Effects of the Disastrous Pandemic COVID 19 on Learning Styles, Activities and Mental Health of Young Indian Students - A Machine Learning Approach

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Abstract— Word Health Organization declared coronavirus disease 2019 (COVID-19) as pandemic on 11 March 2020. After that on 14 March 2020 the Ministry of Home Affairs, India decided to treat COVID-19 as a "notified disaster" due to the spurt in the cases related to coronavirus in the country, leading to a complete shut down from 24 March 2020. This has affected all sectors of the country including the education sector. The near-total closure of schools, colleges, and universities has disrupted academic activities at various levels. The objective of this online survey study is to understand the day to day living, activities, learning styles, and mental health of young students of India during this unprecedented crisis and assess how they are adapting to the new e-learning styles and how they are managing their social lives.

Keywords—disaster, mental health, pandemic, COVID-19, social life, online teaching-learning

I. INTRODUCTION

To contain the spread of the pandemic COVID-19 in India, the government declared a countrywide lockdown beginning 24th March 2020 [1]. All schools and colleges in the country were advised to remain closed for students about a week before this. March being exam time for most educational intuitions in India, board examinations for class X, class XII had to be disrupted, university examinations and several admissions-related entrance examinations such as Joint Entrance Examination (JEE), National Eligibility cum Entrance Test (NEET) and even Union Public Service Commission (UPSC) interviews for Civil Services, etc had to be postponed. Because of the situation most schools, colleges, and universities migrated to online teaching-learning to maintain the continuity in the absence of in-person teaching. Thereafter, a large number of distance learning solutions have been deployed all over the country to reach 32 crore students [2] affected by school and college closures. Apart from this paradigm shift in the mode of teaching-learning, there exist major restrictions to stay indoors, maintain social distancing, restrictions on eating at their favorite outlets and not being able to go for shopping, etc. could be major factors affecting the social and emotional lives of these youngsters who crave to hanging out with at their favorite rendezvous with their peer group. Furthermore, they

may be facing increased mental stress due to the uncertainties viz a viz their postponed examinations, upcoming summer internships, admissions to higher courses, placements, and jobs they were looking forward to joining post examinations, etc. Though these adolescents and young adults are trying their best to cope up with this sudden change in their life, there may be a lot of changes that the stresses due to this pandemic may bring in their activities, emotions, and life as a whole.

The objective of this study is to understand the impact of the lockdown imposed because of the disastrous novel coronavirus (SARS-CoV-2) on the day to day living, activities, learning styles and mental health of young Indian students in schools (class IX to XII) and those enrolled in colleges and universities in undergraduate and postgraduate courses.

The rest of the paper is organized in three sections. The first section gives the details of the methodology, tools, and techniques adopted to conduct this study. The second section discusses the results obtained and their interpretation and the last section concludes our work and discusses the future scope of this study.

II. METHODOLOGY

An online survey was conducted to obtain the dataset required to support this study. The survey questionnaire consisted of 38 questions divided into five major categories: basic details of the responding students, details about their digital connectivity, their social life, online learning experience, engagements, overall mood, and thoughts during the period of national lockdown due to COVID-19.

The survey responses were analyzed and visualized using scripts written using R and Python. Some visualizations were also done using MS-Excel.

R was used to learn and visualize association rules using *apriori* algorithm [3] in *arules* package using the libraries' *arules* [4], *arulesViz* [5], and *RColorBrewer* [6]. These association rules were learned for 13 select columns having responses about the overall mood, level of adaptation to

lockdown, total time spent on screen, time spent on social media for non-academic activities, time spent on chatting with peers, reactions to activities missed and online learning activities. Association rules are evaluated using support, confidence, and lift as measures of interestingness [7]. These are calculated as in (1), (2), and (3) respectively.

$$\text{Support}(A \Rightarrow B) = P(A \cup B) \qquad (1)$$

$$\text{Confidence}(A \Rightarrow B) = P(B|A) = P(A \cup B)/ P(A) \qquad (2)$$

$$\text{Lift}(A \Rightarrow B) = P(B|A)/ P(B) = P(A \cup B)/ P(A)P(B) \qquad (3)$$

