INDIAN JOURNAL OF EDUCATIONAL TECHNOLOGY

Indian Journal of Educational Technology

About the Journal

CIET, NCERT has been a premier institution for development and dissemination of resources and techniques related to Educational Technology (ET) for better understanding of teaching-learning at school level. With renewed thrust on educational technology using digital platforms, the need for a quality journal on educational technology in India is felt more than ever. Keeping this in regard, Indian Journal of Educational Technology will be a medium for scholarly presentation and exchange of information between researchers, professionals and practitioners of technology related fields of education. The journal aims at covering disciplinary areas of educational technology (ET) for school education and teacher education. The specific objectives of this journal are: i) to provide an open access journal for sharing updated and peer reviewed research on Educational Technology for easy access and ii) to promote research on the integration of technology in school and teacher education, promote innovative practice, and inform policy debates on educational technology. This bi-annual open access online peer reviewed journal will be a platform for exchange of ideas and would also become a basis for further innovation in ET in school and teachers' education.

Notes to Contributors

Indian Journal of Educational Technology is a UGC listed (UGC CARE list, List-1) peer reviewed bi-annual journal especially designed for scholarly discourse of use of various forms of technology in education. Some of the themes encompassed under its broad purview are: Education Technology (ET), Information and Communication Technology (ICT) in education, Distance education and technology, Technological integration into pedagogy and content, Open Educational Repositories (OER) and FOSS, Innovation in educational system, Computer-based learning, Audio-video and multimedia in education and issues thereof, Technology cognition and curriculum, Impact of technology in education, Nature of technology and learning, Mobile learning, Learning through social media, Technology assisted evaluation systems, Technology support for differently abled population, Flipped classroom, Virtual and Augmented Reality, Artificial Intelligence, robotics and education, Impact of technology on learning, Social media and children, Economics of technology and its impact on education system, Educational planning administration and technology and Online courses for school education and teacher education. We look forward to your contributions in the coming issues. Your feedback and suggestions are also welcome on the following address:

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Editorial Team

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["Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs....." in Our Common Future; The World Commission on Environment and Development]

Like every year, the World Environment Day (WED) was celebrated across the globe on 5th June 2022 to create worldwide awareness of the environment. Fifty years ago, on this day, the first United Nations Conference on the Human Environment was held in Stockholm, Sweden from June 5-16 in 1972. The date coincides with the first day of the landmark Conference. This year's theme of the WED was focused on #OnlyOneEarth, which was also the motto for the 1972 Stockholm Conference. Even after five decades, the motto continues to be relevant – we have only one earth to live and we must do every bit at our command to save it and nurture it.

We are living in times when automation is the trend. This automation is largely driven by digital technology. A very large amount of data transfer is the key to this technology. As I write there are 5.3 billion people in the world who are using the internet. We have more than 1.9 billion websites functioning worldwide. On an average, we send more than 3 million emails in a second. More than 4 billion videos are viewed on YouTube in a day. More than 50 million images get uploaded daily on Instagram. More than 3 billion people are using Facebook actively. On an average, more than 4 lakhs computers get sold daily. More than 3 million smartphones get sold daily. On average, internet traffic consumes more than 7 billion GB of data daily. The internet alone leads to the consumption of more than 2 million MWh of electricity daily, which is equivalent to more than 2 million tons of CO_2 emitted globally daily. (https://www.internetlivestats.com/). In the last decade, digital technology's energy consumption has increased by more than 70 percent. Various studies have estimated that the digital carbon footprint is about 2.3 percent to 3.7 percent of the global CO_2 emissions, which is equivalent to theCO_2 emissions of the entire aviation industry.

We have been made to believe that the digital is always green! One has to accept it with a pinch of salt. In these times of climate change, we cannot afford to let our guards down. Demand side management can greatly ease the global CO_2 emissions on account of digital technology. According to a study, video streaming causes 75 percent of global traffic data. Reducing video streaming and using audio files for song listening is a way forward in this direction. Judicious purchase of devices and proper disposal of old devices continue to be the mantra for sustainable development. According to a study, more than 50 million metric tonnes of e-waste are generated every year globally. Minimizing dependence on the cloud for data storage leads to lesser energy consumption (https://www.myclimate.org/information/faq/faq-detail/what-is-a-digital-carbon-footprint/). According to an estimate, a country like the UK could reduce its carbon output by over 16,433 tons, simply by each adult sending one less email per day (https://www.genevaenvironmentnetwork.org/resources/updates/data-digital-technology-and-the-environment/)!

We are happy to carry 25 manuscripts consisting of research articles, general articles and book review in this issue. These relate to the topics such as creative commons, teaching-learning of different subjects using online methods, use of multimedia in teaching learning different subjects and effectiveness of online teaching for children with special needs. Online teaching and learning especially during the COVID times continue to generate a lot of research interest. In this issue too, there is a large number of such manuscripts discussing various aspects related to it. I hope these studies will contribute effectively in the academic discourse.

(ABHAY KUMAR)
Editor

Appraising the Awareness, Attitude and Usage of Creative Commons Licence by Central University Faculty Members

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Abstract

Creative Commons is a global non-profit organization providing a set of standard and legal tools that enables sharing and use of original works. The present study aimed to investigate the awareness, attitude and usage of Creative Commons Licence among the faculty members of the department of education in the central universities of India. A descriptive survey design was adopted by the researchers. A self-prepared questionnaire on creative commons licences was developed by the researchers. A sample size of 78 faculty of the department of education based on the convenience sampling technique was selected as the primary source of data. The results of the study showed that the majority of the faculty have used creative commons licensed materials in their classroom teaching. While only a few of them have published their work under creative commons licences and have attended workshops or training programmes on creative commons licences. The study concluded that faculty were aware of the concept of creative commons licences; however, they possess a neutral attitude towards creative commons licences.

Keywords: Awareness, Attitude, Usage, University Faculty Members, Creative Commons Licences

Introduction

The new digital age has opened up a wide opportunity to access essential knowledge and information. With the emergence of the Internet, academic stakeholders can use, download and copy huge amounts of educational resources and also further disseminate them to a professional network. But the question arises, even though all the resources are freely available over the internet, are they free and open to use, adapt, modify, download or disseminate? Are the resources legally free and open for all? Many a time, we knowingly or unknowingly use, modify or share resources that are copyrighted or restricted in some terms. This may limit the academic and knowledge community to access some high-quality educational resources. To eliminate this challenge, a new form of licence called

'Creative commons Licences' came into being. Creative Commons (CC) Licences is a non-profit organization founded on the basis that 'many citizens of the Internet want to share their work and the power to reuse, modify and distribute their work – with others on generous terms' (Bissell, 2009). The main vision of Creative Commons is to realise the goal of universal access to education, knowledge and research by promoting a culture of development, growth and productivity. (Creative Commons, 2011). As viewed by Lessig (2004) copyright laws restrict people from accessing, remixing, and distributing copyrighted materials in a digital environment. It is noted that due to the rigidity and complexity of copyright laws, even those who wish to make their copyright material freely available to others are unable to do so without great effort or the services of a lawyer (McGeever, 2006).

Therefore, for this reason, the group of experts introduced a set of licences that creators and users could use to share their creative materials freely and use without giving up their rights (Awujoola & Phillips, 2020). According to Creative Commons Organisation (2020) "Creative Commons is a set of legal tools, a non-profit organization, a global network and a movement—all inspired by people's willingness to share their creativity and knowledge and enabled by a set of open copyright licences" (Creative Commons Organisation, 2020, p. 1). As Branco and Britto (2014) "Creative Commons licences act as a source of legal instruments for those who want to give up some of their rights in favour of the community and the dissemination of cultural works." Korn and Oppenheim (2008) defined "Creative Commons as a licensing system under which authors or producers of a work offer some of their rights to others to re-use their work under certain specified conditions". It is very important to keep in mind that this creative commons licence provides a pool of content that can be copied, downloaded, modified, combined and shared, within the framework of copyright laws. There is a great benefit in sharing our work with a creative commons licence. Creative commons licences enrich the culture of sharing creative and original works all over the world. The set of creative commons licence allows users to use, adapt, remix and share educational resources freely and openly as Open Educational Resources (OERs). It also enables creators the opportunity to share their resources and decide how their works would be used. Park (2016) considered CC licences as the infrastructure of roads underlying the ecosystem of OER to make reuse and sharing possible. And the emergence of creative commons licences has led to a culture of sharing and remixing knowledge and creativity. The success of creative commons licences in driving these goals will depend on the awareness and attitude of the academic fraternity towards CC licensing.

Literature Review

Williams & Werth (2021) evaluated a study on the preferences of students in the use of licences for projects based on OER-enabled pedagogy, factors affecting student selection of a licensing option and faculty experiences in facilitating licensing selection. The study remarked that the majority of the students preferred a CC-BY licence. However, students indicated that they were not familiar with creative commons licensing before, but were aware of copyright licences. Even faculty tend to be unfamiliar with the concept of creative commons licensing. Finally, the results of the study concluded that students are open to sharing their works with credit and that they value helping others. Awujoola & Phillips (2020) demonstrated a study to investigate awareness and perception of CC licences by lecturers in the Faculty of Education, University of Ibadan, Nigeria. The result showed that lecturers in the Faculty of Education were moderately aware of CC licences and held moderate negative perceptions about CC licences. The study found that there was a significant influence of CC licence awareness on its perception by lecturers. Nobes & Harris (2019) showed that 60 per cent of the participants were familiar with these licences, while only 20 per cent of them have published their papers using CC licences. The majority of the participants preferred the most restrictive CC-BY-NC-ND licence which shows that they were concerned about the commercial usage of their work. It also found a lack of understanding of the commercial clause in creative commons licences among the researchers. Krelja Kurelovic (2016) found out that the familiarity with creative commons licences among the

faculties is very low. The study revealed that only 12.5 per cent of the faculties published digitised teaching under creative commons licences. Liu, Tao, Chen, Chen and Liu (2013) conducted a study to evaluate the effects of the Creative Commons approach on the collaborative learning experience of students. Evidence showed that Creative Commons can significantly improve participants' attitude to the derivative works, the satisfaction level of remix outcomes, perception of the peer interaction and the sense of work ownership. It concluded that Creative Commons has the potential to increase individuals' responsibilities and motivate them to participate in collaborative learning activities. Reed (2012) observed that the majority of the teaching staff were positive about sharing their materials and even reused existing content in their face-to-face or online learning. However, the data gathered confirms that there was a lack of awareness among the teaching staff about the Creative Commons licences.

The above empirical literature shows the understanding, attitude and practice of creative commons licence. Studies by Fitzgerald (2007) and Kapitzke, Dezuanni and Iyer (2011) noted that creative commons provide the most effective coherent way of sharing and reusing digital content or inactive copyright materials. Creative Commons provides a vitally important facility for sharing knowledge in the name of culture and innovation. Creative Commons has significantly and positively affected education and the academic sector. Furthermore, the researchers found limited and scant studies on creative commons licences. It remains unclear whether the faculty members were aware of the creative commons licence and how they perceive and use this licence. The present study attempts to address this gap in the literature. Therefore, it is worthwhile to explore the faculty members' awareness, attitude and use of creative commons licence in

educational contexts.

Objectives of the study

1. To investigate the awareness of creative commons licences among the faculty members of the department of education of the central universities.

2. To determine the attitude towards creative commons licences among the faculty members of the department of education of the central universities.

3. To find out the usage of creative commons licence among the faculty members of the department of education of the central universities.

Research Methodology

The descriptive survey method was adopted to explore the awareness, attitude, and usage of Creative Commons Licences among the faculty members of the department of education of the central universities. The population of the study consists of all the faculty of the department of education of the central universities in India. Data were collected from a total sample of 76 respondents. The researchers adopted a convenience sampling technique due to time constraints, willingness, and easy availability of respondents. A self-prepared questionnaire was used by the researchers. The tool comprises 4 sections: the demographic profile, usage of creative commons licences (3 statements), awareness towards creative commons licences (7 statements), and attitude towards creative commons licences (13 statements). The degree of usage of creative commons licences was measured based on "Yes" and "No". The degree of awareness towards creative commons licences was measured on a 4-point Likert scale with 1 as "Yes", 2 as "To some extent", 3 as "No" and 4 as "Don't Know". The statements under the

dimensions of attitude towards creative commons licences were measured using a 5-point Likert scale consisting of 1 for strongly disagree and 5 for strongly agree. It was validated by five experts from the field of open educational resources and educational technology. The questionnaire was a try-out on 35 samples for establishing reliability. The internal consistency reliability coefficient of the questionnaire was found to be 0.78 indicating a high-level of internal consistency of the statements. However, its subsections which are dimension wise had Cronbach-alpha coefficients of 0.64, 0.84 and 0.98 for usage, awareness and attitude towards creative commons licence, respectively. The research was conducted using an online questionnaire created in Google Forms. Statistical analyses like percentages, mean and standard deviations were used by the researchers.

Table-1: Demographic characteristics of the sample

Respondents' Demographic Information	Frequency	Percentage (%)
Gender		
Male	41	53.95
Female	35	46.05
Years of teaching experience		
Less than 1 years	08	10.53
1-5 years	19	25.00
6-10 years	21	27.63
More than 10 years	28	36.84
Designation		
Professor	22	28.95
Associate Professor	20	26.31
Assistant Professor	27	35.53
Guest Faculty	07	9.21
Usage of Computer		
None	0	0
Daily	69	90.79
Weekly	07	9.21
Monthly	0	0
Total	**76**	**100**

Findings

Analysis of Objective 1- To investigate the awareness of creative commons licences among the faculty members of the department of education of the central universities.

Table-2: Awareness towards Creative Common Licences

Sl. N	Statements	Yes	%	To some extent	%	No	%	Don't Know	%
1.	Creative Commons is actually a non-profit organization.	36	47.37	20	26.31	08	10.53	12	15.79
2.	Creative Commons licences are "free, easy-to-use copyright licences".	35	46.05	17	22.37	15	19.74	09	11.84
3.	Creative Commons licences are an alternative to copyright.	22	28.95	14	18.42	24	31.58	16	21.05
4	The creative commons licences transform all rights reserved to some rights reserved.	28	36.84	19	25.00	15	19.74	14	18.42
5.	If the copyright licence of my creative work expires, the material will automatically come under creative commons licences.	25	32.89	09	11.84	13	17.10	29	38.16
6.	I can use others' original work and publish it under creative commons licences.	14	18.42	12	15.79	31	40.79	19	25.00
7.	I can apply a creative commons licence to a work that is under the public domain.	21	27.63	09	11.84	30	39.47	16	21.05

Table 2 and Fig. 1 reflect the awareness of faculty members toward creative commons licences. According to the table, 47.37 per cent of the samples were aware that creative commons is a non-profit organization and not just a classification. 46.05 per cent accepted that creative commons licences are "free, easy-to-use copyright licences". 31.58 per cent were aware of the

fact that creative commons licences are not an alternative to a copyright licence. 36.84 per cent believed that the notion that creative commons licences transform 'all rights reserved' to 'some rights reserved '. However, 38.16 per cent of the respondents were not sure whether their original work comes under creative commons licence after its copyright licence expired. Moreover, 40.79 per cent and 39.47 per cent of them were aware that they cannot use others' original work and publish it under creative commons licences nor can they apply creative commons licence to a work that is under the public domain.

