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An Empirical Study of Awareness and Use of ICT by School Teachers Before and During Lockdown Due to COVID-19 Pandemic

ABSTRACT

The COVID-19 pandemic has taken almost all the countries across the globe by surprise. It was this time a year ago when the sudden outbreak of the coronavirus forced the closure of educational institutions resulting billions of children out of the classroom. Like many countries worldwide, India also faced the challenges of unexpectedly switching to online classes. Given to this background the study aims at understanding the practical experiences of teachers who were part of the teaching which undertook remotely and on digital platforms. This is a quantitative research using survey technique through a questionnaire that comprised demographic variables, ICT awareness and use before and during lockdown and most importantly their opinion on integration of ICT in teaching and learning. A total of 209 returned questionnaires formed the datasets which have been analyzed based on the objectives of the study. The findings showed that ICT competency was instrumental in adapting to online teaching during COVID-19 school closures.

Keywords: COVID-19 Pandemic, School Education, ICT Awareness, Digital Information Literacy

1. INTRODUCTION

March 2021 marked one year of the decision of closure of educational institutions in India as a precautionary measure to combat the spread of coronavirus. In the Nagpur region of the Maharashtra state, cases rose alarmingly till the middle of September 2020 and then quickly went down only to once again rise steeply in the month of March 2021 leading to another lockdown. The educational institutions were partially reopened for a short period during the last one year and hence teaching and learning is still continuing on online platforms. The burgeoning impact of COVID - 19 had brought every human activity to a standstill not only in India but across the world as, almost all countries left with no other choice but to impose

lockdown to deal with the unexpected health crisis. To quote Albert Einstein, “In the middle of difficulty lies opportunity”. These words were never more accurate than they are today in this pandemic period. The challenges were relentless, and finding a silver lining in the clouds of uncertainty was indeed a difficult task. But the pandemic, while causing so much distress, has also opened the door of a distinctive model of learning, whereby teaching and learning undertaken remotely and on digital platforms. It was well understood even before the COVID -19 pandemic that Information and Communication Technologies (ICTs) have significant potential to ensure quality in learning by providing innovative solutions to facilitate students’ to achieve their curricular objectives. A sizeable number of studies carried out over the last few years have emphasised the need for ICT competency keeping in view the profound potential of it (Martín et al., 2019) (Zovko, 2016) (Uslu & Usluel, 2019) (Garcia et al., 2019) (Valtonen et al., 2018) (Tadesse et al., 2018) (Kang & Park, 2017). The new education policy 2020 has also rightly emphasised extensive use of technology in teaching and learning. But the implementation would have taken a dedicated strategy and considerable time, however this crisis happened to accelerate the pace of adoption of technology in the education sector. The COVID - 19 pandemic brought an unprecedented situation where the academic world had to respond literally overnight to keep the learning going. Integration of technology with education has changed the traditional teaching and learning paradigms and has created a greater demand on teachers to engage with various types of technology in carrying out their routine work with more efficiency and effectiveness. It has been proved beyond doubt that ICT has the power and potential which helped the academia to overcome the challenges. In addition to this it is also evident that it can also make some value additions to classes that could result in an improved teacher and learner performance, leading to an enhanced learning experience. Hence it is quite possible that the integration of Information and Communication Technology (ICT) in education will be further accelerated and that online education will eventually become an integral component of all level of education.

2. REVIEW OF LITERATURE

An increasing number of research has emerged during the COVID – 19 pandemic which emphasised the need for developing digitally competent, literate, able, skilled, capable people keeping in view the constantly changing digital environment. Given to the pedagogical changes the academia encountered during the last year, review of some studies published before the pandemic highlighting the use of ICT in education will also give insight to deal

with the new normal post pandemic. Pinto and others presented an analysis of the state of the policies and plans on information literacy in Ibero-America. For this purpose a survey was carried out on librarians and academics those were specialized in the development of information skills consisting of 13 different countries. The study reported that there was a large amount of confusion in regard to the concepts of digital and information literacy, with governments and institutions paying more attention to the former (Pinto et al., 2019). Given to the surge in research in this domain Stopar & Bartol had conducted a scientometric study on digital competences, computer skills and information literacy in secondary education to find out the publishing pattern and trends. As per the opinion of the authors unlike higher education ICT skills in context of secondary education were investigated less frequently. Data from Web of Science and SCOPUS were considered for the study (Stopar & Bartol, 2019). Sales and others through their study tried to investigate the perception of the Social Sciences faculty of three Spanish universities about their own as well as their students' information and digital competency before and during lockdown due to COVID-19. Group discussion and interview method was used for the collection of the data. The findings show that as per the opinion of the teachers, despite being tech savvy the students lack capacity for evaluation, critical use, and communication of information. The study reports that even the teachers are not digitally competent as per their own admission as they doubt their own ability to train students to enhance the critical literacy skill and secondly shifting to online platform for teaching during lockdown had never been an easy task to deal with (Sales et al., 2020). Soomro and others through their study reported that digital divide indeed exists among the faculty in respect to access to technology. Through the study they had tried to access the digital divide among higher education faculty of Pakistan. The study reports that as per the findings, age, gender, and university type had a significant impact in creating the gap. (Soomro et al., 2020)

3. AIMS AND OBJECTIVES

The study aimed to investigate the self efficacy of the school teachers to adopt online teaching during the early stages of COVID-19 through the following objectives:

- To find out the level of ICT competencies of school teachers before shifting to online teaching
- To investigate the effects of age on ICT literacy

- To check the significant difference in the level of ICT competencies among teachers from government, semi-government and private sector (if any)
- To understand the practical difficulties the teachers faced during the transition to online platform
- To find out the readiness of the teachers to adopt digital skills
- To analyse the perception of teachers regarding future of educational landscape

4. SCOPE

The study is restricted with teachers associated with 243 schools comprising of primary, middle and high schools situated in Hingna, which is one of the 14 Tahsils (Towns) of Nagpur district of Maharashtra, an Indian state. As per the data collected from The Panchayat Samiti, Hingna Block, Nagpur District, as on 27th January 2021, a total of 2038 teachers were on roll in these schools which formed the population for the study.