The implication in association rules means co-occurrence and not causality. Support values help identify the rules worth considering for further analysis. A rule is considered reliable when it has large confidence, large support, and lift > 1. A subset of 20 rules out of a total of 1552 rules obtained is enlisted in Table 1. The scatterplot of these rules is as shown in Fig. 1.
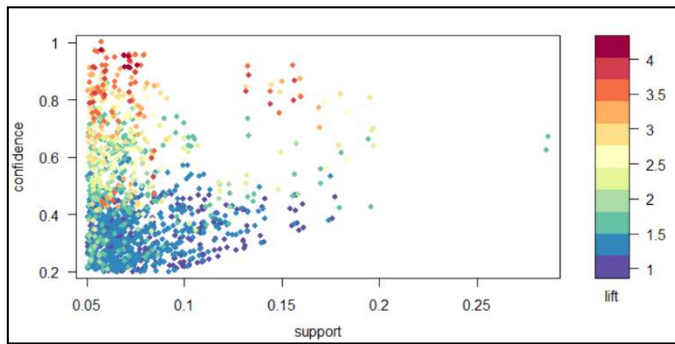

Fig. 1. Scatterplot of 1552 association rules.

A total of 583 students across India respondents to the survey by filling a Google form circulated via email and WhatsApp phone groups. The entire process was online and there was no physical exchange of information whatsoever.

III. RESULTS AND DISCUSSION

Among the 583 participants, 56.3% were females and 43.7% were males. About 51.8% of students were from Delhi-NCR, 28.6% from Uttar Pradesh, and Haryana has taken together and the rest 19.6% from various other states and union territories. The survey was filled with 516 UG/ PG students and 67 school students. Much to our relief, the survey revealed that 95.5% of students were safely staying at home with their families.

A. Digital Connectivity During the Lockdown

This survey was conducted only in online mode, so students who did not have access to the internet via smartphone/computer at their place of stay could not be reached. Though about 58% of the respondents had unlimited access to the internet, nearly 41% faced bandwidth and speed limitations.

The lockdown made most activities go online, thus nearly 50% of the respondents are spending more than six hours a day

in front of the screen of which 27.7% were plugged in for more than eight hours a day as shown in Fig. 2.

About 26.7% of students spent more than four hours a day on social media for non-academic activities as shown in Fig. 3. The study [8] shows that Twitter and Facebook may be considered amongst the best social media options to communicate during conventional disasters. From Fig. 4. WhatsApp is the most popular application among respondents in the present study, followed by Instagram and YouTube. This could be attributed to the fact that most communication amongst students is meant for a closed group of individuals rather than being a public broadcast. Among the video conferencing applications 40.7% of students were using Zoom.
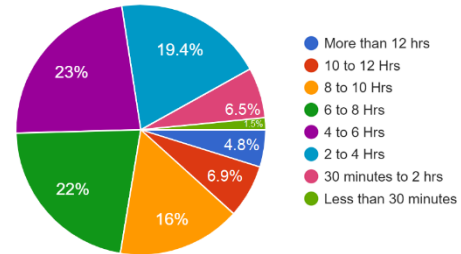

Fig. 2. An average number of hours per day spent on smartphones or computers during the lockdown.

B. Social Life of Students

The lockdown has given a great opportunity to spend time with family as confirmed by 81.5% responses. Fig. 5 shows that watching movies, sleeping, cooking, and playing online games are the next top four activities the youngsters are indulging in during lockdown.
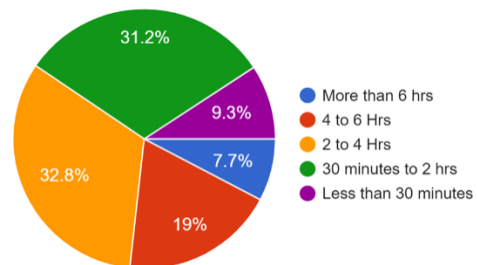