Fig-1: Graphical Representation of Awareness towards Creative Commons Licences
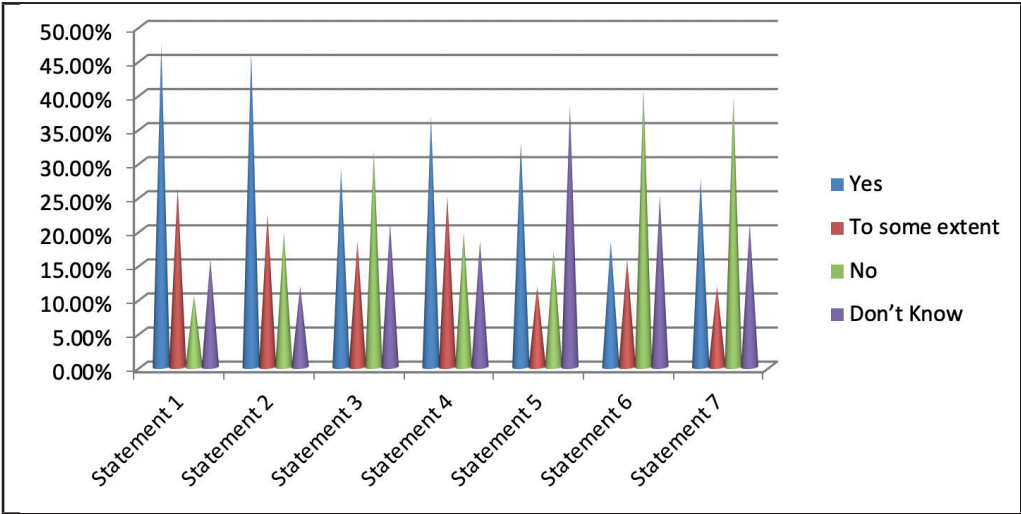
Analysis of Objective 2- To determine the attitude towards creative commons licences among the faculty members of the department of education of the central universities.

Table-3: Attitude towards Creative Commons Licences

Sl. No	Statements	SA	A	N	D	SD	M	SD
1	The use and conditions of creative commons licences are very much easy and clear to understand.	18	27	14	09	08	3.5	1.27
2	I know how to apply creative commons licences to my materials.	15	21	21	10	09	3.30	1.26
3	I can easily locate creative commons licence materials.	17	15	23	11	10	3.24	1.31

							Mean	SD
4	I think everyone should make their work free and open to use, share and modify and even use it commercially without permission as per their own choice rather than locking it behind the protection of copyright.	07	11	19	18	21	2.54	1.28
5	I do not want others to make money from my original works.	21	17	15	12	11	3.33	1.41
6	I prefer the use of a copyright licence rather than creative commons licence.	15	13	22	16	10	3.09	1.31
7	I think creative commons licences remove my creditability and acknowledgement.	13	16	17	11	19	2.91	1.43
8	I think creative commons licences will increase the rate of Plagiarism.	12	16	17	17	14	2.93	1.35
9	Creative Commons Licences might create problems as I can never know who and how someone is using my work.	16	13	20	15	12	3.08	1.36
10	These licences help in sharing and protecting my creative works, while still protecting them from being misused.	11	12	21	15	17	2.80	1.34
11	Creative Commons Licences help me in spreading my work and gaining global recognition for it.	18	19	17	11	11	3.29	1.36
12	Creative Commons Licences helps in creating an online community of sharing and reusing.	13	17	23	12	11	3.12	1.28
13	Compared to traditional copyright, Creative Commons Licences have made it easier to grant permission to all automatically rather than granting permission to each person individually.	19	21	20	09	07	3.47	1.25

Table 3 presents the attitude of central university faculty members towards creative commons licenses. The results indicated that faculty perceived: that creative commons licenses are easy to use and clear to understand its conditions and principles (M3.5, SD=1.27); they have an understanding of how to apply creative commons licenses to their work (M=3.30, SD=1.26) and can easily locate creative commons materials (M=3.24, SD=1.31). However, the majority of them strongly disagreed with the fact that everyone should make their work free and open to use, share and modify and even use

it commercially without permission as per their own choice rather than locking it behind the protection of copyright (M=2.54, SD=1.28); also they don't want others to make money from their original works (M=3.33, SD=1.41); few of the faculty=preferred the use of copyright license rather than creative commons license (M=3.09, SD=1.31). The majority of the faculty believed that creative commons licenses remove their creditability and acknowledgement (M=2.91, SD=1.43); and disagreed that creative commons licenses will increase the rate of plagiarism (M=2.93, SD=1.35). Faculty viewed that creative commons licenses might create problems as they have no idea who and how someone is using their work (M=3.08, SD=1.36); they perceived that these licenses help them in sharing and protecting their creative works (M=2.80, SD=1.34) and gaining global recognition for their work (M=3.29, SD=1.36) They agreed that creative commons licenses help in creating an online community of sharing and reusing (M=3.12, SD=1.28); along with that creative commons licenses makes it easy to grant permission to users compared to copyright license (M= 3.47, SD=1.25). Based on these findings, it can be inferred that the central university faculty members have a neutral attitude about creative commons licenses.

Analysis of Objective 3- To find out the usage of creative commons licence among the faculty members of the department of education of the central universities.

Table-4: Usage of Creative Commons Licences

Statements	Yes	Percentage (%)	No	Percentage (%)
Have you ever used any Creative Commons Licence materials/images/videos/ppts in your classroom teaching?	40	52.63	36	47.37
Have you ever published your work under Creative Commons Licences?	30	39.47	46	60.53
Have you ever attended any workshop or training programme on Creative Commons licences?	27	35.53	49	64.47

Fig-2: Graphical representation of Usage of Creative Commons Licences
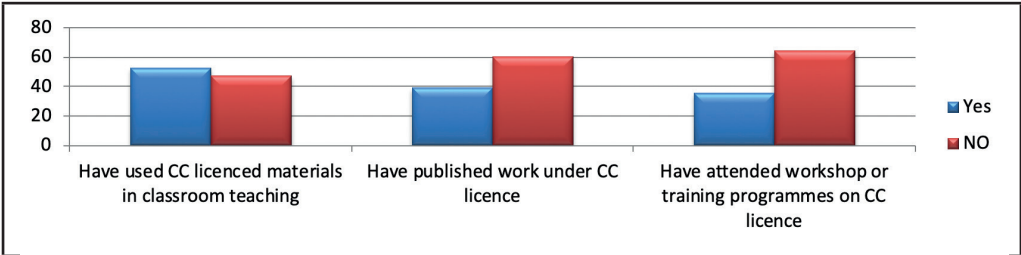
Table no. 4 and Fig. 2 delineate the usage pattern of creative common licence among the respondents. The stated table displayed that 52.63 per cent of the participants have used creative commons licensed materials in their classroom teaching. While only 39.47 per cent of them have published their work under creative commons licences and 35.53 per cent have attended workshops or training programmes on creative commons licences.

Discussions

The study reveals that the majority of central university faculty were aware of creative commons licences. The result of this study is similar to the studies conducted by Awujoola, & Phillips (2020); Baas and Schuwer (2020); Jhangiani, et al., (2016); Nobes & Harris (2019). On the contrary; Baas, Admiraal, & Van Den Berg, (2019) concluded that teachers' awareness of Creative Commons licences is limited. Results of this present study also revealed that the faculty members have a neutral attitude about creative commons licences. This result is inconsistent with research conducted by Awujoola, & Phillips (2020). The study found that the perception of teachers towards creative commons licences is moderately negative. However, in the studies conducted by Brent, Gibbs and Gruszczynska (2012) it was found that teachers were not willing to openly share their teaching resources under the creative commons licence.

Conclusion

Creative Commons licences are the most comprehensible licences to release digital content for use by everyone. Kim (2007) also commented that creative commons can aid us in solving many problems and conflicts that arise due to copyright laws in this digital era. This has led the academic community to have access to licensed and free resources through fast, easy, and reliable creative commons; thereby enabling to encourage the culture of creative sharing and improving the academic and research environment. The present study found out that central university faculty have awareness and understanding regarding creative commons licences and a majority of them possess a neutral attitude towards creative commons licences. However, there is still a need to promote the use of creative commons licences in the educational community.

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Research Article

Effectiveness of ICT on Online Mathematics Teaching and Learning in Secondary Schools of Mizoram during Covid-19 Pandemic

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Abstract

Since ICT has become such an important feature in everyday life, it is no wonder that it has also burrowed through the teaching and learning scenario making its presence felt in more ways than one. The coming of the Covid-19 pandemic, though a calamity in itself, provided an opportunity to find out the true effectiveness of ICT on online mathematics teaching and learning. The population under consideration was secondary teachers teaching mathematics. The findings clearly outlined the status of mathematics teachers when it came to teaching mathematics using ICT. It was discovered that mathematics educators did not consider ICT adequate to replace offline teaching, but they considered that it could supplement it. Besides, it was also observed that students themselves enjoyed teaching enhanced with ICT.

Keywords: Mathematics, ICT, online learning, pandemic, secondary education.

Introduction

ICT is an important part of today's world. In the world of education, regardless of the subject being taught, it is gaining importance with each passing year. Especially, in the light of the fact that teaching is a profession that needs professionals, who can impart the needed resources for the nation. ICT must become a part of teaching from the lowest levels so that students are exposed to technology from an early stage. For the early stage of development and possibility, teachers should be ready to make available modern technology, and within itself have to be made available. But, another important part of this is that even students, who are at receiving ends have to be ready to accumulate and impart knowledge through this medium, meaning they needed to be aware, of need to have the much-needed facilities, if, ICT is used in a remote manner, and connectivity also have to be enabled, so that, two-way communication is enabled.

Mizoram is one of the states in India, situated in the northeastern region sharing 404 km and 318 km long international borders with Myanmar and Bangladesh, respectively. The geographical location of Mizoram is 92°.15′ E to 93°.29′ E Longitude and 21°.58′N to 24°.35′N Latitude. Aizawl is the capital city of Mizoram. There are 11 districts, 23 sub-divisions and 26 Rural Development (RD) Blocks. Its area covers 21,081 square kilometres. According to the 2011 census, there are 830 villages, 2,22,853 households, 10, 97,206 population and a literacy rate of 91.33 per cent. School Education in Mizoram is categorised broadly as Elementary and Secondary. Elementary covers classes 1 to 8 and secondary covers classes 9 to 12. High School covers classes 9 and 10 and Higher Secondary School covers classes 11 and 12. As per Udise plus 2020-21 data, there are 712

High Schools with 4,306 teachers and 40,037 students, 198 Higher Secondary Schools with 1,900 teachers and 24,966 students.

Due to Covid -19 pandemic, schools have been totally closed in Mizoram. There are no other alternatives and so teaching and learning during this pandemic can be carried out using online mode only. With all these factors in mind, state-wide research was done with the following objectives:

Objectives of study

1. To study the challenges faced by the students and teachers in teaching and learning Mathematics during the Covid-19 pandemic.
2. To find out the effectiveness of ICT on online Mathematics teaching and learning at the secondary level of education in Mizoram during Covid-19 pandemic.

Research questions

The study was guided by the following questions:

(i) What is the effectiveness of using ICT for the online teaching process of Mathematics in the secondary school of Mizoram during the Covid-19 pandemic?
(ii) What are the barriers of using ICT for online Mathematics teaching in secondary school of Mizoram?

Review of literature

There are a lot of problems and confusion on the parts of the students as well as the teachers in online teaching during Covid-19 pandemic, as this is done without proper training, for smooth functioning of online learning will need proper training and resources. So, the teachers are in a stage of experimenting and trying their best for their students (Mishra et al. 2020). Students experienced a

dramatic change in mathematics education during the enforced Covid-19 lockdown and there needs to be quality support for students and teachers in the transition (Cardel et al., 2021). The training received for online teaching, the mismatch between pedagogy and learning styles of students, work-life balance pressure and assumptions about home life conditions, connectivity and availability of devices are the constraints to online teaching and learning (Singh et al., 2021). The lockdown situation is certainly an obstacle to the progress of education and mathematics education since most students do not have enough necessary devices (Das, 2021). During the Covid-19 pandemic, students had a positive mathematics self-concept, mathematics anxiety was at a moderate level, and already had mathematics self-regulated learning at a low level (Delima & Cahyawati, 2021). Digital learning environments will be with us forever, such that professional development and teacher preparation programs in mathematics education must focus on the implementation of the digital learning environment (Chirinda et al., 2021). Instructional technology, as a research field with several sub-divisions, has played a major role in cushioning the effect of this pandemic on educational activities by serving as the only platform for instructional design, delivery and assessment platforms (Olasile Babatunde Adedoyin & Emrah Soykan, 2020). Covid-19 crisis ushered in digital teaching and learning experiences that clearly spelt out the existence of digital instructional and pedagogical gaps in mathematics education (Leckson & Deonarain, 2021). The Covid-19 pandemic has severely hit the academic sector due to the lack of proficiency in online teaching mode due to the technological and infrastructural lacuna (Biswas & Rahaman, 2021). The governments must ensure the availability of reliable communication tools, high-quality

digital academic experience, and promote technology-enabled learning for students to bridge the disparities originated in the education system before and after Covid-19 catastrophe which is also inevitably necessitated for uninterrupted learning (Mishra et al., 2020). Before using digital platforms for mathematics learning, students need to be encouraged to practise and engage collaboratively within digital platforms (Jayaluxmi Naidoo, 2020). There is a need for secondary schools, with the help of the government and other stakeholders to promote the establishment of e-learning facilities countrywide (Mukuka et al., 2021).

Methodology

This part of the research was descriptive. The population included secondary school teachers teaching mathematics within the state of Mizoram. The Information schedule and opinionnaire were sent out to the entire population. Out of these, 348 teachers responded. Since there were a total of 774 mathematics teachers at the secondary level and 71 mathematics teachers at the higher secondary level in Mizoram, the responses made up 41.1 per cent of the population and were thus considered more than adequate for research. Since no selection was made, samples were completely random. Given the research objective, the researcher opted for an Information Schedule and Opinionnaire as the main tools. The opinionnaire had a total of three dimensions; each having a set of items in which respondents simply had to opt for a 'yes' or a 'no'. The data received was analysed in a qualitative manner making use of descriptive statistics.