5. LIMITATIONS

For this study a close ended questionnaire was used as a tool for the collection of self assessed data on ICT competencies. Hence possibility of inaccurate responses either deliberately or owing to difficulty in understanding the questions by the respondents cannot be ruled out. Further the study is restricted with a small number of teachers selected through random sampling method. Hence generalization of the findings without additional research will not be free from flaws. However, this study will definitely serve as a call to action for authorities and academic communities leading to dedicated efforts in enhancing the digital competencies of the teachers.

6. POPULATION AND SAMPLE OF THE STUDY

The targeted population for this study comprised all primary school, middle school and secondary school teachers in Hingan Tahsil (Town) of Nagpur district in Maharashtra, India. A total of 243 schools situated in the area selected for the study were identified which have a total of 2038 teachers consisting of all three levels viz. Primary, Middle and High School. To achieve statistical significance the required sample size i.e. 324 was calculated considering a 5% margin of error and a 95% confidence level. 324 school teachers were selected through

random sampling method out of which 209 (64.51%) teachers responded to the survey which formed the data set for the present study.

7. METHODOLOGY

A quantitative research methodology was adopted to assess the ICT competencies of school teachers with an emphasis on their transitions to the online platform during COVID – 19 pandemic. The data were collected during February to March 2021 through a pre designed close ended questionnaire. The items of the questionnaire were based on available research primarily related to digital information literacy, teaching and learning during pandemic and educational psychology. Some common statistical tools such as Mean, Standard Deviation and Coefficient of Variance were used for the analysis of data. To understand the responses across demographic dimensions of respondents considered for analysis, coefficient of variation (CV) has been taken into consideration. Distribution with a $CV \geq 1$ is considered as high variance while $CV < 1$ is considered as low variance.

Marc Prensky introduced the concept of Digital Natives and Digital Immigrants way back in 2001. As per his theory, digital natives are of those born, roughly, after 1980 and those born before that are digital immigrants (Prensky, 2001). Digital natives are the people born into the digital age and hence considered to be inherently technology-savvy while “digital immigrants” are all those people who learnt the use of computers at some stage during their adult life and hence face difficulty in acquainting with information technology (Wang et al., 2013). However, in comparison to the western countries, India started on its digital journey much later and hence unlike western nations, it is only the millennial born after 1995 can qualify for Digital Natives (Darbha & Rao, 2016). In this study also the digital natives and digital immigrants are divided based on this assumption.

8. ANALYSIS AND INTERPRETATION

8.1 Demographic Information

Table 1 summarises the demographic characteristics of the participants under seven characteristics namely Educational Qualification, Gender, Age, Designation, Subject Taught, Teaching Experience (Years) and School Type. Out of the 209 respondents it was found that more than half of the participants (114: 54.55%) are having Masters degree as the highest

qualification followed by Bachelors degree (82: 39.23%), Certificate course (11: 5.26%) and Ph. D (2:0.96%). In the gender wise distribution female respondents were more (151: 72.25%) than the male (58: 27.75%). under the age wise distribution largest group of respondents was comprised of those in the age group of 36 – 45 (99: 47.37%). Second largest age group was 26 – 35 (48: 22.97%) very closely followed by the group 46 – 55 (47: 22.49%). The smallest group of participants are of the age group 56 – 60 (7: 3.35%). Of the total 209 respondents highest numbers of respondents were primary teachers (84: 40.19%) followed by high school teachers (71: 33.97%) while middle school teachers were less (54: 25.84%) in comparison to the other two categories. Of the total respondents Language / Literature teachers were more in number (76 : 36.36%) followed by mathematics (46 : 22.01%) and Science (31 : 14.83%). in regard to teaching experience, largest number of participants were having 6 – 10 years of experience followed by teachers having experience between 11 – 15 (44 : 21.05%). Equal numbers of respondents (2: 0.96%) were in the range “Less than 2 years” and “More than 35 years”. From the data it was found that largest numbers of respondents were from Private Management / Self Finance / Un – Aided schools (157: 75.12%) while respondents from Semi Government / Government Aided and Government Schools were very less in number (i.e. 31: 14.83% and 21: 10.05% respectively)

Table 1: Demographic Information

SN	Characteristics	Distribution Parameters	No. of Respondent	Percentage
1	Educational Qualification	Bachelors	82	39.23
		Certificate	11	5.26
		Masters	114	54.55
		Ph. D.	2	0.96
Total			209	100
2	Gender	Male	58	27.75
		Female	151	72.25
Total			209	100
3	Age	20-25	8	3.83
		26-35	48	22.97
		36-45	99	47.37
		46-55	47	22.49
		56-60	7	3.35
Total			209	100
4	Designation	High school teacher	71	33.97
		Middle school teacher	54	25.84
		Primary teacher	84	40.19
Total			209	100

SN	Characteristics	Distribution Parameters	No. of Respondent	Percentage
5	Subject Taught	Language / Literature	76	36.36
		Mathematics	46	22.01
		Other	38	18.18
		Science	31	14.83
		Social Studies	17	8.13
		Vocational	1	0.48
Total			209	100
6	Teaching Experience (Years)	Less than 2 years	2	0.96
		2-5 years	44	21.05
		6-10 years	58	27.75
		11-15 years	44	21.05
		16-20 years	25	11.96
		21-25 years	15	7.18
		26-30 years	16	7.66
		31-35 years	3	1.44
		More than 35	2	0.96
Total			209	100
7	School Type	Government	21	10.05
		Private Management /Self Finance / Un - Aided	157	75.12
		Semi Government / Government Aided	31	14.83
Total			209	100