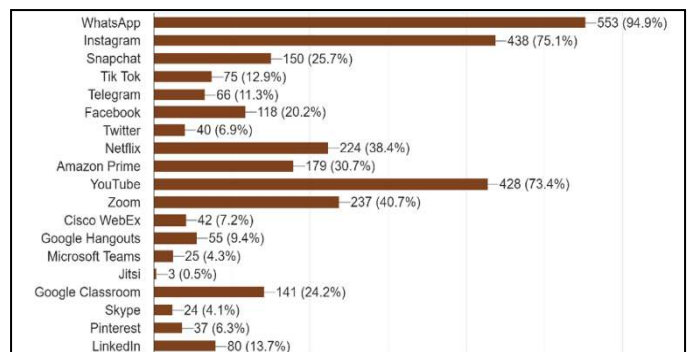Fig. 3. Time spent per day for non- academic activities on Social Media.

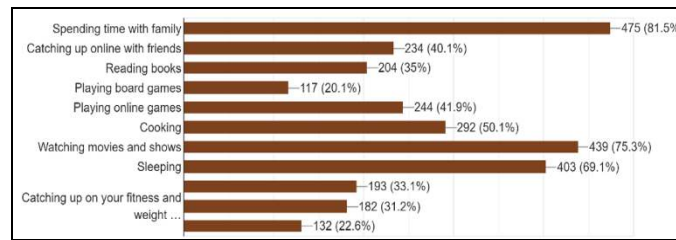Fig. 4. Often used applications during COVID-19 lockdown

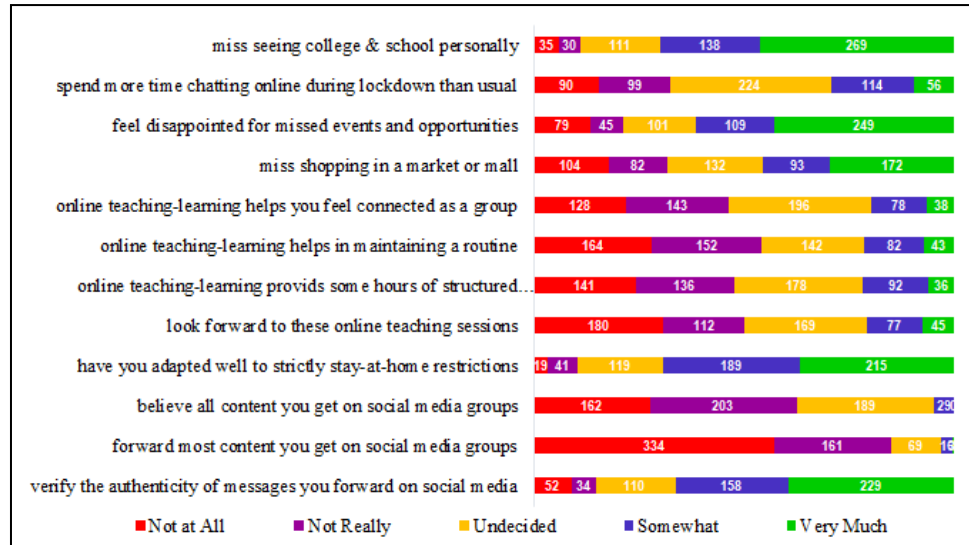Fig. 5. Most popular activities amongst students during COVID-19 lockdown

Fig. 6. Summary of student's social life, their experience with online teaching-learning and how they do feel during the lockdown

Fig. 6 shows that 69.8 % (23.7% somewhat and 46.1% very much) of the students miss seeing their friends in person implying that the lockdown has considerably affected their social life. 61.4% (18.7% somewhat and 42.7% very much) students are disappointed due to missed events and opportunities they had been looking forward to (e.g. annual college festivals, school and college farewell, etc.). This fact is reaffirmed by rule 4 in Table 1 which indicates 28.6% of students miss their friends in person and are disappointed with the missed events and opportunities they were looking forward to. Fig. 8 is based on the answers to *the one thing* students would want to do on the first day when the lockdown is lifted. Their unanimous answer seems to be *Meet with the friends*.