Overview of the profile of teachers at the Secondary level of education in Mizoram

Based on the Information Schedule that was administered by the researcher himself, it was found that out of the 348 responses that came, male teachers made up 80.2 per cent and only 19.8 per cent of them were females. This in itself proved the disparity that still exists in a state like Mizoram, which is a state in the northeastern part of India, that a subject like mathematics which is a highly abstract subject, is still favoured by the male of the population. Out of these, 23.9 per cent of urban and 76.1 per cent of rural teachers were identified, and since the data was collected through the online mode using Google form, it showed that both localities had teachers who could deal with online technology. This in itself was a positive finding, strongly giving evidence that rural teachers were not far behind in dealing with ICT at least at this level. Secondary school teachers made up 91.1 per cent of the responses and 8.9 per cent were from Higher Secondary Schools.

Findings regarding ICT compatibility of teachers

The tool was subdivided into three dimensions in keeping with the research objectives and the pandemic situation which necessitated the use of an online platform for teaching. On the dimension of ICT and teacher, there were 10 items. The results obtained were separately analysed in Table-1.

Table-1: A summary of findings of the result

Sl. No		YES		NO	
		No.	%	No.	%
	ICT and Teacher				
1	I have my own computer	193	55.5	155	44.5
2	I have my own smartphone	347	99.7	1	0.3
3	I do not know how to use Computers	42	12.1	306	87.9
4	I know how to use software for making e-content like pdf/slides/word etc.	274	78.7	74	21.3
5	I use readymade e-content like pdf/slides/word etc to teach my students	208	59.8	140	40.2
6	I can prepare my own teaching videos for student	268	77	80	23
7	I use readymade videos to teach my students	214	61.5	134	38.5
8	I can make e-content using my phone	228	65.5	120	34.5
9	I have received in-service training in ICT	188	54	160	46
10	It is difficult to carry on teaching using ICT	185	53.2	163	46.8

- 55.5 per cent of the sample mathematics teachers had their own computer.
- A small minority of 0.3 per cent among the sample teachers still did not have their own smartphone.
- An unexpected 12.1 per cent of the sample teachers did not know how to use computers, which is an essential part of ICT.
- A majority of them, i.e. 78.7 per cent of the sample teachers could use their software for making e-content.
- A small majority of 59.8 per cent of the sample mathematics teachers could make use of readymade e-content to teach mathematics.
- Among the mathematics teachers who responded, 77 per cent of them claimed to be able to make their own teaching videos.
- Another 61.5 per cent simply made use of ready-made videos.
- A healthy 65.5 per cent of them could make use of their smartphones to make e-content.
- It was noted that only 54 per cent of the sample teachers had received ICT training.
- More than half of the sample teachers i.e. 53.2 per cent still found it difficult to teach using ICT.

Discussion

The study found that teachers were in very different positions in their compatibility to use ICT. While a good 65.5 per cent of the sample teachers could make their own e-content on their smartphones, there is still nearly 12 per cent of them who do not know how to use a computer. Let alone create their own e-content. Th fact that only around 54 per cent of the sample teachers had received ICT training revealed the huge backlog when it came to ICT training. Since 53.2 per cent of them still found it difficult to use ICT for teaching and learning, it was clear that ICT could not be used as a mandatory part of teaching. Given the high percentage of teachers who still do not know how to make use of this technology, the majority of

77 per cent of the teachers who could even make their own teaching videos put the state in a good position, but also highlighted that teachers were in very different positions when it came to ICT compatibility. Also, nearly half of the teachers still do not have their own computers at their service and convenient time. Strongly, indicated that they did not consider an investment in computers as necessary or wise. This in itself was rather disheartening, because it brought into light the lack of education even among teachers themselves, on the utility of ICT.

Findings on the status of mathematics teaching during COVID -19 pandemic according to teachers

The second part of the opinionnaire was concerned with the teaching of mathematics in an online mode which was a necessity during the COVID-19 pandemic (table-2).

Table-2: Findings on the status of mathematics teaching

Sl. No.	Teaching during Covid-19 pandemic	YES		NO	
		No.	%	No.	%
	Teaching during Covid-19 pandemic				
1	I do not take an online class at all due to the non-availability of the internet or some other reason	90	25.9	258	74.1
2	During the Covid-19 pandemic, classes are taken through online mode only	243	69.8	105	30.2
3	I use Learning Management System (Google classroom, Moodle, Teachmint etc.) for online class	179	51.4	169	48.6
4	I use Google Meet for taking an online class	120	34.5	228	65.5
5	I use Zoom for taking online class	109	31.3	239	68.7
6	I use WhatsApp for content delivery	333	95.7	15	4.3
7	I use Facebook for teaching-learning	25	7.2	323	92.8
8	I shared video materials using Youtube	200	57.5	148	42.5
9	I give home-works through emails and WhatsApp	329	94.5	19	5.5
10	I use online classes to teach according to the school timetable (regularly)	244	70.1	104	29.9
11	I enjoy using ICT for teaching Mathematics	227	65.2	121	34.8
12	The teaching of mathematics through online mode is preferable to classroom	27	7.8	321	92.2
13	Teaching Mathematics using ICT should be continue to supplement normal classroom teaching even after Covid-19 pandemic	228	65.5	120	34.5
14	Covid-19 pandemic is a barrier for mathematics education	280	80.5	68	19.5

The following were the findings in various aspects of online mathematics learning:

- It was found that still 25.9 per cent of the sample teachers could not carry on online teaching due to connectivity and other issues.
- A majority of 69.8 per cent could take online classes, but still, the remaining 30.2 per cent had to resort to other means.
- It was revealed that slightly more than half of the teachers, 51.4 per cent of the sample teachers, could make use of online apps like Teachmint, Google classrooms and Moodle.
- A minority of the teachers, 34.5 per cent of them used Google Meet to teach, which is a free Internet Application available with good connectivity. It may also be bought and the bought variety carries some packages along with it.
- A slightly lower 31.3 per cent of the teachers used the Zoom application to teach mathematics.
- A solid majority of 95.7 per cent of the teachers use WhatsApp, a free online service, to teach.
- A small 7.2 per cent of the teachers use the Facebook Platform to teach.
- A good 57.5 per cent of the teachers shared teaching videos through YouTube.
- Another resounding majority of 94.5 per cent of the teachers give homework through emails and WhatsApp.
- A good but certainly not cent per cent, 70.1 per cent of the teachers could carry on teaching through the online mode regularly.
- A fairly good 65.2 per cent of them enjoyed using ICT to teach during the pandemic, but
- Only 7.8 per cent of them preferred online teaching to offline mode.
- A small majority of 65.5 per cent of the teachers wanted to supplement offline teaching with online mode even when the pandemic is over and online mode will no longer be a necessity.
- A large 80.5 per cent of the teachers thought that Covid-19 is a huge barrier to the teaching of mathematics.

Discussion

While it was perfectly acceptable and even accepted that the majority of the teachers could make use of various online Apps to teach mathematics, it is worrisome to find 25.9 per cent that still could not make use of the online mode of teaching due to connectivity issues. Although 70.1 per cent of the teachers thought that they could continue classes regularly, a larger 80.5 per cent of them still felt that the Covid-19 pandemic was a huge barrier to the teachings of Mathematics. Indicating that although they could manage online classes, they still preferred offline classes. It was not surprising that only 7.8 per cent of them thought that online mode was better than offline mode. Although 94.5 per cent of them gave homework and assignments through online mode, only 65.2 per cent of them enjoyed using ICT for teaching. This strongly supports the fact that knowledge is not necessarily meant for learning and enjoyment, due to a lack of ICT knowledge. A small majority of 65.5 per cent were of the opinion that online teaching should be used as a supplement to offline teaching, many persons in this group belong to the ones who were of the opinion that Covid-19 is a barrier to the teachings of Mathematics. All of these responses point to the fact that the majority of the teachers, even though they could carry on online teachings, still preferred the traditional classroom teachings and do not consider the online mode of teaching as worthwhile, if the situation did not demand it.

Findings regarding teachers' opinion of students learning through ICT during Covid-19 pandemic

The third dimension in the present study covered students who are the most important judges to find out the effectiveness of ICT in the teaching of mathematics.

Table-3: Effectiveness of ICT in the teaching of mathematics

SI No		YES		NO	
		No.	%	No.	%
	Students' ability to use ICT				
1	All my students can access to internet facility	154	44.3	194	55.7
2	All students have at least one mobile phone at home for attending online classes	226	64.9	122	35.1
3	All students know how to use emails, WhatsApp and online classes	251	72.1	97	27.9
4	All students attend online classes regularly	140	40.2	208	59.8
5	No student has a problem with online classes	93	26.7	255	73.3
6	Students' achievements have gone up after online teaching (looking at term exams)	137	39.4	211	60.6
7	Students feel it difficult to understand by teaching mathematics through the internet	298	85.6	50	14.4
8	Students prefer online classes to offline classes	107	30.7	241	69.3
9	There is no difference in the achievement of students before and after online teaching	59	17	289	83
10	Students enjoy ICT-enhanced teaching aids even in offline classes	239	68.7	109	31.3

The following are the findings:

- A slight minority of 44.3 per cent of the teachers felt that all their students could access the internet and a larger section believed the opposite.
- Teachers revealed that 35.1 per cent of their students could not access online teaching due to the unavailability of at least one mobile phone at home.
- A large 72.1 per cent of them thought that students knew how to use emails, WhatsApp and online classes.
- Only 40.2 per cent revealed that students attended the online classes regularly.
- A small 26.7 per cent of them thought students did not have a problem with online classes.
- Looking at term examination results, only 39.4 per cent of the teachers were of the idea that students achieved better with online teaching.
- A large 85.6 per cent of them could opine that students did not respond well to the information given through the internet.

- Surprisingly enough, 30.7 per cent of the teachers still believed that students preferred online teaching to offline teaching.
- Nearly half of the teachers, i.e., 40.2 per cent of them believed that students' achievement improved after online classes.
- A huge majority of the teachers 83 per cent indicated that online and offline teaching modes did not have much of a difference on students' performance.
- Yet, 68.7 per cent of the teachers indicated that students enjoyed teaching through ICT.

Discussion

Teachers themselves felt that less than half of the students have good internet facilities. There are still 35.1 per cent of students who do not have at least one mobile phone at home. This meant that these students had to either blindly study on their own or go to their friends who have mobile and internet connectivity when classes were carried out. It did not take deep thinking to deduce that this was the situation in most rural areas where parents are at lower economic levels and internet connectivity is low and weak. It was 30.7 per cent of the teachers' opinion that students preferred online to offline classes. But the larger 69.3 per cent of the students were not in favour of it. Keeping in mind that nearly 35.1 per cent of them do not have a mobile phone at home, it was natural for this group of students to prefer offline teachings to online teachings. Since online classes were necessitated by the pandemic, it was inevitable, but it was clear that 73.3 per cent of the students, even among the ones who have good connectivity, have a problem with online classes. The students' achievement, looking at their examination marks, however, did not indicate any downward or upward change because of online classes. It was

surprising, looking at their opinion in other questions, that 39.4 per cent of them felt that students' achievement improved after online classes. And students also enjoyed ICT-enhanced classes according to teachings in line. The only thing was that they did not want it to replace offline teaching. About 85.6 per cent of the Mathematics teachers could see that their students did not understand Mathematics through the internet.

Conclusion

It was a rewarding endeavour to undertake a study that could reveal the situation of Mizoram when it came to the effectiveness of online Mathematics teaching and learning through ICT. It was clear that technology development in the state was not at par with the needs of the situation. Moreover, the disparity was seen among rural and urban schools when it came to the availability of facilities (Biswas & Rahaman, 2021). However, it was seen that, even in an amenable situation, teachers themselves were not wholly convinced about the use of ICT to teach, although a small percentage of them felt that students fared better after online teaching was initiated. Teachers have varying opinions regarding their compatibility with ICT. Some of them could even make their e-content while others did not even own their own computer, clearly indicating that ICT training has not reached 100 per cent of the teachers (Singh et al., 2021). It was felt that teachers themselves understood rather little about the many applications of ICT. Since this was the situation, it would be good if all teachers, regardless of their localities, were given training in ICT along with proper incentives to induce teachers to undergo training (Mishra et al., 2020). Since ICT is going to gain importance each day, it is important that students must not get disoriented when they

come to the world of work. Students should make ready to compete with the rest of the world and bring up the state of our nation to a situation where there will be a constant flow between technology and education as visualised by the National Education Policy 2020 itself.

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Teacher Satisfaction with Online Teaching: An Exploration of the Role of Social support

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Abstract

The present study aimed to investigate the relationship between Burnout, Social supportwith Job satisfaction of high school teachers in the context of online teaching and to identify the best predictor of Job satisfaction. The study was done on 77 high school teachers (39 females, 38 males) who have been using online teaching methods for the last 6 months and belong to the age range of 22-50 years. Following a survey research design, measures of Burnout, Social support, and Job satisfaction were taken using the Maslach Burnout inventory (1981), Multidimensional scale of perceived social support (Zimet, Dahle, Zimet & Farley, 1988) and Job Satisfaction scale (Dixit, 1993), respectively. Data analysis using Pearson's correlation method suggested significant moderate negative correlation between Burnout and Job satisfaction and a moderate positive correlation between Social support and Job satisfaction. Results of multiple regression analysis revealed a significant contribution of Social support as well as burnout in influencing Job satisfaction (43 per cent). Social support emerged as the most significant predictor of Job satisfaction. Practical implications of the findings are discussed.

Keywords: Burnout, job satisfaction, social support, online teaching

Introduction

Learning and teaching methodologies have undergone tremendous changes with the advent of the COVID-19 pandemic. Online teaching became inevitable in India in a situation when the Government introduced lockdown with all educational institutions closed and there was no opportunity for teachers or students to be physically present in classroom settings. The sudden shift from the traditional mode of teaching to the not much familiar technological mode has been challenging for both teachers and students. Researchers and educationalists across the world have been trying to understand the effectiveness of different methods of online learning and teaching (Joshi, Vinay, & Bhaskar, 2020). So, the impact it has on students and teachers has also been a matter of discussion among educationists (Varanasi, Vashistha, Kizilcec & Dell, 2020). Most of the teachers were new to the technical aspects of using the online mode of teaching though they have been exposed to the internet tools. So, teachers have reported a lack of experience in online teaching, difficulty in communicating with students in the online mode, getting their attention, eliciting responses from them, and poor academic performance of students as causing difficulty in online teaching (Ma, Chutiyami, Zhang,

& Nicoll, 2021). Certain other studies have indicated that the non-availability of the internet and devices, speed of internet connection, and poor student motivation were the major challenges teachers encounter (Rana & Kumari, 2021). Certainly, a drastic shift to a new model of teaching and learning will pose difficulties, mostly for teachers who were forced to use the new system (Singh, Gupta, & Yadav, 2021). There are instances in which such difficulties result in burnout.

