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An Insight into Digital Education in India during COVID-19 from the Lens of Students

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Authors' contributions

This work was carried out in collaboration between both authors. Author SDS designed the study, wrote the protocol and author GPD wrote the first draft of the manuscript. Authors GPD and SDS managed the analyses of the study. Both the authors read and approved the final manuscript.

Article Information

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ABSTRACT

Aim: To identify infrastructure facilities used by the students for digital education as well as to find out the significant difference in knowledge and skills of various online tools before and after lockdown.

Study Design: Exploratory design.

Place and Duration of Study: Students from the government, aided colleges, and state agriculture universities in Andhra Pradesh and Telangana were administered the questionnaire in May 2020. **Methodology:** A total of 315 students (age range under 20-40 years) actively participating in online classes were chosen.

Results: The majority of the students possessed mobile phones even before lockdown and used them for digital learning. Students reported an increase in the amount spent on internet connectivity per month (50%), increased usage of data (70%), and increased recharge amount (46%). Since the overall mobile data usage of the students has greatly increased, consequently the amount spent on

the internet also has increased after lockdown. Although most students (90.48%) were aware of online education, only 30.79% were enrolled in online classes before lockdown. Three fourth of the students were using smartphones for accessing online classes and more than fifty per cent of the students were spending two to three hours per day in the digital learning process. When it came to knowledge up-gradation, 48.89% of the students have not made use of any e-learning platform, only 21.27% used the Swayam e-learning portal, and 12.06% used UGC MOOCs. During the lockdown, students were actively participating in the online classes, which could be gleaned from their knowledge of various apps. There was a significant difference in the students' usage of various applications before and after lockdown. There exists a significant difference between students' knowledge of usage of apps, data, the amount spent, and time spent in the digital learning process during Covid-19. Students who were active in the online classes inadvertently consumed more amounts of mobile data, which gave them continuous network coverage enabling them to finish assignments, attend webinars, and in turn improved their knowledge.

Conclusion: Despite hardships, the students were actively engaged in digital learning during the lockdown period imposed due to Covid-19 by adapting to the new normal mode of online education.

Keywords: Covid-19; coronavirus; digital teaching; online teaching; pandemic; student; e-learning.

1. INTRODUCTION

The COVID-19 pandemic outbreak has impacted as many as 1.2 billion young minds across the globe [1]. The pandemic has thrown up challenges to the entire education system worldwide in the form of interruption in students learning, disruption in assessments, delay or cancellation of public entrance examinations, and replacement with an inferior alternative [2]. Following a nationwide call for lockdown since March 2020 by the Government of India, all schools and colleges were completely shutdown. Many schools and universities across India have quickly embraced the digital e-learning platforms, with short notice and very limited prior experience. The students had to embrace an allnew technology of e-learning tools to keep up with their curriculum and respond to their roll calls from their teachers online. Virtual classwork and homework have become the new normal in a student's life during the period when schools, colleges, and varsities are under the shutdown. Innovative solutions in the form of digital tools and information and communication technology have made a lasting impact in all walks of life, be it livelihoods, access to services, or education [3]. Although both the teachers and the student communities faced several bottlenecks in the initial days of their foray into online education, the journey can only get better and pleasant in the coming days. The entire education world has gone into a virtual mode.

E-learning is a fairly new concept that has been adopted by the Indian universities owing to the lockdown imposed since March, due to coronavirus. Only a few studies were undertaken and reported in this area. A study conducted in West Bengal, India assessed the impact of lockdown on the learning status of undergraduate and postgraduate students. The results indicate although 70 per cent of the students were involved in e-learning, it has not been a smooth transition into e-learning [4]. Research conducted in Ghana showed that COVID-19 pandemic had a significant impact on education and the schools are looking for resources to reconstruct the loss in education due to the pandemic [5]. A study conducted to know about the social impact of Covid-19 on children in India exposed several non-health related issues the children were going through during the pandemic. Some of these were delay or missing routine immunizations, grave issues like child abuse and food insecurity, unavailability of e-platforms for special needs children, street children facing significant challenges in food security, and health [6].

Under such circumstances, a study was conducted which aimed to understand the infrastructure facilities available to Indian students for online education, the gadgets used, the amount of data used, money spent on data plans, and the knowledge of applications for online mode of education, before and after lockdown.