C. Experience in Online Learning

To help alleviate concerns about the educational attainment of students and ensure that learning is largely undisrupted during the lockdown, huge efforts are being made for online teaching-learning. Students across India are speedily trying to adjust to the online-only model of education and simultaneously organize their life that has been suddenly disrupted by the novel coronavirus. Teachers are struggling to shift their lessons and academic resources to a radically different world from a meet in person classroom to a virtual classroom. This shifting of teaching and learning from live classrooms to closed homes in such an abrupt and hurried manner poses lots of challenges that relate to the availability of resources, technical glitches, issues of privacy, and skilled

manpower [2]. These efforts are crucial as in their absence prolonged closure of educational institutions and home confinement during the pandemic might have negative effects on both the physical and mental health of students. Factors such as lesser physical activity, longer screen time, irregular sleep patterns, and improper diet, stress such as fear of infection, monotony, frustration, lack of in-person contact with classmates, friends, and teachers, lack of personal space at home and financial loss for the family, etc. could have continued detrimental effects on these young minds. Yet it is also important not to overburden students [9].

The responses to queries about their experience relating to this aspect in this survey were not very encouraging. From Fig. 6 we infer that only 19.8% (13.4% somewhat and 6.4% very much) students feel connected as a group while attending online classes and 20.9% (13.2% somewhat and 7.7% very much) look forward to these sessions.

Almost a similar number, 21.5% (14.1% somewhat and 7.4% very much) of respondents feel that staying at home and learning online helps them in maintaining a routine and only 22% (15.8% somewhat and 6.2% very much) feel that online classes provide them some hours of structured learning during the lockdown. The association rule numbers 2, 4, 5, 13, 14, 19, and 20, all of which have lift values more than 1, in Table 1 also confirm these observations in graphs of Fig. 6. Word cloud in Fig. 9 draws our attention to some of the points that

the students miss in online teaching like face to face interaction, student discussion, personal attention, etc.

D. Emotions and Moods of Students

Lockdown can save lives and is considered most effective in the present pandemic situation. As shown in Fig. 6 more than 69.3% (32.4% somewhat and 36.9% very much) students have adapted well to the stay at home restrictions and are hopeful that life will soon be normal. Students have experienced major teaching-learning disruption and their prime concerns at this moment include the uncertain schedule of forthcoming examinations, admission to the next higher level courses, and summer internships as is evident from Fig. 10. Those who are graduating this year are worried about their future as they would be entering the jobs at the beginning of a major global recession. Social media plays an important role in disaster management [10]. Factual headlines more often than not come from authentic mainstream media sources. Fake messages on social media must be dealt with cautiously [11]. It is essential to get rid of false information related to COVID-19 for the good of societies for they are already facing a huge load of psychosocial and health burden of this pandemic [12].

Fig. 6 shows that most students are dealing with news related to COVID-19 wisely. 84.9% (57.3% Not at all and 27.6% Not really) do not forward content they receive on social media injudiciously and 66.4% (27.1% somewhat and 39.3% very much) verify the authenticity of messages they receive on social media. About 72.4% of students update themselves about COVID-19 through television channels or/and online news sites.

The overall emotional state of the students during lockdown is as in Fig. 7. It shows a mix of various moods with 19.2% of the students saying they are tired of the phone, 42.9% of them are feeling frustrated, crushingly bored, anxious, overworked and depressed and on the other hand 37.9% are feeling relaxed, peaceful optimistic, calm hopeful and loving.

The inherent strength, positivity, and maturity of these young students are summed up in their one-line message to the world whose essence is *Stay Home, Stay Safe, Stay Together* as depicted in Fig. 11.