The term 'burnout' has originated from the writings of Freudenberger (1974) when he studied professionals mostly in healthcare settings, which was further elaborated by Maslach (1978) who operationalized burnout to have three dimensions, viz., Emotional exhaustion, Depersonalization and Personal accomplishment (Maslach, Schaufeli & Leiter, 2001). Maslach perceives that burnout tends to occur in people in any kind of profession which results from their belief of not being able to make a positive change in the system and feeling emotionally drained due to the working conditions. Emotional exhaustion is a state in which a person realises that he has no more resources available to deal with stressful situations. Depersonalization involves a situation when a person turns cynical and develops a negative approach towards people. Poor Personal accomplishment develops out of feelings of work dissatisfaction.

Studies have been conducted in the past which have identified increased burnout in teachers, mostly attributed to a greater number of students to be managed in online classrooms (Jurjević, Đuranović, & Olčar, 2021). Teachers pursuing online instruction tend to experience average levels of emotional exhaustion, a high degree of depersonalization and a low level of personal accomplishment (Hogan & McKnight, 2007). A recent survey conducted among school teachers in India has identified 13 per cent of them as experiencing high levels of work stress and 66 per cent having moderate levels resulting in burnout (Kumawat, 2020). Burnout can be one of the outcomes of excessive work stress which may have adverse effects on not only teacher productivity but also on the physical and mental health of teachers (Roeser et al, 2013). So, researchers in the past have identified that increased burnout can result in low job satisfaction (Domitrivich et al, 2016). The term `Job satisfaction' was first utilized by Hoppock in 1935, referring to a combination of psychological, physiological and environmental circumstances that make a person feel satisfied with his job. Teachers with high levels of stress were found to exhibit lower levels of job satisfaction.

Burnout has been identified as leading to low job performance thereby affecting productivity. Emotional exhaustion has been identified as one of the components of burnout and that which is related to professional stress (Freudenberger, 1974). Psychologists have tried to address the issue of burnout among professionals and most have focussed on charting interventions intended to increase the coping ability of people. It is in this context that we think of measures to reduce stress, and social support has been identified as a key resource which enables one to deal with stress. Social support has been assumed as having a moderating effect on the experience of stress. Social support can be defined as the supportive interactions or exchanges of resources between people in both formal and informal relationships (House, Umberson, & Landis, 1981). This involves providing emotional support, instrumental support, appraisal support, and informational support. Social support is considered as an external resource which helps

the employees to balance work and family roles because it gives them extra time, energy, and contentment (Ten Brummelhuis et al., 2012). Employees then have enough personal resources to deal with their family demands, thereby preventing those demands from obstructing performance at work. Individuals possessing greater social support are generally found to have better physical and mental health. Similar studies on the relationship between burnout and social support have led us to believe that the latter can have a positive effect on burn out (Fiorilli, Gabola, Pepe, Meylan, Curchod-Ruedi, Albanese, & Doudin (2015).

Significance of the study

A review of extant literature available suggests that burnout is an inevitable result of excessive demands placed on individuals owing to the nature of the job as well as the resources individuals possess in meeting those demands. In the context of online teaching and learning, it is undeniable that the shift to a new system of teaching poses several challenges to teachers. Teachers tend to experience considerable levels of burnout and meeting the demands of work can be challenging which can result in job dissatisfaction. Factors such as social support have been identified in previous studies as acting as buffers in reducing burnout and dissatisfaction. This concern is more relevant, especially in the context in which the entire teaching-learning process has shifted to the online mode and teachers are adapting to the 'new normal'. The challenges placed on teachers are manifold in this respect. Though relevant research has been done in this area in the Western culture, very few studies have tried to understand the most important predictor among them, especially in the Indian context. The present study was therefore undertaken to identify

the influence played by Social support beyond Burnout, if any, in influencing Job satisfaction.

Objectives

1. To understand the nature and extent of the correlation between Burnout, Social support, and Job satisfaction.

2. To find out the most important predictor of Job satisfaction among the variables of Burnout and Social support.

Hypotheses

The following hypotheses were proposed:-

1. There will be no significant negative relationship between Burnout and Job satisfaction.
2. There will be no significant relationship between Social support and Job satisfaction.
3. There will be no significant relationship between Social support and Burnout.
4. There will be no significant predictive relationship between Burnout and Job satisfaction.
5. There will be no significant predictive relationship between Social support and Job satisfaction.

Operational definition of variables

Burnout is a state in which a person becomes exhausted in all aspects of physical and emotional well-being and feels that he or she is overwhelmed, emotionally drained and unable to meet the constant demands of a job.
Job satisfaction is the extent to which an individual feels self- motivated, and satisfied in terms of the intrinsic and extrinsic aspects of a job.
Social support is defined in terms of the supportive network an individual perceives as received from family, friends, and significant others.

Method

Participants

The participants in the study consisted of 77 teachers (39 females and 38 males), teaching in high school classes, and working in different schools (both CBSE and State syllabus) in the Idukki district in Kerala. The age range of the participants was from 21 to 50 years. Teachers with significant psychological issues were excluded from the study as it could be an extraneous variable which may unduly influence the outcome variable. Only teachers who had at least two years of teaching experience and using an online method of teaching for the past 6 months were included in the study.

Research design

The present study followed a descriptive survey research design with data collection following the appropriate steps.

Measures

The following measures were used for data collection:-

1. Personal information schedule

   The information related to socio-demographic variables of the participants was collected using the information schedule developed by the investigators.

2. Maslach Burnout inventory

   The scale developed by Maslach and Jackson (1981) was used to get a measure of burnout. It is a 22-item scale with a 7-point rating of responses varying from very mild (0) to very strong (7). It assesses three dimensions of job burnout, viz., emotional exhaustion, depersonalization, and personalization accomplishment which are independent of each other. High scores on emotional exhaustion and depersonalization and low scores on personal accomplishment are indicative of high burnout. The test-retest reliability scores range from .6 to .82. The concurrent and construct validity of the scale have also been established.

3. Job satisfaction scale

   The test developed by Dixit (1993) was used to assess participants' job satisfaction. It consists of 52 items with a five-point scale rating, meant to assess different dimensions, viz., the Intrinsic aspect of job, Salary, promotion avenues and service conditions, Physical facilities, Institutional plans, and policies, Satisfaction with authorities, Satisfaction with social status and family welfare, Rapport with students and Relationship with co-workers. A high score on the scale indicates greater job satisfaction and vice-versa. The scale has split-half reliability of .92 and test-retest reliability of .86.

4. Multidimensional scale of perceived social support

   The Multidimensional Scale of Perceived Social Support (Zimet, Dahle, Zimet & Farley, 1988) was used to assess social support. The scale consists of 12 items which measure perceived social support from three different sources namely, family, friends, and significant others. Each dimension includes four items with a range of answers from strongly disagree (1) to strongly agree (7). The total scores on the scale range from 12 to 84. The scale shows high reliability of 0.91 with a reliability of 0.94, 0.90 and 0.95 for friends, family, and significant others, respectively. The scale has both construct and concurrent validity.

Procedure

The data was collected using the measuring instruments. Prior permission from Heads of Schools was obtained and consent was taken from teachers regarding their willingness to participate in the research. The participants were assured confidentiality and anonymity of responses and that it was explained to them that the data collected would be used for research purposes only. Data was collected from those teachers who consented to participate.

Data analysis

The collected data were subjected to statistical analysis using SPSS 21. The data was checked to find out whether the assumptions of normality were met. Descriptive statistics were obtained following which Karl Pearson's method of correlation was employed to identify the relationship among the variables under study. To understand the predictive properties of the variables, multiple linear regression analysis was used with the variables, viz., Emotional exhaustion, Depersonalization, Personal accomplishment, and Social support as predictor variables and Job satisfaction as the outcome variable.

Results

The results obtained are presented in the following sections. The scores obtained in the study variables were examined for the whole group of participants and it was identified that 66 per cent of teachers experienced at least a moderate degree of Emotional exhaustion and 92 per cent experienced a high level of depersonalization. It should also be noted that 54 per cent of teachers had feelings of Personal accomplishment while nearly 81 per cent of participants experienced a high level of social support. The mean score obtained in Job satisfaction also indicates that almost all the participants had at least a moderate level of Job satisfaction. Similar results have been obtained in recent studies (Hogan & McKnight, 2007).

Descriptive statistics and Correlations

Table 1 presents the descriptive statistics (Means, Standard Deviations, Minimum and maximum values) and correlations of the study variables.

Table-1: Means, Standard deviations and correlations for the study variables

Variables	Mean	SD	1	2	3	4
Emotional Exhaustion	25.38	8.654				
Depersonalization	16.21	4.908	.768**			
Personal accomplishment	33.55	6.290	.395**	.440**		
Social support	68.61	10.784	-.413**	-.366**	-.025	
Job satisfaction	212.69	23.884	-.452**	-.310**	.098	.562**

The first hypothesis was intended to identify whether there exists a negative correlation between Burnout and Job satisfaction. The results of Pearson's correlation suggest a moderate negative correlation between the variables (Table 1).

The second hypothesis was meant to understand the relationship between Social support and Job satisfaction and a moderate positive correlation was found between the variables.

Similarly, the third hypothesis assumed to test whether there is a negative relationship between social support and burnout and the result was found to be statistically significant and the variables were negatively correlated.

Results of multiple regression analysis

Since the bivariate analysis of the data using Pearson's correlation method revealed a significant correlation of variables to Job satisfaction, an effort was taken to identify the best variables which could predict Job satisfaction after taking into consideration the inter-correlation among the variables (Hypotheses 4 and 5). Multiple regression analysis was used for this purpose and hence the data was analyzed with Job satisfaction as the outcome variable and Emotional exhaustion, Depersonalization, Personal accomplishment and Social support as predictor variables. The results obtained are presented in table 2.

Table-2: Results of regression analysis done with job satisfaction as outcome variable (N=77)

Predictor variables	R	R square	R square change	Unstandardized coefficients		Standardized coefficients	t	Sig.
				B	Std. error	Beta		
Constant				127.339	14.693		8.667	.000
Social support	.562	.315	.315	1.244	.212	.562	5.879	.000
Emotional exhaustion	.612	.374	.059	-.734	.279	-.266	-2.634	.010
Personal accomplishment	.656	.430	.056	.989	.370	.260	2.670	.009

It may be seen from the table that the final regression equation contains three variables, namely social support, emotional exhaustion and personal accomplishment. These variables together could account for 43 per cent of variance in job satisfaction. About 31.5 per cent of the variance in job satisfaction could be accounted for by social support and 5.9 per cent of additional variance could be explained by emotional exhaustion while the remaining 5.6 per cent is attributed to personal accomplishment. Depersonalization, one of the variables of Burnout, was found to be removed from the regression equation and was not found to be a significant predictor of job satisfaction.

Discussion

The present study examined the nature of the relationship between the variables of Burnout, viz., Emotional

exhaustion, Depersonalization, Personal accomplishment and Social support with Job satisfaction. On examining the results, it could be concluded that there exists a moderate negative relationship between Emotional exhaustion and Job satisfaction. Similar was the case with the relationship between Depersonalization and job satisfaction. Social support was found to be positively correlated with Job satisfaction. Social support was found to have the highest correlations with job satisfaction when compared to other predictor variables. Social support was also found to have a negative relationship with Emotional exhaustion and Depersonalization, while it was not found to have any relationship with Personal accomplishment.

Burnout occurs when an individual feels that he or she is overwhelmed, emotionally drained and unable to meet the constant demands of a job. The participant teachers were found to experience a high level of emotional exhaustion which was negatively related to job satisfaction. The demands placed by online teaching may result in the emotional drain, thereby affecting one's sense of contentment with his job. Similar findings were reported by some researchers (Koustelios & Tsigilis, 2005) who found that intrinsic aspects of job satisfaction seemed to correlate stronger to burnout than the extrinsic factors. On the other hand, the participant teachers in the present study were found to have a higher sense of personal accomplishment.

Job satisfaction happens when individuals feel that they have a stable job and career growth. The present study group was found to have a moderate to a high level of job satisfaction. A high level of sense of personal accomplishment was also found to be positively related to job satisfaction. Similarly, when people have a very good amount of social support, they get motivated to achieve different and difficult goals in their lives. Online classes must become a necessity during this pandemic period. Teachers need a great deal of support from their family and friends so that they could handle their daily household chores while managing stress in their professional life. It is also important that some teachers lack knowledge on the technical side and hence need assistance to carry out the tasks assigned to them. The hypothesis that there will be no significant relationship between Social support and Job satisfaction is rejected. Similar findings were reported by Kumar (2015) that better Social support results in higher job satisfaction.

The identification of social support as the most important predictor variable in the present study reiterates the significance of the support system in influencing Job satisfaction. It was observed that lower levels of emotional exhaustion and depersonalization combined with higher levels of social support can result in greater Job satisfaction. It was also found that there was no correlation between personal accomplishment and social support, while a moderate relationship was seen between Social support and emotional exhaustion as well as depersonalization. Greater social support may be related to a lesser degree of Burnout. The size of the personal support network was positively related to personal achievement. When people have an adequate amount of social support, they feel self-motivated. Recognition and rewards from the institution can increase job satisfaction in teachers. Teachers need external support during this pandemic period in particular as teaching in the online mode is the only option available to them and hence they need to manage whatever difficulties are encountered. Some teachers may find it difficult to cope with the new technologies and therefore, it is necessary that those around provide assistance whenever they need any help.

Conclusions and Implications

It was identified in the present study that a lesser degree of Emotional exhaustion and Depersonalization along with greater Social support predicts Job satisfaction. The participant teachers were found to experience Emotional exhaustion, as well as Depersonalization while a large majority tends to have high levels of personal accomplishment. They were also found to have a moderate level of Social support and Job satisfaction. Social support was found to emerge as the most significant predictor of Job satisfaction. Hence, it may be assumed that the increased Social support available to teachers may help them to ease out the negative effects of work stress related to online teaching. Though the specific factors that contribute to Burnout could not be explored in the present study, it was identified that teachers experience considerable Burnout. Further studies could therefore focus on identifying the specific variables contributing to increased Emotional exhaustion and Depersonalization. The greater sense of Personal accomplishment perceived by teachers is a positive aspect identified in the present study. However it was not identified as a predictor of Job satisfaction. Studies in the future can focus on finding out the moderating effect of Social support on the relationship between Burnout and Job satisfaction. The findings of the study indicate the need to build awareness among families and school administration to provide support for teachers during the days of online teaching. The positive effect of Social support identified in the present study could be further utilized by developing intervention strategies focussing on enhancing support systems available to individuals in the context of family and close relationships.