2. METHODOLOGY

An online-based survey was conducted in May 2020 using a pre-structured questionnaire which was sent as a Google forms link.

2.1 Sample

Students who are actively involved in online teaching were selected based on purposive random sampling. Thus, a total of 315 students belonging to the government, aided colleges, and state agriculture universities were selected.

2.2 Statistical Analysis

An exploratory study was conducted, where profile characteristics, infrastructure facilities to participate in the online teaching process, and the knowledge of the respondents about various on-line apps were collected, frequency and percentages were calculated. Further, knowledge on various applications with regards to heard and used before and after the lockdown was obtained which was analyzed using per cent variation (maximum-minimum value/maximum value*100).

2.3 Research Questions

Is there any significant difference between students' knowledge of various applications before and after the lockdown as well as their usage before and after lockdown?

Is there any significant difference between knowledge on apps and mobile data plan, the amount spent, and time spent in digital learning?

A paired t-test was computed to know the significant difference between heard beforeheard after and used before and used after applications. Based on one-way ANOVA analysis, the variation between knowledge and mobile data plan, the amount spent, time spent was calculated.

3. RESULTS AND DISCUSSION

3.1 Profile Characteristics of the Respondents

The vast majority (87.30%) of the students were female, while only 12.70 per cent of them were male (Table 1). Concerning the age of the respondents, more than half (58.18%) of the female students and 35 per cent of the male students fell under 20 years of age followed by (41.45% & 60.00%) female and male students under 21-30 years. A very negligible per cent (0.36% & 5.00%) of the female and male students fell under the age range of 31-40 years. Hence, the majority of the respondents were

under 20 years indicating that they were undergraduate students.

It can be observed from Table 2 that a highly significant per cent (63.49%) of the students were studying in state agriculture university followed by Government College and aided college (20.63% & 15.87%).

Table 3 reveals that the majority (80.00%) of the students were studying under graduation (UG) with an age range of under 20 years (53.65%) followed by postgraduate students (PG) (15.24%) and 13.02 per cent of them belong to 21-30 years age range. A meager 4.76 per cent of the students were pursuing their doctoral degree with the majority of them falling in the age group of 21-30 years.

A significant percentage (41.90%) of the students in the study belonged to the humanities discipline Table 4 followed by science and agriculture disciplines (31.43% & 26.67%) respectively. Most (80%) of the students in all three disciplines were in UG followed by PG & Ph.D. programs (15.24% & 4.76%) respectively.

Table 5 shows that more than fifty per cent of the students fell under the family income range of below Rs. 70.000 and among them. most of them were UG students followed by PG and Ph.D. (56.51%, 4.44% &1.59%) and respectively. In the Rs. 70,001-Rs.2,70,000 income range fifteen per the students were studying cent of undergraduate followed by PG & Ph.D. students (6.67% & 1.90%) respectively. Slightly more than ten per cent of the students were between the range of Rs.2,70,001-Rs.8,40,000. Out of them, 7.62 per cent were undergraduate students followed by 2.86% PG students and 1.27% Ph.D. A very negligible per cent (1.90%) of the students fell under the income range of above Rs.8, 40, 0001.

3.2 Specific Information

Data in Table 6 points out that a high proportion (85.71%) of the students possesses mobile phones even before lockdown. Out of this, the majority (74.29%) was using pre-paid plans and the remaining 11.43 per cent used postpaid plans before lockdown. Whereas after lockdown, the remaining 14.29 per cent of the students procured mobile phones, and among them, 10.16 per cent of the students opted for a prepaid plan, while 4.13 per cent preferred a postpaid plan. It was evident that a highly significant proportion of

students were using mobile phones before lockdown and the percentage increased after lockdown as mobile phone serves many functions to students particularly, they need a phone to submit various academic-related activities like assignments, attending webinars and updating their knowledge on varied aspects related to academics as well as research. Further, to have scholarship enrolments in websites like Gnanabhumi to get the onetime password phone is a must and of utmost importance. Most students use mobile to attend online classes its ease of use and convenience.