8.2 Frequency of Use of ICT

Table 2: Frequency of Use of ICT

SN	Frequency of Use of Computer & Internet	Age	Daily	%	Occasionally	%	Total	Difference
1	Frequency of use of Computer and Internet for online educational contents before lockdown	20-25	5	2.39	3	1.44	8	0.96
		26-35	22	10.53	26	12.4	48	-1.91
		36-45	49	23.44	50	23.9	99	-0.48
		46-55	14	6.7	33	15.8	47	-9.09
		56-60	2	0.96	5	2.39	7	-1.44
Total			92	44.02	117	56	209	12
2	Frequency of use of Computer and Internet for online educational contents during lockdown	20-25	7	3.35	1	0.48	8	2.87
		26-35	40	19.14	8	3.83	48	15.31
		36-45	87	41.63	12	5.74	99	35.89
		46-55	39	18.66	8	3.83	47	14.83
		56-60	7	3.35	0	0	7	3.35
Total			180	86.12	29	13.9	209	72.3

It can be seen from Table 2 that majority of the respondents were occasional user of ICT before shifting to online platform for collection of course contents as except the age group 20-25 in all other cases the number of occasional users were more in comparison to daily users. The difference of number of users between daily and occasionally use of ICT was happened to be more in the age group 46-55 (-9.09%) while the difference is less is in the age group 36-45 (-0.48%). In total the daily users before lockdown were 92(44.02%) while the occasional users were 117(55.98%) where the difference between these two was -11.96%. A significant surge in the number of daily users of ICT during lockdown is clearly visible. In total the daily users were 180(86.12%) while the occasional users were quite less than this i.e. 29(13.88%). Highest numbers of daily users were found to be from the age group 36-45(41.63%). Equal numbers of users i.e. 7(3.35%) were from the age group 20-25 and 56-60 while almost equal number of users were from the rest two age group i.e. 26-35 and 46-55 with 40(19.14%) and 39(18.66%) users respectively.

Table 3: Frequency of daily use of ICT

SN	Frequency of Use of Computer & Internet	Age	< 1 hours	%	2 - 5 hours	%	> 5 Hours	%	Total
1	Frequency of use of Computer and Internet for online educational contents before lockdown	20-25	2	0.96	2	0.96	1	0.48	5
		26-35	13	6.22	8	3.83	1	0.48	22
		36-45	23	11	21	10.05	5	2.39	49
		46-55	6	2.87	8	3.83	0	0	14
		56-60	0	0	2	0.96	0	0	2
Total			44	21.1	41	19.62	7	3.35	92
2	Frequency of use of Computer and Internet for online educational contents during lockdown	20-25	0	0	4	1.91	3	1.44	7
		26-35	2	0.96	25	11.96	13	6.22	40
		36-45	5	2.39	51	24.4	31	14.83	87
		46-55	1	0.48	25	11.96	13	6.22	39
		56-60	1	0.48	4	1.91	2	0.96	7
Total			9	4.31	109	52.15	62	29.67	180

Table 3 depicts the frequency of daily use of ICT before and during lockdown. Significant rise in the number as well as hours spent by the respondents for online educational contents during lockdown can be seen from the table. Before lockdown highest numbers of respondents (44: 21.05%) were using the ICT less than one hour, lowest numbers of users (7:

3.35%) were using more than five hours. However during lockdown more than half of the respondents (109: 52.15%) were using the ICT between two to five hours on a daily basis.

8.3 Familiarity and Use of ICT for General Purpose

Table 4: Familiarity and Use of ICT for General Purpose

SN	Areas of Knowledge and Use of ICT	Age	Before Lockdown	%	During Lockdown	%	Still not Familiar	%
1	Familiarity with commonly used computer and mobile devices such as desktop, laptop, iPod, tablet, Smartphone, e-readers, etc.	Digital Native	6	2.87	2	0.96	0	0
		Digital Immigrant	144	68.9	54	25.84	3	1.44
2	Familiarity with popular web browsers like Google Chrome, Mozilla Firefox, Internet Explorer etc	Digital Native	6	2.87	2	0.96	0	0
		Digital Immigrant	134	64.11	59	28.23	8	3.83
3	Familiarity with popular search engines like Google, Yahoo, Bing etc.	Digital Native	8	3.83	0	0	0	0
		Digital Immigrant	135	64.59	54	25.84	12	5.74
4	Knowledge of different file types and format like .doc, xls, ppt, pdf,rtf, .txt, jpg etc	Digital Native	7	3.35	1	0.48	0	0
		Digital Immigrant	116	55.5	72	34.45	13	6.22
5	Ability to identify, download and use of apps for various purposes like paying bills, booking tickets, online banking etc.	Digital Native	8	3.83	0	0	0	0
		Digital Immigrant	125	59.81	52	24.88	24	11.48
6	Familiarity with social networking platforms like Whats app, Facebook, Twitter, Flickr, Skype etc.	Digital Native	8	3.83	0	0	0	0
		Digital Immigrant	164	78.47	31	14.83	6	2.87
7	Knowledge of privacy setting to protect from misuse of personal information on social media platforms	Digital Native	8	3.83	0	0	0	0
		Digital Immigrant	120	57.42	52	24.88	29	13.88
8	Use of tools on social networking platforms to upload content such as photos and videos	Digital Native	7	3.35	1	0.48	0	0
		Digital Immigrant	138	66.03	49	23.44	14	6.7
9	Access and use online social media including blogs, wikis, discussion boards, and similar interactive sites	Digital Native	6	2.87	0	0	2	0.96
		Digital Immigrant	76	36.36	81	38.76	44	21.05