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Online Education during COVID-19 in Punjab: A Study on Perception of Teachers

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Abstract

The closure of various educational institutions during the Covid-19 Pandemic resulted in an unplanned shift from the offline mode to the online mode of education. This shift created various perceptions amongst teachers as well as students. In this context, the present study aims to explore the perceptions of teachers regarding this transition. The teachers from various educational institutes of Punjab i.e. from schools, colleges and universities, were asked to give their opinion on the online teaching-learning practice. The structured questionnaire was framed and administered through Google form and drawn online on 250 teachers of Punjab during the period from 13-31 January 2021 (more than two weeks), using a snowball sampling technique. The present study deployed descriptive statistics and factor analysis. .The positive factors that impacted this transition were teacher's characteristics, technical support from institutions, a supportive educational environment for students, social support, and a life-long learning process. The challenges faced by teachers are hedonic motivation, personal problems, and technical problems. The paper outlined that teachers preferred the regular and blended mode of education instead of the entire online system due to various constraints.

Keywords: Covid-19, Teacher's Perception, Cross-Sectional Data, Factor Analysis, Online Education

Introduction

During the Covid-19 pandemic, the whole world is disturbed. The pandemic was unexpected and forced the world towards a sudden and disruptive transformation. Academics also faced huge difficulties and the massive transformation worldwide during the Covid-19 outbreak from face-to-face learning to online teaching platforms. Consequently, online teaching-learning practice has taken a surge without which the education system would have become ineffective and could collapse. One of the main priorities of the education system is to provide flawless education to the students. The government does not want to make any compromise with the study of students whether they belong to elementary or higher-level education. These circumstances pushed the classroom teaching of the whole world towards the online/virtual classrooms along with challenges.

Since March 2020, everything was shut down for a long time due to lockdown; the only feasible and viable solution to the problem was online education. Technology plays an important role in it. The technology-based teaching-learning process has started a revolution in the field of education with manifestation in reality. Although online learning was not a new phenomenon, it was not adopted formally hitherto. This sudden

transformation from regular classes to online education put an impact on both the teachers and students. It requires consistent efforts on the part of both. Imparting education in the digital mode has many advantages as it is free from physical boundaries, cost-effective, flexible, and has more retention power (Sareen and Nangia, 2020). But online teaching is not free from problems and its challenges and limitations. These problems are internet connectivity, increased work, complexity, accessibility, and monitoring of the student's progress (Thomas, 2020).

In the light of this scenario, an attempt has been made to study the impact of Covid-19 on education. Teachers are the key drivers; who are engaged in building the future of the students. The present paper studies both qualitative and quantitative approaches which help in analysing the perception of teachers on sudden online shifts in teaching-learning practice. For this purpose, an online survey (Google Form) was conducted to study the opinion, perceptions, and challenges faced by the teachers during this period. A total number of 250 teachers from various educational institutions have participated in this online survey.

Objectives of the Study: In this light of the above-mentioned details, the objectives of the study are:

- To study the various modes of online teaching-learning adopted by teachers during the Covid-19 pandemic.

- To study the perceptions of teachers on this sudden shift to online/virtual classes.

Basic Framework and Data

Design of the Present Study:

The teachers of Punjab from various educational institutions, i.e. from schools, colleges and universities, were asked to give their perception of online teaching-learning practice.

Sample of the Study:

The structured questionnaire was framed and administered through Google form and drawn online on 250 teachers of Punjab during 13-31 January 2021 (more than two weeks), using a snowball sampling technique.

Tools of the Study:

The questionnaire consisted of Open-Ended and Closed-Ended questions. The questionnaire consists of the socio-demographic details of the teachers, the information related to the teaching-learning tools used, types of devices, internet platforms used by teachers, and duration of classes. The next section of the questionnaire delineated the respondents' perception of virtual classes. For this purpose, all the statements were measured using a Five Point Likert Scale. A Five-Point Likert continuum was used to rate the statements on the scale of strongly agree, agree, neutral, disagree, and strongly disagree (Malhotra et. al., 2006). The teacher's opinions and perceptions were sought on 24 statements about the sudden change from regular classes to virtual classes due to the pandemic.

Methods of the Study:

The data were transcribed through a deductive encoding-decoding method and analyzed with the help of SPSS software. The data collected were analysed by employing descriptive statistics and factor analysis.

Descriptive Statistics: The percentage analysis of the socio-demographic profile of respondents and online platforms and tools used by respondents was done.

Cronbach's Alpha: The reliability

of the statements was checked by employing Cronbach's Alpha Method. Cronbach's alpha is a coefficient of internal consistency or reliability check (Cronbach, 1951). In the present study, Cronbach's alpha is calculated as follows:

$$\alpha = \frac{n_{24}.\underline{x}}{\underline{v} + (n_{24} - 1).\underline{x}}$$

Here, α is Cronbach's alpha;
n is the number of statements;

$\underline{x}$ is the average covariance between statements-pair;

$\underline{V}$ is average variance.

Factor Analysis: The participants were asked to rate the 24 statements on a Five Point Likert-Continuum. To extract the factors from these statements, Factor Analysis statistical technique was adopted. Factor Analysis is a method to explore the factors from the mentioned number of statements/variables (Malhotra et. al., 2006). The detailed model of factor analysis of the present study is as follows:

$$X_1 = ß_{1(0)} + ß_{1(1)}F_1 + ß_{1(2)}F_2 + \text{----------} ß_{1(8)}F_8 + e_1$$

$$X_2 = ß_{2(0)} + ß_{2(1)}F_1 + ß_{2(2)}F_2 + \text{----------} ß_{2(8)}F_8 + e_2$$

$$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$$

$$X_{24} = ß_{24(0)} + ß_{24(1)}F_1 + ß_{24(2)}F_2 + \text{--------} ß_{24(8)}F_8 + -e_8$$

Here, $X_1, X_2, \dots X_{24}$ are the 24 statements asked from the teachers.

$F_1, F_2, \dots F_8$ are the 8 components extracted.

$ß_{12}$ is the loading of variable X_1 on factor F_2.

$e_1, e_2,$ and e_8 are the error terms, present to indicate that the hypothesized relationships are not accurate.

Ethics Approval:

Informed consent was obtained from the respondents. The respondents were informed about the aims and implications of the study. The respondents were assured of confidentiality, security, and anonymity of information. The response rate of the respondents was 100 per cent and only one response was obtained from the participants to avoid duplication. No payment or reward was provided to any of the respondents.

Results and Discussion

This section explains the results of the present study based on details obtained from the 250 questionnaires surveyed. The data were encoded-decoded first and then it was analyzed using SPSS version 21. The results related to each section are explained below separately.

Table-1: Socio-Demographic Profile of Teachers

Demographic Details	Frequency	Percent
Age-Groups		
20-30 years	32	12.8
30-40 years	136	54.4
40 years & Above	82	32.8
Gender		
Male	85	34.0
Female	165	66.0
Qualification		
Diploma	2	0.8
Bachelor's Degree	16	6.4
Master's Degree	140	56.0
Ph. D.	92	36.8
Classes Taught		
Grade1-Grade 12	53	21.0
Diploma	55	22.0
Bachelors and Masters	142	57.0
Teaching Experience		
Less than 5 Years	145	58.0
5-10 Years	61	24.4
10-15 Years	12	4.8
More than 15 Years	32	12.8
Type of Educational Institution		
Pre-Primary and Primary Schools	0	0
Secondary and Higher Schools	63	25.2
Colleges	163	65.2
Universities	24	9.6
Total	**250**	**100.0**

Source: Computed from Primary Data

Table-1 portrays the socio-demographic profile of the teachers of Punjab. This section is devoted to the personal information of the sampled respondents regarding their age, gender, qualification, classes taught, number of years they taught along with the type of educational institutions. Most of the respondents, i.e. 136 (54.4 per cent) teachers were in the age group of 30-40 years, 82 (32. 8 per cent) teachers were in the age group of 40 and above category and 32 (12.8 per cent) teachers were in the 20-30 years age group. Among the participants, 165 (66 per cent) teachers were female and 85 (34 per cent) respondents were male. The majority of the teachers (56 per

cent) have post-graduate qualifications, followed by 36.8 per cent who have a doctorate, 6.4 per cent have bachelor's degree and 0.8 per cent have done diploma courses.

It is clear from Table-1 that approximately 57 per cent of faculty members have the experience to teach bachelor's and master's degree classes; 21 per cent and 22 per cent of the faculty respondents have taught Class 1 to Class 12 and diploma classes respectively. The faculty respondents (58 per cent) have teaching experience of fewer than 5 years, 24.4 per cent have teaching experience of 5-10 years, 4.8 per cent have 10-15 years experience and 12.8 per cent of teachers have more than 15 years of teaching experience. The results of the survey analysis showed that around 9.6 per cent of the faculty had come from the different departments of the universities. About 65 per cent of the teachers were from the colleges, and approximately 25 per cent of teachers were from the secondary and higher secondary schools.

Table-2: Accessibility of technology by the Respondents

	Frequency	Percent
Preference of the Teachers		
Online Teaching	96	38.4
Regular Teaching	154	61.6
Devices Used		
Smartphone	112	44.8
Tablet	17	6.8
Laptop	121	48.4
Online Platforms		
Zoom	84	33.6
Google Classroom	49	19.6
You tube	24	9.6
Webex	15	6.0
Whatsapp	66	26.4
Cisco	12	4.8
Duration of Classes		
<1 hr/day	104	41.6
1-2 hr/day	58	23.2
2-4 hr/day	69	27.6
>4 hr/day	19	7.6
Teaching-Learning Tools		
Live Video Conferencing Tool	95	38.0
Social Media Live Streaming	26	10.4
Social Media Without Live Streaming	18	7.2
Audio Recorded Presentation	15	6.0

Online Teaching-Learning Apps	37	14.8
Videos made by Teachers	42	16.8
E-Platform owned by Institutions	17	6.8

The findings of the survey given in Table-2 indicate that 61.6 per cent of the teachers preferred face-to-face interactive classes and 38.4 per cent of faculty members favoured online classes. The majority of the participants (48.4 per cent) used their laptops to teach, 44.8 per cent of faculty used their smartphones to take classes and 6.8 per cent of teachers used tablets to take online classes. It is clear from Table-2 that the majority of the faculty (33.6 per cent) used Zoom application, followed by WhatsApp (26.4 per cent), Google Classroom (19.6 per cent), YouTube (9.6 per cent), Webex (6 per cent) and Cisco (4.8 per cent) for imparting education amongst students. About 42 per cent of the respondents took classes for less than 1 hr/day, 23.2 per cent of teachers 1-2 hr/day, 27.6 per cent of faculty took classes for 2-4 hr/day and 7.6 per cent of teachers took more than 4 hr/day classes as depicted in Table 2.

Several teaching-learning tools were adopted by the faculty to disseminate the knowledge to students as shown in Table 2. The results of the survey, as shown in Table 2 reveal that among the various tools, around 38 per cent of the teachers used live video conference tools to teach the students. About 16.8 per cent prepare videos first and send them to students and 14.8 per cent of the teachers use online teaching-learning apps respectively to impart the knowledge. Further, 10.4 per cent and 7.2 per cent of the teachers mentioned that they used social media live streaming and live streaming methods respectively to teach students. Audio recorded presentations (6.0 per cent) and methods of e-platforms owned by the educational institutions (6.8 per cent) were adopted by the teachers.

Table-3: Cronbach's Alpha Reliability Statistics

Cronbach's Alpha Coefficient	No. of Items
0.8778	24

In the present study, the Cronbach Alpha coefficient was used to check the internal consistency/reliability of the statements asked in the questionnaire. Table-3 indicates that 24 statements had the value of overall Cronbach Alpha coefficient of 0.8778, indicating good reliability.

Table-4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.857
Bartlett's Test of Sphericity	Approx. Chi-Square	3628.194
	df	276
	Sig.	0.000

Table-4 shows the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. KMO value of the continuum is 0.857 (df=276, Chi-square=3628.194, Sig.=0.000), with a great structural validity. The values of KMO hovered between 0.8 and 0.9 and are considered to be great to run factor analysis. Bartlett's Test with a p-value of 0.000, is significant (Field, 2009).

Table-5: Total Variance Explained

Compo-nents	Initial Eigen Values		
	Total	% of Variance	Cumulative %
1	5.113	21.303	21.303
2	3.706	15.440	36.743
3	2.060	8.582	45.325
4	1.728	7.201	52.526
5	1.524	6.351	58.877
6	1.281	5.339	64.217
7	1.138	4.744	68.960
8	1.082	4.508	73.400

Source: Computed from Primary Data

Extraction Method: Factor Analysis
After KMO and Bartlett's tests, the next step was to apply factor analysis to afore-mentioned 24 statements. Table-5 displays that Eigen Value is greater than 1 and a total of 8 factors were extracted with the cumulative contribution rate of the variance reaching 77.64 per cent and 22.36 per cent of lost information content.

Table-6: Factor Analysis Results: Rotated Component Matrix

S. No.	Factors	Statements	Factor Loadings
1	Teacher's Characteristics	Availability of teachers to discuss the topic asked by the students	0.791
		You provide well-prepared, precise and summative lectures	0.732
		Easy to interact with students while teaching online	0.794
		Online teaching positively affected your teaching style	0.688
2	Technical Support by Institutions	Institutions provided proper guidance and operative manuals to teachers as well as students	0.611
		Proper Infrastructure provided by the institutions	0.587
		Institutions provide online portals to access materials	0.512

3	Supportive educational environment for students	Virtual presentations increase the learning of students	0.562
		Online classes reduce financial costs	0.467
		Students can attend online classes from any location	0.419
4	Social Support	Social and Physical distancing is possible due to online classes	0.840
		Interactive teaching between teachers and students	0.757
5	Life-long Learning	Acquired new teaching skills	0.824
		Increased Meta-cognitive Skills	0.764
6	Hedonic Motivation	Difficult to motivate Students	0.606
		Difficult to reach students belong to remote areas	0.490
		Difficulty in monitoring the progress of students	0.408
		Difficulty in maintaining discipline	0.372
7	Personal Problems	Require more time to prepare course material	0.841
		Difficult to teach the numerical subjects through the online mode	0.707
		Increased household-related chores	0.676
		Off-campus increased academic work also	0.594
8	Technical Problems	Problems related to internet connectivity	0.603
		Problems related to electricity	0.565

Source: Computed from Primary Data

Notes: Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 11 iterations.

Table-6 reveals that the rotated matrix of factor loadings for each statement is extracted from each rotated factor. In total 24 statements were presented to the respondents for their views/opinions. These statements loaded on 8 key factors and these factors reflected teachers' characteristics, technical support by institutions, supportive educational environment for students, social support, lifelong learning hedonic motivation, personal problems, and technical problems during the online teaching-learning process.