Table 7 indicates that the amount spent on internet connectivity per month increased to nearly fifty per cent followed by no change (41.90%) and a marginal (9.84%) decrease. In the case of usage of data for digital learning, a noteworthy increase (69.52%) was recorded followed by no change and a slight decrease (22.22% & 8.25%). It is noteworthy to mention that an equal percentage (46.35%) of students reported both an increased recharge amount and no apparent change in data plans used, while less than ten (7.30%) per cent of the students expressed a decreased recharge amount. A noticeable increase in the amount spent on

internet connectivity, data usage, and data plan was observed from the findings given below which indicates the active involvement and participation of students in digital education.

From Table 8, it can be inferred that the overall mobile data usage of the students has tremendously increased after lockdown. Before the lockdown, the majority (85.71%) of the students were using 1 GB per day, 12.70 per cent were using 2-5 GB per day. After lockdown, the percentage of 2-5 GB per day users rose to 41.90 per cent while the percentage of 1 GB per day users fell to 52.06 per cent.

The change in the data usage is attributed to more online activities like attending webinars for knowledge up-gradation, submission of assignments, etc. The 5-10 GB per day category also showed a slight increase of 3.81 per cent post lockdown when compared to 1.27 per cent before lockdown. The extended data could have been used by PG and Ph.D. students for various online activities like attending webinars, workshops, collecting literature related to research work along with attending the online classes.

Table 1. Age and gender of the respondents (n=315)

S.No	Age Group	Female		Mal	Grand Total	
		Frequency	%	Frequency	%	_
1.	Under 20 years	160	58.18	14	35.00	174
2.	21-30 years	114	41.45	24	60.00	138
3.	31-40 years	1	0.36	2	5.00	3
	Grand Total	275	87.30	40	12.70	315

Table 2. Type of the institutions to which the students belong to (n=315)

S.No	Type of Institution	Frequency	%
1.	State Agriculture University	200	63.49
2.	Government College	65	20.63
3.	Aided College	50	15.87
	Total	315	100.00

Table 3. Age distribution of respondents according to the academic level (n=315)

S.No	Age Group of	UG		PG	PG		Ph.D	
	the students	Frequency	%	Frequency	%	Frequency	%	Total
1.	Under 20 years	169	53.65	5	1.59		-	174
2.	21-30 years	83	26.35	41	13.02	14	4.44	138
3.	31-40 years	-	-	2	0.63	1	0.32	3
	Grand Total	252	80.00	48	15.24	15	4.76	315

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S. No.	Discipline	UG			PG		Ph. D		Grand Total	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	
1.	Humanities	101	32.06	19	6.03	12	3.81	132	41.90	
2.	Science	84	26.67	15	4.76	0	0.00	99	31.43	
3.	Agriculture	67	21.27	14	4.44	3	0.95	84	26.67	
	Grand Total	252	80.00	48	15.24	15	4.76	315	100.00	

Table 4. Distribution of students according to their discipline (n=315)

Table 5. Distribution of respondents based on family income level (n=315)

S.	Income ranges	l	JG	F	PG Ph. D		Ph. D Grand Total		d Total
No.	-	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1.	Below Rs. 70,000	178	56.51	14	4.44	5	1.59	197	62.54
2.	Rs.70,001- Rs.2,70,000	48	15.24	21	6.67	6	1.90	75	23.81
3.	Rs. 2,70,001 – Rs.8,40,000	24	7.62	9	2.86	4	1.27	37	11.75
4.	Above Rs. 8,40,0001	2	0.63	4	1.27	0	0.00	6	1.90
	Grand Total	252	80.00	48	15.24	15	4.76	315	100.00

Table 6. Infrastructure facilities (n=315)

S.	Possession of	Prej	baid	Postpaid		Gra	nd Total
No.	Mobile Phone	Frequency	%	Frequency	%	Frequency	%
1.	Before lockdown	234	74.29	36	11.43	270	85.71
2.	After lockdown	32	10.16	13	4.13	45	14.29
	Grand Total	266	84.44	49	15.56	315	100.00

S. No	Criteria	Decreased	%	Increased	%	No Change	%	Grand Total
1.	Amount spent for internet	31	9.84	152	48.25	132	41.90	315
	Connectivity per month							
2.	Data usage (GB) for	26	8.25	219	69.52	70	22.22	315
	digital learning							
3.	Data plan (recharge amount)	23	7.30	146	46.35	146	46.35	315