IV. CONCLUSION

The most important job right now for teachers and mentors is to be there for their students and provide support not just for teaching-learning but also reinforce and supplement the already existing awareness they have about COVID-19, lockdown, measures how to stay safe and avoid fake news. As mentors the teachers need to double up as friends and lend their ear to listen to their students for the emotional support they may be needed during this pandemic because schools and colleges are not just institutions of formal learning, they are also informal communities in their own right.

Most respondents are aware and law-abiding young citizens and have aligned themselves to the need of the hour. They are spending a lot of time with their families but they miss meeting their peer groups in person implying that virtual meeting places are not a substitute for personal interactions for these young students. The uncertainties related to their examinations and

growth path by way of internships, jobs, etc. are a major cause of mental stress created by the changed scenario due to COVID-19. The results also confirm that the students feel that online teaching can supplement classroom teaching but it cannot substitute the experience and learn in the classroom environment and the face to face interactions therein.
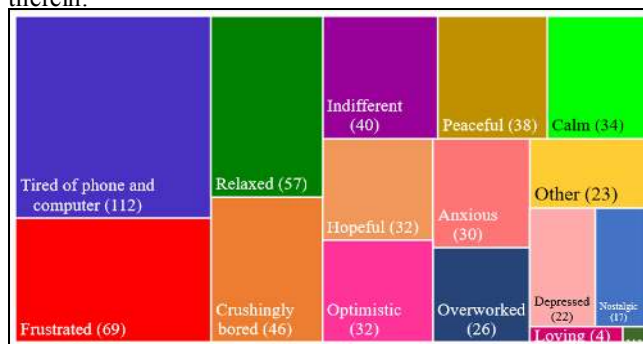

Fig. 7. Overall Emotional State of the students during lockdown
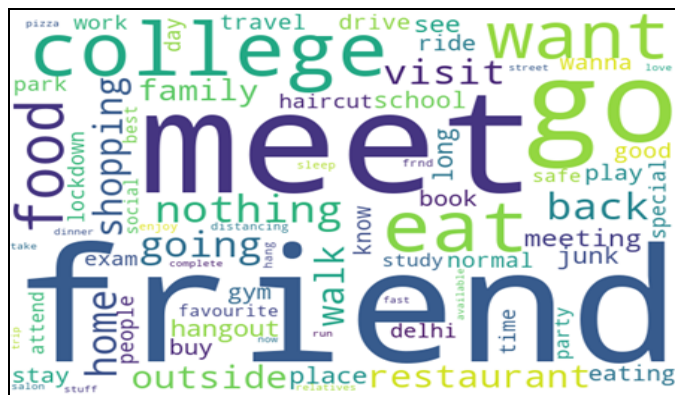

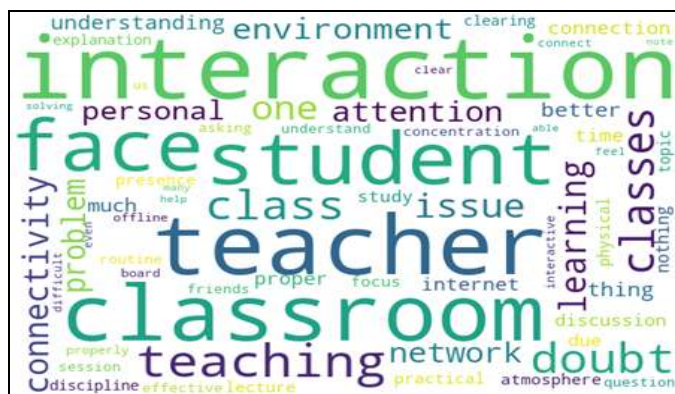Fig. 8. One thing to do on the 1st day when the lockdown is lifted

Fig. 9. Things in classroom teaching that cannot be substituted by online

Fig. 10. The prime concern of students due to change in the academic schedule

Fig. 11. One-Line message to the World during the schedule lockdown!!