Factor 1 has a high coefficient for the statements like availability of teachers to discuss the topic asked by the students, teachers provide well prepared, precise, and summative lectures, easy to interact with students while teaching online, and online teaching positively affected the teaching style. This factor has been labelled as a teacher's characteristics. Verma and Priyamvada (2020) revealed that some faculty members found the virtual process beneficial, and also had positive results. The teachers stated that teaching virtually is much easier on some of the topics, as the content was

presented in a more effective model to the students. Students could revisit the lectures if required.

Factor 2 has high factor loadings for statements like institutions providing proper guidance and operative manuals to teachers as well as students, proper infrastructure provided by the institutions and institutions providing online portals to access materials. Factor 2 was labelled as technical support provided by institutions and the attitude of teachers was positive towards this factor. Bao (2020) highlighted that institutions had been providing adequate support to faculties to impart knowledge during the virtual classes effectively and efficiently. The study also concluded that to improve the teaching-learning process, six institutional strategies must be followed. These strategies included preparation of some contingency plans for unexpected situations, imparting the online classes in smaller units, providing proper infrastructure facilities to teachers as well as students, focusing more on voice clarity, and promoting online as well as offline self-learning among students efficiently.

Factor 3 is named as a supportive educational environment for students, accounting for statements like virtual presentation increases the learning of students, online classes reduce financial costs and students can attend online classes from any location. Lepp et. al. (2021) highlighted those factors like maintaining interactive sessions with students, supporting the students, and discussing potential and practical implications with students in such emergencies by motivating both students and teachers positively.

Social support being Factor 4 has recorded items like social and physical distancing is possible due to online classes and interactive teaching between teachers and students. The

virtual classes made the teaching-learning experience more interesting and enriching for both teachers and students. Online mode is the only means to assure the effective teaching-learning process. During the time of the Covid-19 outbreak, virtual classes served as saviours and valuable additions to the formal education sector (Yagnik and Chandra, 2020).

Factor 5 labelled as life-long learning for teachers and registered the items like acquiring new teaching skills and increased meta-cognitive skills. This sudden online transition impacted the teachers professionally as well as personally in both positive and negative ways. The positive aspects covered the learning of new methods, modes, and platforms to teach students. This transition process increased the ability to plan, monitor, regulate and promote self-regulatory skills among the teachers (Verma and Priyamvada, 2020).

Factor 6 has high factor loadings for items like difficulty to motivate students, difficulty to reach students belonging to remote areas, difficulty in monitoring the progress of students, and difficulty in maintaining discipline among students. Therefore, this factor is labelled as Hedonic Motivation. Students often get bored when e-learning courses consist of long text. The lack of interest of students also affects the feedback in the form of multiple-choice questions as most of the questions are answered wrongly. To safeguard the students from this boredom it is necessary that the online courses should be interactive, dynamic & includes some fun. Mishra et al., (2020) mentioned that lengthy use of interaction virtually impacted both teachers and students. Even students who belonged to remote areas and with low socio-economic ground could not attend online classes because of the unavailability of resources. Some teachers still preferred the traditional method of teaching because

of difficulties regarding maintaining discipline in online classes and following up on the progress of students.

Factor 7 has high loadings for statements, namely requiring more time to prepare course material, difficulty to teach numerical subjects through online mode, increased household-related chores, and increased off-campus academic work. Mainly Personal Problems were considered in this factor. The swivelling from regular classes to virtual classrooms makes the teaching-learning gap more. The resistance to change amongst some of the teachers does not allow them to adapt to the online teaching-learning environment. Sareen and Nangia (2020) also stated that teachers faced many problems while taking online classes. This sudden transformation from regular mode to virtual classes raised many issues like lack of appropriate infrastructure availability, lack of in-service training, lack of knowledge regarding e-resources, and lack of efficacy.

Factor 8 has loaded the items like problems related to internet connectivity and electricity and labelled them as technical problems. When we talk about online learning, technical difficulties cannot be ignored and these difficulties are the main stumbling block in online learning. There are so many issues i.e., operating system, browser, etc. These issues again add to a lack of interest. These issues can be solved by making online learning simple. One should keep in mind that learning does not require a high speed of connectivity. Attention should be paid to sound quality. Sakshi and Sharma (2020) also highlighted that virtual class's created anxiety and stress among teachers and students. Problems related to electricity and network connectivity hampered the flawless teaching-learning process, making the online mode not effective as face-to-face classes.

Thus, the impact of Covid-19 can be seen in the educational system. Virtual teaching is the need of the hour. However, every aspect has its certain merits and demerits. On the one hand, the virtual teaching-learning process did wonders to facilitate the process of imparting education, whereas, on the other hand, there are certain issues such as network connectivity problems, unavailability of resources, and existing infrastructure.

Educational Implications of the Study:

- Issues related to network connectivity create a hurdle in the effective teaching-learning process. It is difficult to reach the students who belong to remote areas. Proper technical, infrastructure support and training should be provided to students as well as teachers.

- It is really difficult to monitor the progress of the students and keep them involved during the teaching-learning process. Real-time monitoring systems should be developed and adapted as may be applicable to different levels.

- Teachers and students should be encouraged and administrators should motivate teachers and students for the proper implementation of online education.

Conclusion

Based on the above discussion, we can conclude that due to this sudden transition the demand for online learning platforms increased significantly. This transition has certain positive results like teaching the concepts more interestingly; enhancing the knowledge regarding online education, saving travelling time and cost, and increasing the meta-cognitive skills. This unplanned and rapid shift toward online learning

had created many challenges for the teachers too. The teachers admitted that lack of equipment and resources, a lack of training among teachers, a lack of social interaction, increased workloads, and also difficulty in explaining certain concepts. Moreover, technological issues also posed many problems. However, we can say that the blended form of education will certainly prove a boon to the education system. This transition promoted the concept of digitization and undoubtedly teachers have learned to live and survive the complexities of online education. Even the Government supported and promoted technology-enabled learning for students so that the disparities that emerged in the education system should be buckled. At last, it can be concluded that we still have to go a long way to change the education system in virtual mode, whereas in the present circumstances, a blended form of education is one of the best options.

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Effectiveness of Instructional Strategy for Teaching Chemistry to VII standard

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Abstract

An experimental study was conducted to study the effectiveness of Instructional Strategy for Teaching Chemistry to VII standard. The instructional strategy consisted of teaching with the Concept Attainment Model (CAM) coupled with multimedia instructions. The objectives of the study were: (i) To study the effectiveness of the instructional strategy in terms of (a) Achievement of students in chemistry, and (b) Reaction of students towards the strategy, (ii) To study the effect of treatment, gender and their interaction on the achievement in chemistry of class VII students, by taking their scores of intelligence as a covariate, (iii) To study the effect of treatment, style of learning and thinking and their interaction on achievement in chemistry of class VII students, by taking their scores of intelligence as a covariate. The sample consisted of 50 students in a school in Bhopal. The random assignment of already formed classes to experimental and control groups was employed to examine the treatment effect. Data was collected by administering the Verbal Intelligence Test, Style of Learning and Thinking inventory and multimedia material of Edurite DigitALly version v.3.6.01 from Pearson Education Services. The Achievement Test in Chemistry and Reaction Scale was developed by the investigator. The findings of the study are: (i) The developed instructional strategy was effective in terms of students' achievement in chemistry,(ii)The developed instructional strategy was effective in terms of students' reactions towards the developed instructional strategy, (iii) The treatment produced a significant differential effect on the achievement of students in chemistry, (iv) Gender did not produce a significant differential effect on the achievement of students in chemistry, (v) The interaction of treatment and gender did not produce a significant differential effect on the achievement of students in chemistry, (vi) There was no significant differential effect of style of learning and thinking on the achievement of students in chemistry, (vii) The interaction of treatment and style of learning and thinking did not produce a significant differential effect on the achievement of students in chemistry.

Keywords: Concept Attainment model, Multimedia instruction, chemistry teaching

Introduction

Chemistry is offered as a school subject across different educational boards in India. The importance of chemistry is evidenced by the many career opportunities it offers in various fields like, medicine, engineering, pharmaceuticals, cosmetics, etc.

Therefore, a sound understanding of the various concepts in the subject is very essential for understanding how things work in our day-to-day life.

This further leads to the important issue of pedagogy of chemistry. Over the years it has been observed globally that students have performed satisfactorily in the examinations, but when interviewed revealed gross misconceptions regarding the chemical phenomena. Hence, there is a need for

a change in instructional strategy to achieve the desired learning outcomes at various school levels.

The instructional strategy consisted of teaching with the Concept Attainment Model (CAM) coupled with multimedia instructions.

Concept Attainment Model (CAM)

This model of teaching was developed by Jerome Bruner and his associates Jacqueline Goodrow and George Austin. Concepts are the building blocks of knowledge. Concept Attainment is "the search for and listing of attributes that can be used to distinguish exemplars from non- exemplars of various categories."(Bruner, Goodrow and Austin, 1967). In this study, the Reception Strategy of the model was used. The students were exposed to positive and negative examples and they identified the common characteristics (attributes) and hypothesized.

Multimedia

Multimedia is a combination of many types of media including audio, video, text, pictures, graphs, animation, etc. Educational multimedia offers many advantages when compared to chalk and board classroom teaching. Since more senses are involved it makes learning long-lasting. It provides an enhanced learning experience with attention to the specific needs of the individual (Almarabeh, Amer and Sulieman, 2015). The use of multimedia helps students with different skills and learning styles (Ilhan and Oruc 2016). Therefore, in this study multimedia instructions were also used with the Concept Attainment Model (CAM).

Review of Literature

Several studies carried out in India and abroad show that the Concept Attainment Model (CAM) and teaching through multimedia effect achievement in chemistry. These are effective for the introduction of concept, creation of interest, and motivation in chemistry.

Kaur (2018) found that students of IX standard when taught chemistry through the concept attainment model possessed higher scores on achievement tests developed by the investigator than students who were taught through traditional methods. Similar results were reported by Mahmood (2017) for IX standard science students. Kalani (2008) in a study found that the achievement of students who were taught by the concept attainment model was better than those who were taught by the control method. Sreelekha and Nayar (2004) found that CAM was effective in improving the overall level of achievement in chemistry. Lukopoteea and Narod (2012) reported that the use of CAM had motivated the students, and increased their level of participation during the lessons. The findings also showed that use of the model had enhanced conceptual understanding and helped to improve students' performance on the topic "Periodic Table". It was also found that students were better able to identify the attributes of the concepts when varied resources and strategies were used to present the exemplars and non-exemplars.

Su (2011) studied the processes of the students' chemistry learning, its effectiveness and their attitudes. The result analyses verified that their ICT integrated environmental learning has a more significant effect on the students" learning performance. The results obtained from this ICT integrated environmental learning when compared with other chemical experimental results showed the same positive and scientific perspective for academic research. Morais and Paiva (2007) studied the application of simulations in the teaching-learning

process in science and found that the aspects considered by pupils to be positive in the study of chemistry using digital resources were: it was less difficult to learn; they understood the content more fully (since the resources can be seen and used again) and the use of images and audio helped them in their understanding and led them to be more attentive.

It is not easy to conclude whether gender influences achievement in chemistry or not. The studies done by Veloo, Hong and Lee (2015), Hatice Belge Can (2012), Busolo (2010), Barmby et al. (2008), Cousins, A. (2007) and Chambers & Andre(1997) found that gender produced a significant differential effect on academic achievement as well as achievement in chemistry.

But the studies of Oluwatosin and Josiah (2017), Azizoglu (2004), Dahindsa and Chung (2003) and Demircloglu and Norman (1999) indicate that academic achievement and achievement in chemistry is independent of gender.
Similarly, mixed results were found in studies related to learning styles on academic achievement and achievement in chemistry. The studies done by Yilmaz-soylu and Akkoyunlu (2002) and Wilson (2011), show that the type of the learning style was not significantly effective on students' achievement. However, the studies of Vaishnav (2013) and Uzuntiryaki (2007) show that there was a statistically significant difference among students with different learning styles concerning academic achievement and achievement in chemistry.

Delimitations of the study

The study was conducted under the following constraints:

- The study is delimited to an English Medium, co-ed school of Bhopal only.

- The study is delimited to the subject of chemistry.

- The study is delimited to students of VII standard studying in ICSE Board.

Objectives of the study

1. To study the effectiveness of the instructional strategy in terms of
   a) Achievement of students in chemistry, and
   b) Reaction of students towards the strategy.

2. To study the effect of treatment, gender and their interaction on the achievement in chemistry of class VII students, by taking their scores of intelligence as a covariate.

3. To study the effect of treatment, style of learning and thinking and their interaction on achievement in chemistry of class VII students, by taking their scores of intelligence as a covariate.

Hypotheses

1. There is no significant effect of treatment on the achievement in chemistry of class VII students when their scores of intelligence were taken as covariate.

2. There is no significant effect of gender on the achievement in chemistry of class VII students when their scores of intelligence were taken as covariate.

3. There is no significant interaction of treatment and gender on the achievement in chemistry of class VII students when their scores of intelligence were taken as covariate

4. There is no significant effect of style of learning and thinking on the achievement in chemistry of class VII students when their scores of intelligence were taken as covariate.

5. There is no significant interaction of treatment and style of learning and thinking on the achievement in chemistry of class VII students when their scores of intelligence were taken as covariate.

Methodology

The experimental method was employed for this study. The design employed for this research work was Post-test Control Group Quasi-Experimental Design. The size of the sample was 50 students studying in VII standard of an English medium school in Bhopal. The random assignment of already formed classes to experimental and control groups was employed to examine the treatment effect.

Tools

The following tools were used in this study:

- Verbal Intelligence Test developed by Ojha and Ray Choudhary.

- Style of Learning and Thinking (SOLAT) developed by Dr. D. Venkatraman.

- The multimedia material of Edurite DigitALly version v.3.6.01 from Pearson Education Services, Board-ICSE, standard–VII, subject –chemistry, topic- Acids, Bases and Salt was used.

- Achievement Test in Chemistry developed by the investigator.

- The Reaction Scale was developed by the investigator.

Procedure of Data Collection:

Table-1: The Schematic Representation of the Experiment

Activity	Experimental Group	Control Group	Time
Group Formation	Students were randomly divided into two groups and the group were selected randomly		
Activity	Experimental Group	Control Group	Time
Treatment	10 lessons were taught through the newly designed instructional strategy	10 lessons were taught through the Lecture cum Demonstration Method	Each class of 30minutes.
	Administration of Intelligence test		40 minutes
	Administration of Style of Learning and Thinking Tool		30 min.
Post testing of variable	**Administration of Achievement Test in Chemistry**	**Administration of Achievement Test in Chemistry**	30 min.
	Administration of Reaction Scale	----	30 min.