SN	Areas of Knowledge and Use of ICT	Age	Before Lockdown	%	During Lockdown	%	Still not Familiar	%
10	Ability to troubleshoot basic technological problems while using computer and mobile devices	Digital Native	6	2.87	2	0.96	0	0
		Digital Immigrant	84	40.19	67	32.06	50	23.92
11	Ability to independently learn the use and applicability of emerging technologies	Digital Native	8	3.83	0	0	0	0
		Digital Immigrant	85	40.67	89	42.58	27	12.92
12	Familiarity with popular web-based tools for file-sharing, storage, communication and collaboration, such as Google Drive, Google Apps , Microsoft One Drive, Office Online etc	Digital Native	7	3.35	1	0.48	0	0
		Digital Immigrant	93	44.5	88	42.11	20	9.57

Previous digital experiences from everyday life in all probability would have eased the shifting to online teaching. To determine the awareness and use of ICT for general purpose by looking into the extent of use of these resources by the teachers, options were provided in the questionnaire indicating the different areas of ICT which the teachers could likely be familiar. Their responses are provided in Table 4.

Focusing on the age groups it is noted that there are no significant differences in the responses among the group of respondents divided as Digital Native and Digital Immigrants based on age. For all the items of areas of knowledge and use of ICT for general purposes the percentage of responses against each area is not significantly varying which indicates that all the respondents have almost equal level of prior acquaintance with ICT. From item number 9, 11 and 12 it is clear that almost 40% respondents (81/201, 89/201 and 88/201 respectively) of the Digital Immigrants category became aware about web aspect of ICT during the lockdown period while they were engaged with the online teaching. From the answers it was found that Digital Immigrants are not familiar with almost all the heads across the questions where as the Digital Natives were apparently more tech savvy as except one head (item no. 9) in all other areas the respondents were familiar with the ICT before forced adoption of technology.

8.4 Familiarity with ICT for Teaching and Learning

Table 5: Familiarity with ICT for Teaching and Learning

SN	Areas of Knowledge and Use of ICT	Age	Before Lockdown	%	During Lockdown	%	Still not Familiar	%
1	Knowledge of various Open Educational Resources (OER)	Digital Native	4	1.91	3	1.44	1	0.48
		Digital Immigrant	76	36.36	109	52.15	16	7.66
2	Able to identify the information need and locate the most appropriate material on the internet	Digital Native	6	2.87	1	0.48	1	0.48
		Digital Immigrant	95	45.45	99	47.37	7	3.35
3	Organization of the digital information for easy retrieval by using tools and techniques such as bookmark, Reference Management Software , tagging etc	Digital Native	5	2.39	2	0.96	1	0.48
		Digital Immigrant	67	32.06	86	41.15	48	22.97
4	Modification of the contents collected from various sources to meet the need of an individual student	Digital Native	6	2.87	2	0.96	0	0
		Digital Immigrant	62	29.67	122	58.37	17	8.13
5	Knowledge of e book and audio book file types and compatible devices	Digital Native	5	2.39	2	0.96	1	0.48
		Digital Immigrant	71	33.97	109	52.15	21	10.05
6	Evaluation of internet search results for relevancy, currency, and accuracy	Digital Native	3	1.44	4	1.91	1	0.48
		Digital Immigrant	70	33.49	90	43.06	41	19.62
7	Knowledge of the ethical and legal issues of use of information collected from internet like copyright and plagiarism	Digital Native	4	1.91	2	0.96	2	0.96
		Digital Immigrant	59	28.23	79	37.8	63	30.14
8	Knowledge of LMS (Learning Management System) like Google class room, MOODLE, Open edX, Canvas etc.	Digital Native	1	0.48	7	3.35	0	0
		Digital Immigrant	32	15.31	148	70.81	21	10.05
9	Knowledge of online teaching platform such as ZOOM, Webex, Google meet etc.	Digital Native	2	0.96	5	2.39	1	0.48
		Digital Immigrant	30	14.35	164	78.47	7	3.35
10	Knowledge of collaborative platforms such as Google Docs, Google Drive, Google Hangouts, Kahoot, Skype, etc. for learners collaboration	Digital Native	6	2.87	1	0.48	1	0.48
		Digital Immigrant	50	23.92	123	58.85	28	13.4

As the very back ground of Digital Native is their ability to use technology, it is believed that adoption of technology is an integral part of their work culture. Across all the questions included to determine the use of ICT for teaching and learning purpose, in seven out of ten areas (S.N. 1, 2, 3, 4, 5, 7, 10) almost half of the respondents (4/8, 6/8, 5/8, 6/8, 5/8, 4/8 and 6/8 respectively) grouped under Digital Natives were well aware about the technology even before the compulsory move to online platform. Majority of the respondents under the Digital Immigrant group became aware about the Learning Management System (148: 70.81%) and online teaching platforms (164:78.47%) during the lockdown period which is quite understandable as the mode of teaching prior to that was predominantly offline. In four areas (S.N. 1, 4, 5 and 10) more than half of the respondents (109/201, 122/201, 109/201 and 123/201 respectively) became acquainted with the technology during the lockdown. In eight out of ten heads (S.N. 1, 2, 3, 5, 6, 7, 9 and 10) Digital Natives are still not familiar with the technology while in regard to Digital Immigrants this is the case in all the ten heads though the number of respondents were comparatively small (Table 5).