Table 7. Average monthly spending on data plan/for data recharge after lockdown (n=315)

Table 8. Usage of GB and amount spent before & after lockdown (n=315)

Criteria	Before lockdown	%	After lockdown	%					
Mobile data (GB) usage for digital learnin	Mobile data (GB) usage for digital learning								
a) 1 GB per day	270	85.71	164	52.06					
b) 2-5 GB per day	40	12.70	132	41.90					
c) 5-10 GB per day	4	1.27	12	3.81					
d) Above 10 GB per day	1	0.32	7	2.22					
Total	315	100.00	315	100.00					
Amount spent on the internet									
a) Rs. Up to Rs.100	213	67.62	190	60.32					
b) Rs.100 – 500	56	17.78	25	7.94					
c) Rs. 500 – 1000	45	14.28	89	28.25					
d) Above Rs. 1000	1	0.32	11	3.49					
Total	315	100.00	315	100.00					

The amount spent on the internet was significantly high after lockdown compared to before lockdown. Before lockdown maximum (67.62%) of the students were using up to Rs. 100 followed by Rs. 100 - 500 (17.78%), Rs.500 -1000 (14.28%) and above Rs.1000 (0.32%). The amount spent on Rs.500-1000 category showed an increase from 14.28 per cent before lockdown to 28.25 per cent post lockdown, which could be attributed to participation in online education. The data package on the students' mobile phone could have been used for multiple purposes before lockdown. After lockdown, the data package and the amount spent on internet usage has shown an increase due to the demands of online classes. A recent Business Today report reveals that the broadband consumption of Indian homes has increased by 30 percent since lockdown. An increase in mobile subscriptions in urban areas was observed, as more professionals started work from home [7].

Most of the students (90.48%) were aware of online education and nearly ten per cent of the students were unaware of the online education before lockdown. This might be because the concerned teachers were creating awareness about courses offered by online course portals like Swayam, NPTEL to improve their subject knowledge (Table 9).

Table 9. Awareness of online education before lockdown (n=315)

S. No.	Responses	Frequency	%
1.	Aware	285	90.48
2.	Unaware	30	9.52
	Grand Total	315	100.00

Concerning the involvement of students in online classes before lockdown, it is very clear that most (69.21%) of the students were not enrolled in any online classes probably because it was not enforced on them before lockdown (Table 10). Slightly more than one-fourth of the students actively participated in online classes probably due to their high academic aspirations. A study conducted in India and Korea reports that 50 per cent of the students did not experience online education before lockdown [8]. Another study conducted in India reports that 73.7 per cent of the study group did not attend online classes before lockdown [4]. All the studies reiterate the fact that online classes were unheard of before lockdown. One good outcome of coronavirus is the upsurge of online education.

Table 10. Involvement in online sessions/classes before lockdown (n=315)

S. No.	Responses	Frequency	%
1.	Participation	97	30.79
2.	Non-participation	218	69.21
	Grand Total	315	100.00

S. No.	Type of Gadget	Frequency	%
1.	Smartphone	233	73.97
2.	Smartphone & Laptop	54	17.14
3.	Laptop	5	1.59
4.	Smartphone, Smart TV	4	1.27
5.	Smartphone, Laptop, & Desktop	3	0.95
6.	Smartphone, Desktop	3	0.95
7.	Smartphone, Tablet	3	0.95
8.	Smartphone, Laptop, & Tablet	2	0.63
9.	Desktop	2	0.63
10.	Smart TV	2	0.63
11.	Smartphone, Laptop, & Smart TV	1	0.32
12.	Smartphone, Desktop, &Smart TV	1	0.32
13.	Smartphone, Laptop, Desktop, & Tablet	1	0.32
14.	Laptop, e. Smart TV	1	0.32
	Total	315	100.00

Table 11 indicates that a vast majority (73.97%) of the students were using the smartphone for accessing online classes followed by different combinations like laptop & smartphone (17.14%), laptop alone (1.59%), smartphone & smart TV (1.27%), smartphone, laptop & desktop plus smartphone & desktop and smartphone, tablet (0.95%). A very meager (0.32%) per cent of the students were using the smartphone, laptop, smart TV, desktop, tablet in different combinations. The smartphone was the most preferred device as it is a cost-effective device compared to other devices such as laptops, tablets, desktop & smart TV. Android mobile seemed to be the most used gadget by students for attending online classes [4].