Statistical Techniques Used for the Analysis of Data

1. For studying the effectiveness of the instructional strategy in terms of
   a) Achievement of students in chemistry, and

   b) Reaction of students towards the strategy, descriptive statistics were used.
2. For studying the effect of treatment, gender and their interaction on the achievement in chemistry ANCOVA of unequal cell size was used.

3. For studying the effect of treatment, learning style and their interaction on achievement in chemistry ANCOVA of unequal cell size was used.

Analysis of Data and Its Interpretations

The data was analysed using SPSS.

Effectiveness of instructional strategy in terms of Achievement of students in chemistry

To study the effectiveness of the instructional strategy in terms of Achievement of students in chemistry, the scores of the experimental group are taken into consideration. The scores were analyzed with the help of Percentiles, Mean, and Standard Deviation. It was found that 10 per cent of students achieved 48 per cent marks. 50 per cent of students achieved 72 per cent marks and 10 per cent of students achieved 89.60 per cent marks. Hence, it can be stated that teaching through this instructional strategy was effective in terms of the achievement of students in chemistry.

Figure-1: Histogram showing Achievement in chemistry
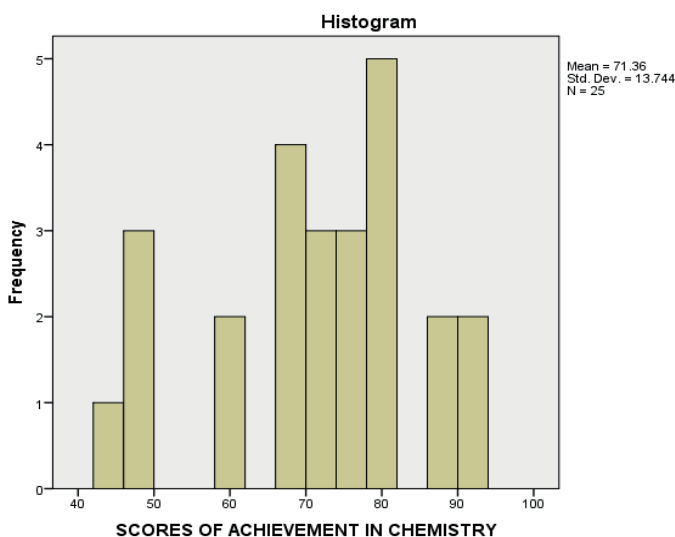
Finding and Discussion

The nature of the approach demands greater involvement of pupils in teaching-learning situations. So, the students were motivated and performed well. Different examples which were presented during teaching might have aroused interest and motivation among the students to study chemistry. Thus, interest and motivation might have contributed to the present result. Due to the MCQ-type test items, pupils' achievement might have been higher.

Thus, teaching through the developed instructional strategy was found to be effective in terms of student's achievement in chemistry.

Table -2: Reactions of students towards instructional strategy for teaching of chemistry in percentages

S. No.	STATEMENT	SA	A	UD	DA	SDA
1	Learning through this multimedia mediated approach is time consuming.	8	32	-	60	**-**
2	Sometimes it is boring to learn through this approach.	-	-	-	48	52
3	Learning through this approach is an interesting experience.	36	60	-	4	-
4	It is difficult to interact with the teacher while she/ he is teaching through multimedia.	-	-	8	32	60
5	I feel motivated while learning through multimedia approaches.	8	88	4	-	-
6	Studying through this approach develops a competitive attitude.	12	84	-	4	-
7	I feel active and happy in the class when the teacher taught through this approach.	88	8	4	-	-
8	Teaching based on this approach gives a chance to think independently.	-	80	12	4	4
9	I was encouraged to learn when other students attained concepts in the subject.	32	56	12	-	-
10	Studying through this approach motivated the students to explore examples other than those given in textbooks.	68	32	-	-	-
11	Presentation of the contents through this approach helped me to acquire concepts.	28	68	4	-	-
12	Presentation of the examples/ illustrations helped me to understand the concepts well.	4	96	-	-	-
13	Provision for different examples for illustrating a concept helped me to learn with comprehension.	24	76	-	-	-
14	The questions asked in the class helped me to think independently.	16	80	4	-	-
15	I felt motivated in answering questions after watching the videos/animation of the related content.	40	52	8	-	-
16	Linkage of different concepts in the content was well organized.	16	80	-	4	-

The instructional strategy was found to be effective in terms of students' reactions to the strategy. The various aspects of teaching were taken into consideration. The majority of the students expressed favourable reactions towards those above-said aspects. Thus, it can be concluded that the favourable reactions of the majority of students towards the mentioned aspects are of importance and that the students expressed favourable reactions towards the strategy.

Effect of treatment on the achievement in chemistry

Effect and interaction of treatment and gender on the achievement in chemistry

The second objective of the investigation was to study the effect of treatment, gender and their interaction on the achievement in chemistry of class VII students, by taking their scores of intelligence as a covariate. The scores of intelligence were collected by administering the Verbal Intelligence Test on both the groups. The data were analysed with the help of 2 X 2 Factorial design ANCOVA of Unequal Cell Size. The results are presented as under.

Table-3: F-value for Treatment, Gender and their Interaction on the Achievement in Chemistry

Sources of Variance	Df	SS	MSS	F
Group	1	816.667	816.667	5.237*
Gender	1	71.778	71.778	.460
Treatment X Gender	1	88.424	88.424	.567
Error	45	7018.019	155.956	
Total	48			

Significance at 0.05 level

Table-4: Mean and SD for Achievement in Chemistry of Boys and Girls

Treatment	Instructional Strategy			Lecture cum Demonstration Method		
Gender	N	Mean	SD	N	Mean	SD
Boys	11	66.55	17.369	9	63.11	18.950
Girls	14	75.14	9.037	16	63.25	11.975
Total	25	71.36	13.744	25	63.20	14.468

Table-3 reveals that the F– value of 5.237 for the treatment is significant at 0.05 levels with df equal to1/48. It indicates that the treatment produced a significant differential effect on the achievement in chemistry. In other words, it can be said that the instructional strategy was effective in enhancing the achievement in Chemistry of the students taught through the multi-media model.

Therefore, the null hypothesis, namely "There is no significant effect of treatment on the achievement in chemistry of class VII students when their scores of intelligence were taken as a covariate," is rejected. Therefore, it can be said that the achievement in chemistry is dependent upon the method of instruction.

Further table- 4 shows that the mean

achievement scores in chemistry of the students taught through the developed instructional strategy (71.36) are higher than those taught through the Lecture cum Demonstration Method (63.20). It can therefore be said that the developed instructional strategy was found to be more effective in terms of achievement of students in chemistry than the Lecture cum Demonstration Method.

Finding and discussion

There was a significant differential effect of treatment on the achievement of students in chemistry. Therefore, it can be said that the achievement in chemistry is dependent upon the method of instruction. This finding is supported by the findings of Kaur (2018), Mahmood (2017), Kalani (2008), Sreelekha and Nayar (2004), Luckpoteea, and Narod (2012), who found teaching through the concept attainment model to be effective in their studies. It is also supported by the findings of Su (2011) and Morais and Paiva (2007), who found that teaching through multimedia produced positive effects on achievement in chemistry. The reasons could be that the climate of the classroom was open, co-operative and encouraging with the scope for a good deal of students' activity. The instructional strategy thus provided a wide opportunity for students for acquiring concepts, interpreting the data and applying the principles in new and different situations. Multimedia technology offers unique benefits for chemistry courses when students are learning complex and new ideas. This instructional strategy may have stimulated more student-student and teacher-student interactions in different levels of students' competence and performance.

Effect of gender on the achievement in chemistry

Table-3 reveals that the F– value of 0.460 for the gender is not significant at 0.05 level with df equal to 1/48. It indicates that gender did not produce a significant differential effect on achievement in chemistry. It shows that students' achievement in chemistry is independent of gender. Therefore, the null hypothesis, namely, "There is no significant effect of gender on the achievement in chemistry of class VII students when their scores of intelligence were taken as covariate", is not rejected.

Finding and Discussion

There was no significant differential effect of gender on the achievement of students in chemistry. Therefore, it may be said that there is no significant difference in the performance of boys and girls in terms of achievement in chemistry. This finding is supported by the findings of Demircloglu and Norman (1999), Dahindsa and Chung (2003), Azizgolu (2004) and Oluwatosin and Josiah (2017). In contrast Veloo, Hong and Lee (2015), Hatice Belge Can (2012), Busolo (2010), Barmby et al. (2008), Cousins (2007) and Chambers & Andre (1997) did find significant differences in the performance of boys and girls. However, the results of the present study indicate that the achievement in chemistry is independent of gender and depends on an individual's cognitive development. This change in the attitude of parents and teachers towards education irrespective of gender might be the cause of the present finding.
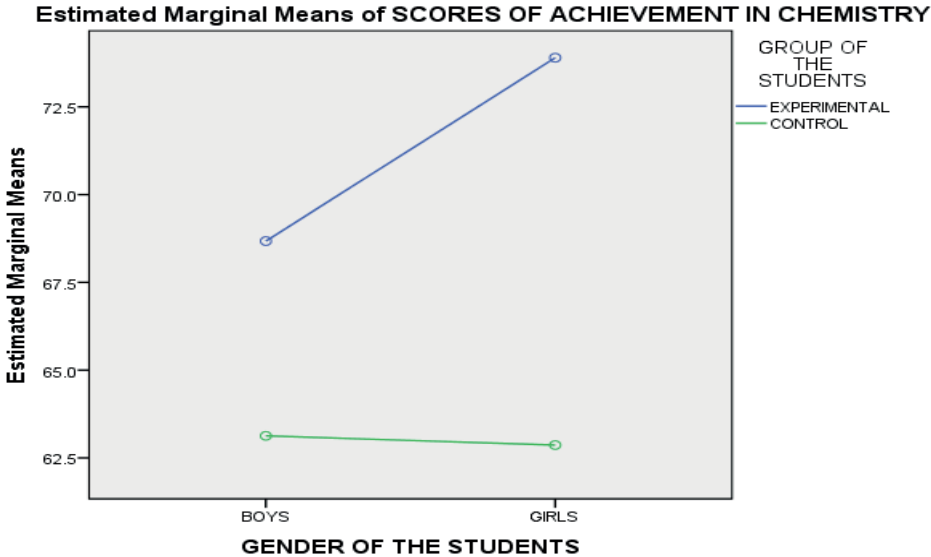
Interaction of treatment and gender on achievement in chemistry

Table-3 reveals that the F– value of 0.567 for the interaction between treatment and gender is not significant at the 0.05 levels with df equal to 1/48. It indicates that the interaction of treatment and gender did not produce a significant differential effect on the achievement in chemistry. In other

words, there was no interactional effect of treatment and gender of students on achievement in chemistry. Therefore the null hypothesis, namely, "There is no significant interaction of treatment and gender on the achievement in chemistry of class VII students when their scores of intelligence were taken as covariate", is not rejected. It indicates that the students of both the groups were equally benefited in the measure of achievement in chemistry.

Figure-2: Achievement in Chemistry of Boys and Girls

Covariates appearing in the model are evaluated at the following values: SCORES OF INTELLIGENCE = 49.02

Finding and Discussion

The interaction of treatment and gender did not produce a significant differential effect on the achievement of students in chemistry. The results showed that treatment affected the achievement of students in chemistry. The results indicate that the mean achievement of the experimental group was higher than the control group. Further, the mean achievement of girls (75.14 and 63.25) was higher than the boys (66.55 and 63.11) in experimental and control groups respectively. This shows that the effect of treatment on the achievement of students in chemistry is independent of gender. The achievement in chemistry depends on an individual's cognitive development.

Effect of Treatment, Style of Learning and Thinking and Their Interaction on Achievement In Chemistry

The third objective of the investigator was to study the effect of treatment, style of learning and thinking and their interaction on the achievement in chemistry of class VII students, by taking their scores of intelligence as a covariate. The data were analysed with the help of 2 X 2 Factorial design ANCOVA of Unequal Cell Size. The results are presented as under:

Table-5: F-value for Treatment, Style of Learning and Thinking and Their Interaction on Achievement in Chemistry

Sources of Variance	Df	SS	MSS	F
Group	1	104.739	104.739	.680
Style of Thinking and Learning	1	84.762	84.762	.550
Treatment X Style of Thinking and Learning	1	190.203	190.203	1.234
Error	45	6933.713	154.083	
Total	48			

Table-6: Mean and SD for Achievement in Chemistry of the Right and Left Hemispheres of Experimental and Control Groups

Treatment	Instructional Strategy			Lecture cum Demonstration Method		
Style of Thinking and Learning	N	Mean	SD	N	Mean	SD
Right Hemisphere	22	73.09	13.420	21	62.29	15.103
Left Hemisphere	3	58.67	10.066	4	68.00	10.832
Total	25	71.36	13.744	25	63.20	14.468

Effect of Treatment on the Achievement in Chemistry

The findings have been discussed in the previous section.

Effect of Style of Learning and Thinking on Achievement in Chemistry

Table-5 indicates F– value of 0.550 for the style of learning and thinking on achievement in chemistry is not significant at 0.05 level with df equal to1/48. It indicates that the style of learning and thinking did not produce a significant differential effect on the achievement in chemistry. It shows that students' achievement in chemistry is independent of style of learning and thinking. Therefore, the null hypothesis, namely, "There is no significant effect of their style of learning and thinking on the achievement in chemistry of class VII students when their scores of intelligence were taken as covariate", is not rejected.

Further, Table-6 also indicates that the mean achievement of students with right hemisphere dominance (73.09) for the experimental group is higher than that of students of the control group (62.29). The mean achievement of students with left hemisphere dominance is 58.67 for the experimental group and the control group is 68.00. But, this difference is not significant.

Finding and Discussion

There was no significant differential effect of style of learning and thinking on the achievement of students in

chemistry. Both the groups of learners i.e., students with left hemisphere brain dominance and right hemisphere brain dominance benefitted in the same way. This finding is supported by the findings of Yilmaz-soylu and Akkoyunlu(2002) and Wilson (2011) and is not supported by the findings of Uzuntiryaki (2007) and Vaishnav(2013).

Interaction of Treatment, Style of Learning and Thinking on Achievement in Chemistry

Table-5 reveals that the F– value of 1.234 for the interaction of treatment and style of learning and thinking is not significant at 0.05 levels with df equal to 1/48. It indicates that the interaction of treatment and style of learning and thinking did not produce a significant differential effect on the achievement in chemistry. Therefore, the null hypothesis, namely "There is no significant interaction of treatment and style of learning and thinking on the achievement in chemistry of class VII students when their scores of intelligence were taken as covariate", is not rejected.