8.5 Experience of online teaching during lockdown

Table 6: Experience of online teaching during lockdown

SN	Activity & Experience while Engaging Online Classes	Category of Respondents	3-Always, 2- Occasionally, 1-Never						
			3	2	1	Total	Mean	SD	CV
1	Shifting to Online teaching was a easy task	HS	18 (25.35%)	40 (56.34%)	13 (18.31%)	71 (100%)	2.07	0.66	0.32
		MS	11 (20.37%)	36 (66.67%)	7 (12.96%)	54 (100%)	2.07	0.58	0.28
		PS	17 (20.24%)	49 (58.33%)	18 (21.43%)	84 (100%)	1.99	0.65	0.33
		DN	2 (096%)	5 (2.39%)	1 (0.48%)	8 (3.83%)	2.13	0.64	0.3
		DI	44 (21.05%)	120 (57.42%)	37 (17.70%)	201 (96.17%)	2.03	0.64	0.31
2	Experienced anxiety and work pressure while shifting to online mode of teaching	HS	20 (28.17%)	40 (56.34%)	11 (15.49%)	71 (100%)	2.13	0.65	0.31
		MS	12 (22.22%)	33 (61.11%)	9 (16.67%)	54 (100%)	2.06	0.63	0.31
		PS	34 (40.48%)	41 (48.81%)	9 (10.71%)	84 (100%)	2.3	0.65	0.28
		DN	1 (0.48%)	6 (2.87%)	1 (0.48%)	8 (3.83%)	2	0.53	0.27
		DI	65 (31.10%)	108 (51.67%)	28 (13.40%)	201 (96.17%)	2.18	0.66	0.3

SN	Activity & Experience while Engaging Online Classes	Category of Respondents	3-Always, 2- Occasionally, 1-Never						
			3	2	1	Total	Mean	SD	CV
3	Faced difficulty in creatively designing on-line learning plans	HS	13 (18.31%)	49 (69.01%)	9 (12.68%)	71 (100%)	2.06	0.56	0.27
		MS	15 (27.78%)	31 (57.41%)	8 (14.81%)	54 (100%)	2.13	0.65	0.3
		PS	30 (35.71%)	44 (52.38%)	10 (11.90%)	84 (100%)	2.24	0.65	0.29
		DN	1 (0.48%)	5 (2.39%)	2 (0.96%)	8 (3.83%)	1.88	0.64	0.34
		DI	57 (27.27%)	119 (56.94%)	25 (11.96%)	201 (96.17%)	2.16	0.62	0.29
4	The thought that the classes were open to parental scrutiny made you conscious while delivering the best in online classes	HS	12 (16.90%)	35 (49.30%)	24 (33.80%)	71 (100%)	1.83	0.7	0.38
		MS	16 (29.63%)	22 (40.74%)	16 (29.63%)	54 (100%)	2	0.78	0.39
		PS	31 (36.90%)	36 (42.86%)	17 (20.24%)	84 (100%)	2.17	0.74	0.34
		DN	2 (0.96%)	5 (2.39%)	1 (0.48%)	8 (3.83%)	2.13	0.64	0.3
		DI	57 (27.27%)	88 (42.11%)	56 (26.79%)	201 (96.17%)	2	0.75	0.37
5	Converting teaching material into digital format in a short time was difficult	HS	12 (16.90%)	48 (67.61%)	11 (15.49%)	71 (100%)	2.01	0.57	0.28
		MS	11 (20.37%)	33 (61.11%)	10 (18.52%)	54 (100%)	2.02	0.63	0.31
		PS	24 (28.57%)	46 (54.76%)	14 (16.67%)	84 (100%)	2.12	0.67	0.31
		DN	2 (0.96%)	4 (1.91%)	2 (0.96%)	8 (3.83%)	2	0.76	0.38
		DI	45 (21.53%)	123 (58.85%)	33 (15.79%)	201 (96.17%)	2.06	0.62	0.3
6	The Digital Learning Initiatives by the Government such as DIKSHA and eVidya were very useful	HS	42 (59.15%)	25 (35.21%)	4 (5.63%)	71 (100%)	2.54	0.61	0.24
		MS	30 (55.56%)	21 (38.89%)	3 (5.56%)	54 (100%)	2.5	0.61	0.24
		PS	60 (71.43%)	21 (25.00%)	3 (3.57%)	84 (100%)	2.68	0.54	0.2
		DN	4 (1.91%)	4 (1.91%)	0	8 (3.83%)	2.5	0.53	0.21
		DI	128 (61.24%)	63 (30.14%)	10 (4.78%)	201 (96.17%)	2.59	0.59	0.23
7	Keeping the students attentive during online teaching was challenging	HS	30 (42.25%)	34 (47.89%)	7 (9.86%)	71 (100%)	2.32	0.65	0.28
		MS	21 (38.89%)	29 (53.70%)	4 (7.41%)	54 (100%)	2.31	0.61	0.26
		PS	44 (52.38%)	37 (44.05%)	3 (3.57%)	84 (100%)	2.49	0.57	0.23
		DN	5 (2.39%)	2 (0.96%)	1 (0.48%)	8 (3.83%)	2.5	0.76	0.3
		DI	90 (43.06%)	98 (46.89%)	13 (6.22%)	201 (96.17%)	2.38	0.61	0.25