It can be seen from Table 12 that more than fifty per cent of the students were spending two to three hours per day in the digital learning process followed by one hour and 4 hours & above (30.48% & 13.02%) respectively. Academic institutions had to be shut down overnight due to Covid-19. To continue the tempo of learning without hampering the students' academic year, most institutions switched over to online classes, which necessitated the students in spending more time on online education.

Table 12. Average time spent per day in the digital learning process (n=315)

S. No.	Time	Frequency	%
1.	1 hour	96	30.48
2.	2-3 hours	178	56.51
3.	4 hours and above	41	13.02
	Total	315	100.00

The results from Table 13 reveal that nearly fifty percent of the students were not using any elearning tools related to their subjects to improve their knowledge probably because it was not made obligatory in most colleges and universities. The remaining fifty per cent of the students used various e-learning platforms like the national digital library of India (21.90%) followed by the Swayam e-learning portal (21.27%), and UGC MOOCS (12.06%). Close to ten per cent of the students were using Coursera, Mana TV classes, e-pathshala, CEC-UGC on YouTube, and NPTEL (8.89%, 8.57%, 8.25%, 7.30%, and 6.67% respectively). Only about five per cent of the students were using Swayamprabha and e-content courseware on UG subjects (4.13%). The plausible reason for the highest usage of the national digital library

and Swayam could be that the courses offered in these portals are most relevant to their subjects and the content might be easy for the students to understand. Further, to improve students' knowledge the teachers in some of the colleges are giving additional credit completion certificates that act as an incentive for the students for enrolment and completion. In the case of econtent courseware on UG, subjects are regularly offered by that particular university and the content serves as good reference.

A feature article on SWAYAM MOOC gives elaborate information on the features of courses offered, its many advantages and disadvantages, mode of learning, modules in the courses, course credits, quadrants in SWYAM courses, assessments, etc. [9].

Data in Table 14 shows the knowledge of the students regarding various applications and their use both before and after lockdown computed in terms of per cent variation. The students became aware of many applications. Notable among them were Apps like Skype (53% increase), Cisco Webex (45% increase), Face time (34% increase), Microsoft Teams (33% increase), Go to meeting (28% increase) which showed an increased awareness/knowledge when compared to 'before' and 'after' lockdown. Similarly, apps like Zoom (17% increase), Go To Meeting (15% increase). Google Classroom (14% increase), Cisco Webex (11% increase) recorded more usage when compared to 'before' and 'after' lockdown. Interestingly Skype showed a 17 per cent decrease in usage, while Microsoft Teams recorded no change in terms of usage 'before' and 'after' lockdown. A decrease in the usage of Skype post lockdown could be due to the surge of new and novel apps like Zoom, Cisco Webex, etc, which had better features, were easy to use, and had become very popular with academia for online teaching. High media coverage about the Zoom app at the beginning of the lockdown could have made the respondents choose this app among all the other apps. Further, the options in zoom are easy to follow and whatever apps their teachers were using the students followed those apps. Popular platforms used for e-learning were Zoom. Google Classroom, and YouTube Live [4].

Table 15 shows that more than fifty (63.30%) of the students possessed average knowledge of various apps, which is an indication of active participation in the online classes. Greatest (89.52%) per cent of the students know about the Zoom app followed by Cisco Webex (84.13%), individual e-learning platforms (66.35%), Microsoft Teams (64.44%), and face time (63.17%). A considerable per cent of the students aware of Skype (60.95%), go to meeting (60.32%), Google Hangouts & Google classroom (48.89% & 48.25%), and dropbox (46.98%). Zoom and Cisco Webex appear to be the most widely used cloud computing video conferencing apps for online education as they are free, user friendly, and simple to use. With respect to knowledge over individual e-learning platforms such as Mana TV, e-courses of the universities may be that the students have preexisting knowledge of attending classes in Mana TV even before lockdown, and some of the ecourses were developed by their universities where they used to access lessons from these platforms. Low knowledge about dropbox and Google classroom may be because these two apps were used to store the data such as class notes, power points by the teachers, hence limited knowledge.