TABLE I   ASSOCIATION RULES

Rule	LHS => RHS	Support	Confidence	Lift	Count
1.	{DisappointedWithMissedEvents=Very Much} => {MissFriendsInPerson=Very Much}	0.286	0.671	1.454	167
2.	{OT_LookForward=Not at All} => {OT_Routine=Not at All}	0.062	0.643	1.505	115
3.	{MissShopping=Very Much} => {MissFriendsInPerson=Very Much}	0.196	0.663	1.436	114
4.	{OT_StructuredLearning=Not at All} => {OT_Routine=Not at All}	0.196	0.809	2.874	114
5.	{OT_StructuredLearning=Not at All} => {OT_LookForward=Not at All}	0.084	0.620	3.477	107
6.	{MissShopping=Very Much} => {DisappointedWithMissedEvents=Very Much}	0.180	0.610	1.429	105
7.	{TimeOnSocialMedia=2 to 4 Hrs} => {MissFriendsInPerson=Very Much}	0.175	0.534	1.157	102
8.	{WellAdapted=Very Much} => {MissFriendsInPerson=Very Much}	0.161	0.437	0.948	94
9.	{DisappointedWithMissedEvents=Very Much, MissShopping=Very Much} => {MissFriendsInPerson=Very Much}	0.132	0.733	1.589	77
10.	{WellAdapted=Very Much, DisappointedWithMissedEvents=Very Much} => {MissFriendsInPerson=Very Much}	0.103	0.667	1.445	60
11.	{DisappointedWithMissedEvents=Not at All} => {MissShopping=Not at All}	0.103	0.667	1.445	49
12.	{TimeOnSocialMedia=4 to 6 Hrs} => {TotScreenTime=6 to 8 Hrs}	0.076	0.396	1.805	44
13.	{OT_StructuredLearning=Not at All, OT_Burden=Very Much} => {OT_Connected=Not at All}	0.075	0.396	1.805	44
14.	{OT_Connected=Not at All, OT_Routine=Not at All, OT_LookForward=Not at All, OT_Burden=Very Much} => {OT_StructuredLearning=Not at All}	0.196	0.809	2.874	40
15.	{OverallMood=Tired of phone and computer, MissFriendsInPerson=Very Much} => {DisappointedWithMissedEvents=Very Much}	0.060	0.921	2.157	39
16.	{OverallMood=Relaxed} => {WellAdapted=Very Much}	0.067	0.750	1.756	37
17.	{MissFriendsInPerson=Very Much, TotScreenTime=6 to 8 Hrs} => {DisappointedWithMissedEvents=Very Much}	0.062	0.643	1.505	36
18.	{OverallMood=Frustrated, MissFriendsInPerson=Very Much} => {DisappointedWithMissedEvents=Very Much}	0.060	0.921	2.156	35
19.	{WellAdapted=Very Much, OT_Connected=Not at All, OT_LookForward=Not at All} => {OT_Routine=Not at All}	0.063	0.649	1.760	34
20.	{MissShopping=Very Much, OT_Connected=Not at All, OT_Routine=Not at All} => {OT_StructuredLearning=Not at All}	0.197	0.639	2.271	33

number of transactions   support   confidence
583   0.05   0.2
set of 1552 rules found, rule length distribution (lhs + rhs): sizes: 2 (859 rules), 3 (547 rules), 4 (136 rules) and 5 (10 rules)

Summary of Quality Measures

	Support	Confidence	Lift	Count
Min	0.05146	0.2000	0.7074	30.00
1st Quartile	0.05832	0.2910	1.0282	34.00
Median	0.06690	0.3889	1.2042	39.00
Mean	0.07506	0.4425	1.5211	43.76
3rd Quartile	0.08062	0.5659	1.7491	47.00
Max	0.28645	1.0000	4.1751	167.00

APPENDIX A

The survey questionnaire consisted of 38 questions divided into five sections: basic details of the responding students, details about their digital connectivity, their social life, online learning experience, engagements, overall mood, and thoughts during the period of national lockdown due to COVID-19. A full copy of the survey questionnaire is available from the authors upon request.

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