SN	Activity & Experience while Engaging Online Classes	Category of Respondents	3-Always, 2- Occasionally, 1-Never						
			3	2	1	Total	Mean	SD	CV
8	Keeping the students away from the distraction of social media was tough	HS	28 (39.44%)	37 (52.11%)	6 (8.45%)	71 (100%)	2.31	0.62	0.27
		MS	20 (37.04%)	28 (51.85%)	6 (11.11%)	54 (100%)	2.26	0.65	0.29
		PS	39 (46.43%)	37 (44.05%)	8 (9.52%)	84 (100%)	2.37	0.65	0.28
		DN	4 (1.91%)	3 (1.44%)	1 (0.48%)	8 (3.83%)	2.38	0.74	0.31
		DI	83 (39.71%)	99 (47.37%)	19 (9.09%)	201 (96.17%)	2.32	0.64	0.28
9	Faced difficulty in reaching to students who do not have the access to the technology required for online classes	HS	32 (45.07%)	32 (45.07%)	7 (9.86%)	71 (100%)	2.35	0.66	0.28
		MS	20 (37.04%)	28 (51.85%)	6 (11.11%)	54 (100%)	2.26	0.65	0.29
		PS	39 (46.43%)	41 (48.81%)	4 (4.76%)	84 (100%)	2.42	0.59	0.24
		DN	3 (1.44%)	5 (2.39%)	0	8 (3.83%)	2.38	0.52	0.22
		DI	88 (42.11%)	96 (45.93%)	17 (8.13%)	201 (96.17%)	2.35	0.63	0.27
10	Faced Internet connectivity issue	HS	11 (15.49%)	53 (74.65%)	7 (9.86%)	71 (100%)	2.06	0.5	0.25
		MS	9 (16.67%)	40 (74.07%)	5 (9.26%)	54 (100%)	2.07	0.51	0.25
		PS	28 (33.33%)	49 (58.33%)	7 (8.33%)	84 (100%)	2.25	0.6	0.27
		DN	2 (0.96%)	6 (2.87%)	0	8 (3.83%)	2.25	0.46	0.21
		DI	46 (22.01%)	136 (65.07%)	19 (9.09%)	201 (96.17%)	2.13	0.55	0.26

Note : HS- High School, MS – Middle School, PS – Primary School, DN – Digital Native, DI – Digital Immigrants, SD – Standard Deviation, CV – Co efficient of Variance

To find out the practical problems the respondents may have encountered while shifting to online mode of teaching, questions covering multiple aspects were provided in the questionnaire. Based on a three point scale (always to never) respondents were asked to select their answer for the statements related to their activities and experience while engaging online classes. Their responses were provided in Table 6. As previous knowledge of ICT, work culture and initiatives by the authorities to upgrade the knowledge of the teachers through in service training play significant role, responses were analysed from two demographic dimensions i.e. from age group and from the type of management of the school. Across all the dimensions the average mean happened to be 2.21 which are almost nearer to the mean found for individual dimension (HS – 2.17, MS – 2.17, PS – 2.30, DN – 2.21 and

DI – 2.22). Significant variance among the respondents across the demographic dimensions is also not visible.

8.5 Opinion on Online/Blended Learning at Work Place Post Lockdown

Table 7: Opinion on Online/Blended Learning at Work Place Post Lockdown

SN	Activity & Experience while Engaging Online Classes	Dimensions	Strongly Agree (SA) – 4, Agree (A) – 3, Disagree (D) – 2, Strongly Disagree (SD) - 1							
			SA	A	D	SD	Total	Mean	Std. Dev.	CV
1	Sound knowledge of digital technology is a essential to survive in the workplace post lockdown	G	11 (52.38%)	9 (42.86%)	1 (4.76%)	0	21 (100%)	3.48	0.6	0.17
		PM /SF/ UA	90 (57.32%)	60 (38.22%)	6 (3.82%)	1 (0.64%)	157 (100%)	3.52	0.61	0.17
		SG / G A	13 (41.94%)	17 (54.84%)	1 (3.23%)	0	31 (100%)	3.39	0.56	0.16
		DN	4 (1.91%)	4 (1.91%)	0	0	8 (3.83%)	3.5	0.53	0.15
		DI	110 (52.63%)	82 (39.23%)	8 (3.83%)	1 (0.48%)	201 (96.17%)	3.5	0.6	0.17
2	The ability to conduct work via mobile technologies is increasingly important in the workplace	G	9 (42.86%)	11 (52.38%)	1 (4.76%)	0	21 (100%)	3.38	0.59	0.17
		PM /SF/ UA	67 (42.68%)	76 (48.41%)	13 (8.28%)	1 (0.64%)	157 (100%)	3.33	0.65	0.2
		SG / G A	12 (38.71%)	17 (54.84%)	2 (6.45%)	0	31 (100%)	3.32	0.6	0.18
		DN	3 (1.44%)	5 (2.39%)	0	0	8 (3.83%)	3.38	0.52	0.15
		DI	85 (40.67%)	99 (47.37%)	16 (7.66%)	1 (0.48%)	201 (96.17%)	3.33	0.64	0.19
3	The online class should have a well-planned sequence of activities for ‘active engagement’	G	9 (42.86%)	11 (52.38%)	1 (4.76%)	0	21 (100%)	3.38	0.59	0.17
		PM /SF/ UA	87 (55.41%)	60 (38.22%)	10 (6.37%)	0	157 (100%)	3.49	0.62	0.18
		SG / G A	14 (45.16%)	16 (51.61%)	1 (3.23%)	0	31 (100%)	3.42	0.56	0.16
		DN	6 (2.87%)	1 (0.48%)	1 (0.48%)	0	8 (3.83%)	3.63	0.74	0.21
		DI	104 (49.76%)	86 (41.15%)	11 (5.26%)	0	201 (96.17%)	3.46	0.6	0.17
4	Positive attitude towards emerging technologies is important for professional growth	G	15 (71.43%)	5 (23.81%)	1 (4.76%)	0	21 (100%)	3.67	0.58	0.16
		PM /SF/ UA	107 (68.15%)	48 (30.57%)	2 (1.27%)	0	157 (100%)	3.67	0.5	0.14
		SG / G A	16 (51.61%)	12 (38.71%)	3 (9.68%)	0	31 (100%)	3.42	0.67	0.2
		DN	4 (1.91%)	4 (1.91%)	0	0	8 (3.83%)	3.5	0.53	0.15
		DI	134 (64.11%)	61 (29.19%)	6 (2.87%)	0	201 (96.17%)	3.64	0.54	0.15