Table 13. Online e-learning resources used by the respondent's for knowledge up-gradation (n=315)

S. No	e-learning apps for education	Frequency	%
1.	National Digital Library of India	69	21.90
2.	Swayam e-learning portal	67	21.27
3.	UGC MOOCS	38	12.06
4.	Coursera	28	8.89
5.	Mana TV classes	27	8.57
6.	e Pathashala	26	8.25
7.	CEC –UGC on YouTube channel	23	7.30
8.	NPTEL	21	6.67
9.	Swayamprabha	17	5.40
10.	e-content courseware on UG subjects	13	4.13
11.	None of the above	154	48.89

Table 14. Knowledge of apps before and after lockdown among the students (n=315)

S. No.	Knowledge of Apps	Heard of before lock down	Heard of after lock down	% Increase/ Decrease/ No change	Used before lockdown	Used after lockdown	% Increase/ Decrease/ No change
1.	Zoom	73	90	+19	64	77	+17
2.	Skype	80	37	-53	30	25	-17
3.	Google class room	72	83	+13	65	76	+14
4.	Google hang outs	62	67	+7	35	34	+2
5.	Go to meeting	48	77	+28	35	41	+15
6.	Dropbox	45	57	+21	17	18	+5
7.	Cisco Webex	47	86	+45	38	43	+11
8.	Face time	41	62	+34	20	22	+9
9.	Microsoft Teams	43	64	+33	23	23	0 (No change)
10.	Individual e- learning plat forms develop ped by your University Eg: e-courses, Mana TV lessons]	63	67	+6	51	54	+5

S.No	Apps	Knowledge	%	No Knowledge	%
1.	Zoom	282	89.52	33	10.48
2.	Cisco Webex	265	84.13	50	15.87
3.	Individual e-learning	209	66.35	106	33.65
	platforms developed by				
	your University				
4.	Microsoft Teams	203	64.44	112	35.56
5.	Face time	199	63.17	116	36.83
6.	Skype	192	60.95	123	39.05
7.	Go to meeting	190	60.32	125	39.68
8.	Google hangouts	154	48.89	161	51.11
9.	Google classroom	152	48.25	163	51.75
10.	Drop box	148	46.98	167	53.02
	Average	199.40	63.30	115.60	36.70

Table 15. Percentage of students with knowledge on apps Vs No knowledge during Covid-19 (n=315)

Table 16. Com	parison of student's	knowledge of a	pps before and afte	r lockdown (n=315)
					/

Domain	Mean rate of heard before lockdown	Mean rate of heard after lockdown	Standard Error	t-test	P value	Result	
Apps	57.40	64.00	16.70	1.66	0.06	NS	
Domain	Mean rate of Used Before Lockdown	Mean rate of Used After Lockdown	Standard Error	t-test	P value	Result	
Apps	37.80	41.30	2.92	2.02	0.03	S	
Note: NS-Not Significant S- Significant							

Note: NS-Not Significant, S- Significant

Table 17. Analysis of variation between knowledge, mobile data usage, the amount spent, and average time spent on digital learning (n=315)

Domain	Average	Variance	F-calculated	P value	F critical Value	Remark
Mean knowledge on apps	63.30	184.67	6.43	0.003	3.15	S
Average Mobile data (GB) usage for digital learning	25.00	662.02	-	-	-	-
Average amount spent on the internet	25.00	670.55	-	-	-	-
Average time spent per day in digital learning	33.33	479.01	-	-	-	-

Note: S- Significant

Students' knowledge of various applications before and after the lockdown was compared. Concerning awareness on applications, before and after lockdown no significant difference was found Table 16 indicating that students' awareness about various apps before and after lockdown may be more or less the same. This could be attributed to their pre-existing knowledge of some of the apps like individual elearning platforms like Mana TV, Skype, and Google Classroom. Further, as young students were more active on social media networks, they might not have heard about these apps, hence there is no significant change. In the case of usage of apps, the mean rate before the lockdown was 37.80 and after the lockdown was 41.30 which indicates a significant difference. It can be inferred that the students after equipping themselves with the wherewithal of the ways and means of using the various applications were finally able to put them to good use after lockdown, owing to restricted movement and social distancing norms practiced by the mankind during the coronavirus pandemic outbreak. Hence a significant difference was found. The student's usage of these online apps before the

lockdown was limited due to regular face-to-face classroom teaching whereas after lockdown the situation demanded the use of apps to continue the academic tempo of the teaching-learning process.

