved. All these assessments should be contemplated while impressive mode online teaching and learning courses to make them more impressive and fruitful for the learner. It's possible that once the COVID-19 pandemic settles down, we may see comprehensive education systems using online mode for

study aids, albeit in a hybrid mode in sequence with regular classes. Hence this study will explain useful for re-conceptualizing and improving higher education with segment pressing online mode.

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Author's Contributions

Manmohan Singh: Carrying out the experiment, collected and verified the analyzed data; prepared the draft of the manuscript and approved the final manuscript.

Vinod Patidar: Member of the laboratory experimental/implementation monitoring and approved the field data.

Shaheen Ayyub: Correction of the translation of the manuscript in English, experimental monitoring, member of the Laboratory/implementation.

Anita Soni and Dharmendra Sharma: Correction of the translation of the manuscript in English, experimental monitoring, member of the laboratory/implementation and approved the field data.

Monika Vyas: Member of the laboratory, preparation of the nursery, implementation monitoring, and collection of data.

Amol Ranadive: Design the research plan and supervised this study and approved the final manuscript.

Ethics

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and that no ethical issues are involved.

References

Azevedo, A., & Santos, M. F. (2008). KDD, SEMMA and CRISP-DM: A parallel overview. *IADS-DM*. http://hdl.handle.net/10400.22/136

Almakki, R., AlSuwaidan, L., Khan, S., Baig, A. R., Baseer, S., & Singh, M. (2022). Fault Tolerance Byzantine Algorithm for Lower Overhead Blockchain. *Security and Communication Networks*, *2022*. https://doi.org/10.1155/2022/1855238

Cadena, S., Vela, Herrera, J. O., Torres, G., & Mejía Madrid, G. (2018). Innovation in the university, in: Proceedings of the Sixth International Conference on Technological Ecosystems for Enhancing Multiculturality-TEEM'18, pp: 799-805. https://doi.org/10.1145/3284179.3284308

Chapman, P., Clinton, J., Kerber, R., Khabaza, T., Reinartz, T., Shearer, C., & Wirth, R. (2000). CRISP-DM 1.0: Step-by-step data mining guide. *SPSS inc*, *9*(13), 1-73.

Chapman, P., Clinton, J., Kerber, R., Khabaza, T., Reinartz, T., Shearer, C., & Wirth, R. (1999, March). The CRISP-DM user guide. In *4ᵗʰ CRISP-DM SIG Workshop in Brussels in March* (Vol. 1999). sn. https://s2.smu.edu/~mhd/8331f03/crisp.pdf

Colin Shearer. (2006). Cross-Industry Standard Process for Data Mining (CRISP-DM). https://mmsi.binus.ac.id/2020/09/18/cross-industry-standard-process-for-data-mining-crisp-dm/

Forbes. (2015). What IT Needs To Know About The Data Mining Process.

Haffar, J. (2015). Have you seen ASUM-DM. *SPSS Predictive Analytics*.

Jensen, K. (2012). Process diagram showing the relationship between the different phases of CRISP-DM. *26 April*.

Kurgan, L. A., & Musilek, P. (2006). A survey of knowledge discovery and data mining process models. *The Knowledge Engineering Review*, *21*(1), 1-24. https://doi.org/10.1017/S0269888906000737

Mariscal, G., Marban, O., & Fernandez, C. (2010). A survey of data mining and knowledge discovery process models and methodologies. *The Knowledge Engineering Review*, *25*(2), 137-166. https://doi.org/10.1017/S0269888910000032

Piatetsky, G. (2014). CRISP-DM, still the top methodology for analytics, data mining, or data science projects. *KDD News*. http://www.kdnuggets.com/2014/10/crisp-dm-top-methodology-analytics-data-mining-data-science-projects.html

Singh, M., Mewada, H., Tahilyani, M., Malviya, J., Sharma, R. & Shrivastava, S. S. (2022). RRD Tool: A Round Robin Database for Network Monitoring. *Journal of Computer Science*, *18*(8), 770-776. https://doi.org/10.3844/jcssp.2022.770.776

Sirinaovakul, W., Eiamyingsakul, T., Tubtimtoe, N., Prom-on, S., & Taetragool, U. (2020, September). The relations between implementation date of policies and the spreading of COVID-19. In *2020 1ˢᵗ International Conference on Big Data Analytics and Practices (IBDAP)* (pp. 1-6). IEEE. https://doi.org/10.1109/IBDAP50342.2020.9245459

UJH. (2019). COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University" or "JHU CSSE COVID-19 Data" for short, and the url: https://github.com/CSSEGISandData/COVID-19

Weiss, C., Carriere, M., Fusco, L., Capua, I., Regla-Nava, J. A., Pasquali, M., ... & Delogu, L. G. (2020). Toward nanotechnology-enabled approaches against the COVID-19 pandemic. *ACS nano*, *14*(6), 6383-6406. https://elearninfo247.com/2020/03/16/COVID-19-and-its-impact-on-learning/

WDHETFC. (1998) Vision and Action and Framework for Priority Action for Change and Development in Higher Education, adopted by the World Conference on Higher Education: *Higher Education in the Twenty-first Century, Vision and Action*, 9 October 1998. https://unesdoc.unesco.org/ark:/48223/pf0000141952.

WHO. (2020) Coronavirus disease (COVID-19) Weekly Epidemiological Updates and Monthly Operational Updates. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports

Wrycza, S., & Maślankowski, J. (2020). Social media users' opinions on remote work during the COVID-19 pandemic. Thematic and sentiment analysis. *Information Systems Management*, *37*(4), 288-297. https://doi.org/10.1080/10580530.2020.1820631