SN	Activity & Experience while Engaging Online Classes	Dimensions	Strongly Agree (SA) – 4, Agree (A) – 3, Disagree (D) – 2, Strongly Disagree (SD) - 1							
			SA	A	D	SD	Total	Mean	Std. Dev.	CV
5	The ability to be an aware learner is important for personal development	G	16 (76.19%)	4 (19.05%)	1 (4.76%)	0	21 (100%)	3.71	0.56	0.15
		PM /SF/ UA	102 (64.97%)	51 (32.48%)	4 (2.55%)	0	157 (100%)	3.62	0.54	0.15
		SG / G A	15 (48.39%)	14 (45.16%)	2 (6.45%)	0	31 (100%)	3.42	0.62	0.18
		DN	5 (2.39%)	3 (1.44%)	0	0	8 (3.83%)	3.63	0.52	0.14
		DI	128 (61.24%)	66 (31.58%)	7 (3.35%)	0	201 (96.17%)	3.6	0.56	0.15
6	Ethical awareness about information use including Copyright, Fair Use, and Citation is important both for students and teachers	G	12 (57.14%)	8 (38.10%)	1 (4.76%)	0	21 (100%)	3.52	0.6	0.17
		PM /SF/ UA	88 (56.05%)	63 (40.13%)	5 (3.18%)	1 (0.64%)	157 (100%)	3.52	0.59	0.17
		SG / G A	13 (41.94%)	12 (38.71%)	5 (16.13%)	1 (3.23%)	31 (100%)	3.19	0.83	0.26
		DN	5 (2.39%)	2 (0.96%)	1 (0.48%)	0	8 (3.83%)	3.5	0.76	0.22
		DI	108 (51.67%)	81 (38.76%)	10 (4.78%)	2 (0.96%)	201 (96.17%)	3.47	0.64	0.18
7	Integrating ICT in Education can enhance the level of education in India	G	11 (52.38%)	9 (42.86%)	1 (4.76%)	0	21 (100%)	3.48	0.6	0.17
		PM /SF/ UA	77 (49.04%)	76 (48.41%)	4 (2.55%)	0	157 (100%)	3.46	0.55	0.16
		SG / G A	12 (38.71%)	16 (51.61%)	2 (6.45%)	1 (3.23%)	31 (100%)	3.26	0.73	0.22
		DN	5 (2.39%)	3 (1.44%)	0	0	8 (3.83%)	3.63	0.52	0.14
		DI	95 (45.45%)	98 (46.89%)	7 (3.35%)	1 (0.48%)	201 (96.17%)	3.43	0.59	0.17
8	ICT has the power and potential to help the users to make some unexpected value additions to classes leading to an enhanced learning experience	G	7 (33.33%)	12 (57.14%)	2 (9.52%)	0	21 (100%)	3.24	0.62	0.19
		PM /SF/ UA	62 (39.49%)	91 (57.96%)	4 (2.55%)	0	157 (100%)	3.37	0.53	0.16
		SG / G A	11 (35.48%)	17 (54.84%)	2 (6.45%)	1 (3.23%)	31 (100%)	3.23	0.72	0.22
		DN	4 (1.91%)	4 (1.91%)	0	0	8 (3.83%)	3.5	0.53	0.15
		DI	76 (36.36%)	116 (55.50%)	8 (3.83%)	1 (0.48%)	201 (96.17%)	3.33	0.58	0.17
9	ICT can counter the shortcoming in traditional learning	G	8 (38.10%)	8 (38.10%)	5 (23.81%)	0	21 (100%)	3.14	0.79	0.25
		PM /SF/ UA	45 (28.66%)	101 (64.33%)	10 (6.37%)	1 (0.64%)	157 (100%)	3.21	0.58	0.18
		SG / G A	10 (32.26%)	14 (45.16%)	3 (9.68%)	4 (12.90%)	31 (100%)	2.97	0.98	0.33

SN	Activity & Experience while Engaging Online Classes	Dimensions	Strongly Agree (SA) – 4, Agree (A) – 3, Disagree (D) – 2, Strongly Disagree (SD) - 1							
			SA	A	D	SD	Total	Mean	Std. Dev.	CV
		DN	3 (1.44%)	5 (2.39%)	0	0	8 (3.83%)	3.38	0.52	0.15
		DI	60 (28.71%)	118 (56.46%)	18 (8.61%)	5 (2.39%)	201 (96.17%)	3.16	0.68	0.22
		G	11 (52.38%)	9 (42.86%)	1 (4.76%)	0	21 (100%)	3.48	0.6	0.17
10	Technology has changes the way you communicate with your students	PM /SF/ UA	72 (45.86%)	77 (49.04%)	8 (5.10%)	0	157 (100%)	3.41	0.59	0.17
		SG /G A	17 (54.84%)	13 (41.94%)	1 (3.23%)	0	31 (100%)	3.52	0.57	0.16
		DN	7 (3.35%)	1 (0.48%)	0	0	8 (3.83%)	3.88	0.35	0.09
		DI	93 (44.50%)	98 (46.89%)	10 (4.78%)	0	201 (96.17%)	3.41	0.59	0.17
		G	9 (42.86%)	10 (47.62%)	2 (9.52%)	0	21 (100%)	3.33	0.66	0.2
11	ICT enabled education is a good supplement to face to face communication	PM /SF/ UA	56 (35.67%)	79 (50.32%)	21 (13.38%)	1 (0.64%)	157 (100%)	3.21	0.69	0.21
		SG /G A	10 (32.26%)	16 (51.61%)	4 (12.90%)	1 (3.23%)	31 (100%)	3.13	0.76	0.24
		DN	5 (2.39%)	3 (1.44%)	0	0	8 (3.83%)	3.63	0.52	0.14
		G	14 (66.67%)	6 (28.7%)	1 (4.76%)	0	21 (100%)	3.62	0.59	0.16
12	Face to face mode is more important for in-depth and practical teaching	PM /SF/ UA	89 (56.69%)	58 (36.94%)	8 (5.10%)	2 (1.27%)	157 (100%)	3.49	0.66	0.19
		SG /G A	17 (54.84%)	11(35.48 %)	3 (9.68%)	0	31 (100%)	3.45	0.68	0.2
		DN	4 (1.91%)	4 (1.91%)	0	0	8 (3.83%)	3.5	0.53	0.15
		DI	116 (55.50%)	71 (33.97%)	12 (5.74%)	2 (0.96%)	201 (96.17%)	3.5	0.66	0.19
		G	9 (42.86%)	10 (47.62%)	2 (9.52%)	0	21 (100%)	3.33	0.66	0.2
13	Assessing students through a Multiple-Choice Question (MCQ) mechanism is not sufficient for judging the actual standard of the student	PM /SF/ UA	78 (49.68%)	59 (37.58%)	17 (10.83%)	3 (1.91%)	157 (100%)	3.35	0.75	0.22
		SG /G A	14 (45.16%)	13 (41.94%)	3 (9.68%)	1 (3.23%)	31 (100%)	3.29	0.78	0.24
		DN	4 (1.91%)	2 (0.96%)	2 (0.96%)	0	8 (3.83%)	3.25	0.89	0.27
		DI	97 (46.41%)	80 (38.28%)	20 (9.57%)	4 (1.91%)	201 (96.17%)	3.34	0.74	0.22
		G	14 (66.67%)	6 (28.7%)	1 (4.76%)	0	21 (100%)	3.62	0.59	0.16