There exists a significant difference between students' knowledge of usage of apps, GB, amount spent, and time spent in the digital learning process during Covid-19 since *P* value < 0.05. Hence it is most obvious that the students who are using more mobile data (GB) will have uninterrupted network coverage and can access the lessons, assignments, webinars by using various online apps which in turn aid in the improvement of app knowledge Table 17.

4. CONCLUSION

The onset of Coronavirus has hastened up the digital reset in India. Despite all odds. students never stopped learning thanks to the myriad opportunities that were at the disposal of the teaching fraternity. Traditional classroom teaching was replaced with an online classroom, which ironically was found to have several increased advantages like retention of information, less time to learn, etc [1]. Although both the teachers and students had no formal training for online classes and were ill-equipped with sufficient bandwidth; they were able to continue learning through online mode for the past six months. It is expected that online education will continue to be used in the future and may all set to become a part of education along with traditional offline mode in the postpandemic period. A new form of learning namely blended learning is sure to emerge. The study has shown that there exists a gap between the knowledge and skills of apps amongst students. There is an improvement in student's knowledge and skills of various online teaching platforms after lockdown when compared to before lockdown.

5. RECOMMENDATIONS

To make the digital learning process more effective in the future, additional training on online teaching-learning tools and platforms is required for both teachers and students. The Government of India must create a positive digital space for study to the Indian students from the vulnerable sections of the society. To encourage students to pursue online teaching in the post Covid-19 era, extra credits earned through Swayam, NPTEL online courses can be added to their credit load. Certificate courses

/workshops for students on digital communication skills to improve their virtual learning experience can be organized. Strategies are urgently needed to build a resilient education system in India which will ensure to develop the skills for employability and the productivity of the young minds.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Li C, Lalani F. The COVID-19 Pandemic has changed education forever: This is how. [online] World Economic Forum; 2020. Accessed 9 September 2020 Available:https://www.weforum.org/agenda /2020/04/coronavirus-education-globalcovid19-online-digital-learning/
 Burgess S, Sievertsen HH. Schools, skills,
- Burgess 3, Slevensen HH. Schools, skins, and learning: The impact of COVID-19 on education. VOX, CEPR Policy Portal. [online] Voxeu.org; 2020. Accessed 4 October 2020 Available:https://voxeu.org/article/impactcovid-19-education
- Sharma A, Sengupta H. COVID-19 has accelerated India's digital reset. [online] World Economic Forum; 2020. Accessed 9 September 2020 Available:https://www.weforum.org/agenda /2020/08/covid-19-has-accelerated-india-sdigital-reset/
- Kapasia N, Paul P, Roy A, Saha J, Zaveri A, Mallick R. Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. Children and Youth Services Review. 2020;116: 105194.
- 5. Upoalkpajor JLN, Upoalkpajor CB. The Impact of COVID-19 on education in Ghana. Asian Journal of Education and Social Studies. 2020;9(1):23-33.
- Unni J. Social effects of Covid-19 pandemic on children in India. Indian Journal of Practical Pediatrics. 2020; 22(2):214 Accessed on 15 October 2020.

Available:https://www.ijpp.in/Files/2020/ver 2/Social-effects-of-COVID-19.pdf

 Kaushik M. Coronavirus lockdown: Internet consumption jumps 30%; Airtel, Jio to benefit. Businesstoday.in; 2020. Accessed 9 September 2020 Available:https://www.businesstoday.in/sec tors/telecom/coronavirus-lockdown-airtelreliance-jio-to-make-money-as-internetuse-booms-30/story/402145.html

8. Baber H. Determinants of students' perceived learning outcome and

satisfaction in online learning during the pandemic of COVID19. Journal of Education and e-Learning Research. 2020; 7(3):285-292.

Available:https://ssrn.com/abstract=36794 89

9. Bast F. SWAYAM MOOC education on the Go. Science Reporter. 2019;31-33.

Accessed 9 September 2020.

Available:http://nopr.niscair.res.in/handle/1 23456789/48955

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