SN	Activity & Experience while Engaging Online Classes	Dimensions	Strongly Agree (SA) – 4, Agree (A) – 3, Disagree (D) – 2, Strongly Disagree (SD) - 1							
			SA	A	D	SD	Total	Mean	Std. Dev.	CV
14	Blended learning could also be the next normal	G	4 (19.05%)	14 (66.67%)	3 (14.29%)	0	21 (100%)	3.05	0.59	0.19
		PM /SF/ UA	41 (26.11%)	101 (64.33%)	14 (8.92%)	1 (0.64%)	157 (100%)	3.16	0.59	0.19
		SG /G A	9 (29.03%)	14 (45.16%)	6 (19.35%)	2 (6.45%)	31 (100%)	2.97	0.87	0.29
		DN	4 (1.91%)	4 (1.91%)	0	0	8 (3.83%)	3.5	0.53	0.15
		DI	50 (23.92%)	125 (59.81%)	23 (11.00%)	3 (1.44%)	201 (96.17%)	3.1	0.64	0.21

Note - G- Government, PM /SF/ UA – Private Management/Self Financed/ Un Aided, SG /GA –Semi Government/Government Aided, DN – Digital Native, DI – Digital Immigrants, Std.Dev. – Standard Deviation, CV – Co efficient of Variance

To determine the opinion of the teachers towards online or blended learning as the new normal post pandemic, the respondents were asked to select the most appropriate option based on a four point scale (strongly agree to strongly disagree) for a list of statements which might reveal their attitude and preparedness towards the adoption of technology. The result is presented in Table 7. Across all the questions, the average mean score for those participants grouped under digital native was higher (3.53), even greater than the overall average mean (3.41), indicating a higher level of awareness and preparedness by the teachers coming under this category. Average mean of the other demographic dimensions are not very diverse although viz. G – 3.41, PM /SF/ UA – 3.42, SG /GA – 3.28, and DI – 3.39. The value of co efficient of variance also found to be low and almost equal across the dimensions.

9. DISCUSSION AND CONCLUSION

The present day societies are predominantly based on information and knowledge. Technology enabled education can play a pivot role in transforming the nation into a digitally empowered society and knowledge economy. An increasing amount of research has emerged over the last few years that emphasises the need for developing digitally competent, literate, able, skilled, capable people given to the rapidly evolving technological environment (Fulton and McGuinness, 2016). In particular, the COVID-19 pandemic has sharpened social focus on the need for digital skills (Iansiti and Richards, 2020). In India in consequence to the nationwide lockdown to ensure continuity in learning, educational institutions were switched to online platform which is still continuing even today. Apparently the education sector is one of the worst affected sectors as the teaching and learning had never been stopped. Given to

this background the aim of this present study was to understand the practical problems faced by the teachers, their preparedness to adopt the technology and their opinion on the technology enabled education system. Questions focused multifaceted items addressing, everyday participation as digital citizen, Utilisation of ICT for teaching and learning, Activities and experience while engaging online classes and most importantly their viewpoint on future teaching and learning paradigm. Key findings indicate that whilst the majority of respondents found to be reasonably digital literate, but the all of the sudden shift from physical to online platform did posed a lot of challenges to overcome to. While there was an enthusiastic group of teachers who adopted many of the technology during the lockdown only, a group of respondents who are still not familiar with it also came to the fore. Though this was out of the scope of the present study, this opens a further area of research focusing on the way they reached to their students during the last one year while doing their teaching job. There found to be an overall agreement that effective education could be achieved through the integration of technology into the teaching methods, at the same time they do believe that face to face mode is also important for in-depth and practical teaching. Though the demographic distribution of samples based on digital natives and digital immigrants are unequal while 3.83% of total sample fulfilled the criteria of digital native, an equal distribution on this line cannot be achieved as previous studies also echoes the same notion (Darbha & Rao, 2016). The demographic information shows diversity of the participants and hence generalization of the study results with caution will be helpful for the future course of action. Focus should be to assess the skill level of the teachers and provide targeted training enabling them to realize their potential and role in nation building.

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