Figure-3: Achievement scores of Students having different Styles of Learning and Thinking
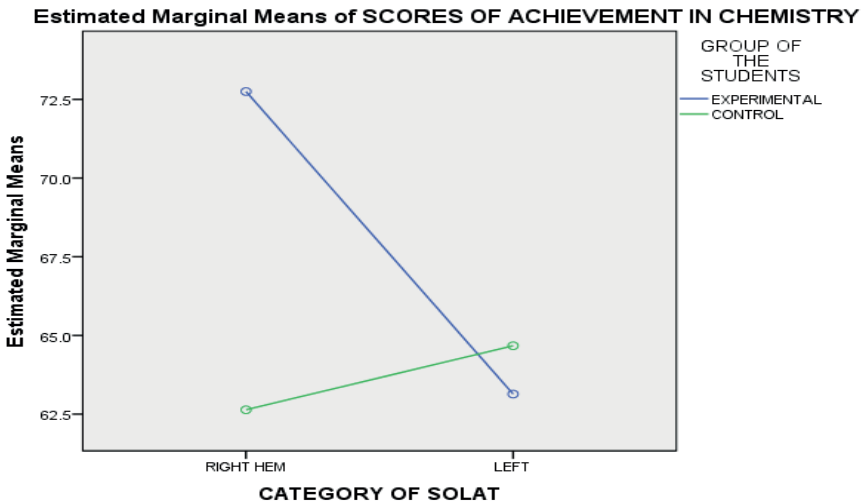
Estimated Marginal Means of SCORES OF ACHIEVEMENT IN CHEMISTRY

Covariates appearing in the model are evaluated at the following values: SCORES OF INTELLIGENCE = 49.02

Finding and Discussion

The interaction of treatment and style of learning and thinking did not produce a significant differential effect on the achievement of students in chemistry. The results showed that treatment affected the achievement of students in chemistry. The results also indicate that style of learning and thinking did not have any significant differential effect on the achievement of students in chemistry. Therefore, there might not be any significant differential effect of the interaction of treatment and style of learning and thinking on the achievement of students in chemistry.

Conclusion

The findings of the study reveal that the instructional strategy was effective in terms of the achievement of students in chemistry and in terms of reactions of students towards the strategy. It produced a significant differential

effect on achievement in chemistry when compared to the Lecture-cum-demonstration method. It was also found that achievement in chemistry is independent of gender and style of learning. Teachers should use more than one teaching style to cater to the individual needs of the students, respecting their style of learning and thinking. The contents of textbooks of chemistry should be presented on CAM approach giving opportunities to the students to explore more examples. These examples should include the ones related to daily life. Teachers should also use such instructional strategies for teaching chemistry which allows students to think independently.

The curriculum developers should make the curriculum gender-friendly at all stages. Parents should give equal importance to their child's educational needs irrespective of their ward's gender. Teachers should also give equality concerning gender in the classroom as well as outside the classroom.

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21st Century Skills - Perception of College Students Towards e-learning

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Abstract

Digital education is an innovative approach in the present education era. E-learning is known as the use of digital tools, devices and technologies in the teaching-learning process. It depends upon the technological devices, applications and internet facility. Different kinds of educational platforms and tools are available, which are used by the teacher to deliver the content through online learning. The objective of this present study is to find out the perception of college students on e-learning, particularly skills required for 21st century learners. 109 students studying in UG and PG programmes were selected as samples. A questionnaire was used to find out the perception of e-learning among the samples. The study results revealed that the samples are having good perception of e-learning. They also shared that the skills such as communication skills, presentation skills, critical thinking, technical skill and time management are improved through e-learning.

Keywords: E-Learning, College students and 21st Century Skills

Introduction

Web-based learning is referred to as e-learning. Allencom company (2018) describes that e-learning is an instructional method that utilizes digital assets to deliver content to grow knowledge, shape behaviours, and increase motivation. In these learning systems, electronic devices such as computers, mobiles, tablets and the internet play a major role in the teaching-learning process. Live lectures, video conferencing and webinars are the various modes to transfer the content and knowledge. E-learning enhances the ability to learn and implement the learned content among the learners. The audio-visual materials help in remembering knowledge for a longer time. This e-learning system allows the teachers to cover the curricular content easily and regularly. Students can also avail the learning materials at anytime and anywhere.

Review of Literature

Abooki & Kitawi (2014) examined the impact of methodology, ideologies, output and ecology of Information and Communication Technology (ICT) strategies and their students' performance. The finding shows that the e-learning strategies adopted at the University positively impacted students' academic performance.

Zare et al (2016) conducted a study to investigate the effect of using self-directed e-learning among students learning on basic chemistry and creativity. The result indicates that the self-directed e-learning group achieves better marks in chemistry and their creativity is higher than the traditional group.

Elfakil et al (2019) explained that there is a significant difference in learning outcomes besides positive attitudes between online and traditional learners which can be a viable alternative learning method for higher education.

Need and Significance of this Study

E-learning includes information such as syllabus, course materials, teaching, evaluation and progression status, which are helpful for the students to understand the content and to check their performance also. This e-learning system allows the students to learn the content at their own pace (anywhere & anytime). But this system of learning requires electronic devices, technical knowledge, computer literacy, time management skills, interest and motivation among the learners to undergo the programme effectively. Switching from the traditional classroom with face-to-face instructor training to computer-based training in a virtual classroom makes the learning experience entirely different for students (Kumar, 2015). 21stcentury learner requires the following skills, namely critical thinking, creativity, collaboration, communication, information literacy, media literacy, technology literacy, flexibility, leadership, initiative, productivity and social skills. So, this study intended to find out the perception of college students about e-learning about the enhancement of 21st century skills through e-learning.

Methodology

Objective of the Study

To find out the perception of college students towards e-learning related to the enhancement of 21stcentury skills.

Research Design

A Survey method under descriptive research design was adopted for this present study.

Sampling Method and Sample Size

109 students studying in UG and PG programmes of various higher education institutions from Coimbatore District, Tamil Nadu were selected as a sample for this present study through the convenience sampling method under the non-probability sampling technique.

Table-1: Sample Details based on Gender & Programme

Programme	UG Programme	PG Programme
	59%	41%
Gender	Male	Female
	32%	68%

Research Questions

1. What is the status of the availability of e-learning resources among samples?

2. Can students follow the teaching in the e-learning process?

3. Does e-learning improve 21st century skills among college students?

Research Tool

A questionnaire with 20 questions about the various aspects of e-learning namely availability of resources, teaching-learning process and enhancement 21stskills was developed

by the researcher to collect the data.

Data Collection Procedure

The objective of this study and the instructions about the questionnaire was spelt out with the samples. The questionnaire was circulated to the students through Google form. The collected data were then analyzed for further interpretation.

Findings and Discussion

The findings and discussion of this study are explained based on the following aspects such as the availability of ICT facilities, the teaching-learning process and various skills required for 21st century learners.

Finding and Discussion based on Availability of ICT facilities

The e-learning system works based on ICT devices and the internet. 96.3 per cent of the samples informed that they have ICT facilities (mobile/ tablet/ laptop/ desktop) at their home and the remaining 3.7 per cent of the samples do not have these facilities. 91.7 per cent of the samples shared that they have an internet facility (mobile network/ LAN). The remaining 8.3 per cent of the students were not having an internet facility because of staying in the remote area.

Figure-1: Availability of ICT facilities
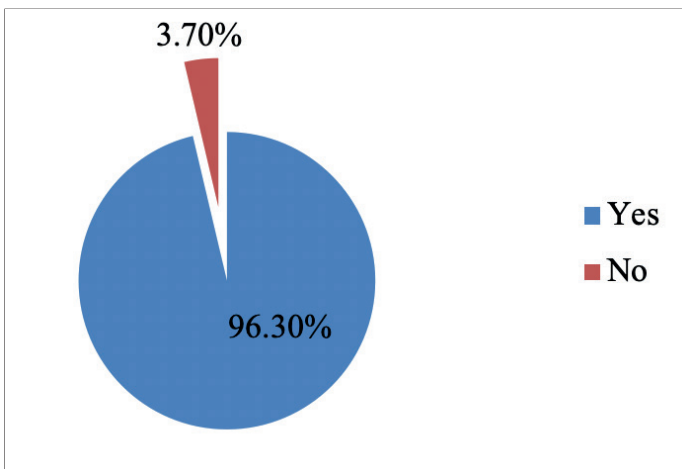
Findings and Discussion based on Teaching-Learning Process

Success in the teaching-learning process depends on the interest and motivation of the students. 91.7 per cent of the samples pointed out that e-learning creates interest and motivation for learning and also they stated that it provides an opportunity to enhance their knowledge. 87.1 per cent of the samples were able to follow the instructions given by the teachers during the e-learning classes.

Method of Learning: 11 per cent of the samples stated that they prefer the interactive learning type, 19 per cent of the students preferred the self-learning type and the remaining 70 per cent of the students preferred both types of learning.

Figure-2: Method of learning preferred by students
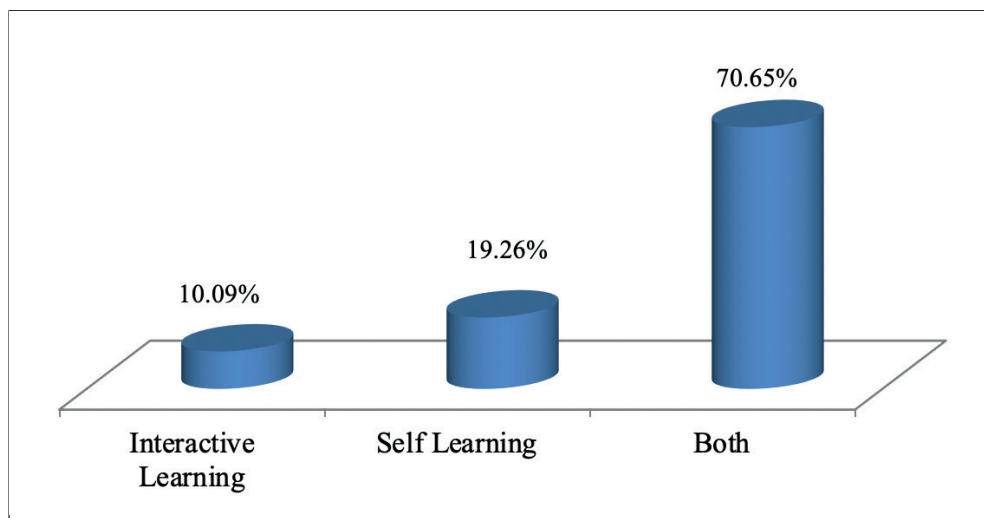
Mode of E-learning: Different learning platforms are available and used by the teachers for e-learning. 51.37 per cent of students preferred Google Meet, 24.77 per cent of samples preferred Zoom, 6.42 per cent of samples preferred Go to Meeting and 17.43 per cent of students preferred Google Classroom.

Figure-3: Mode of learning preferred by students
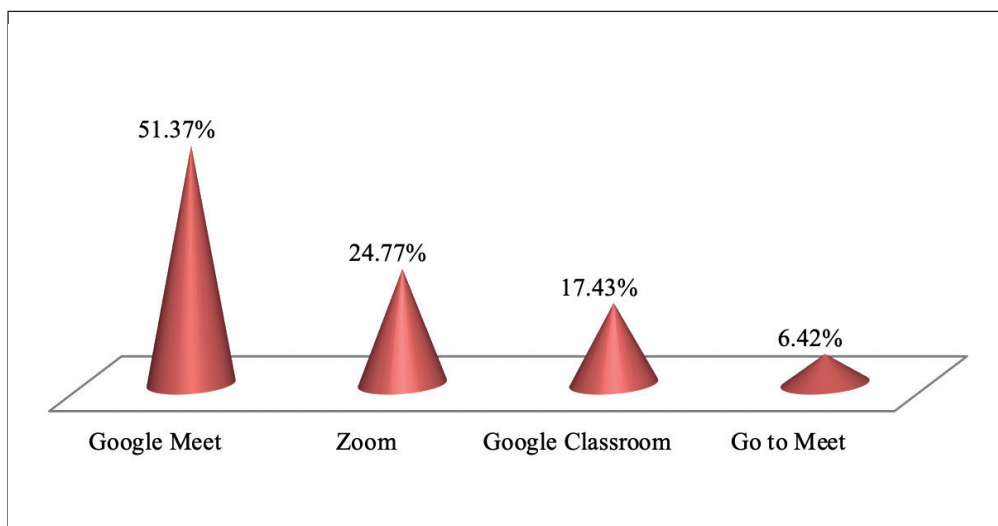
Teaching Learning Materials: Teaching learning materials (TLM) play a significant role in the teaching process. It makes learning. 33.94 per cent of the students preferred video and audio content, 10.09 per cent of the students preferred PowerPoint presentations, 7.33 per cent of the students preferred animation materials and 48.62 per cent of the students mentioned that they preferred the combination of all.

Figure-4: TLMs preferred by students
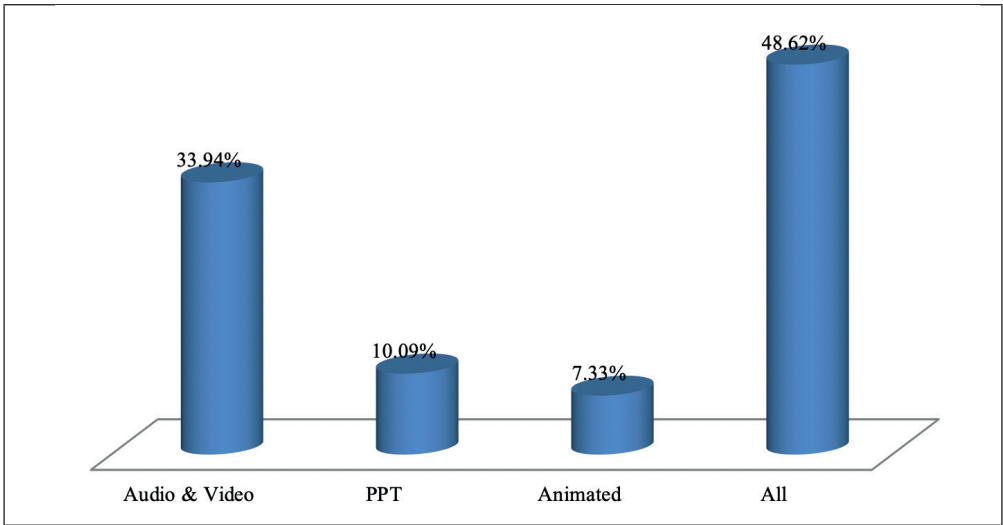
Evaluation: 34.86 per cent of students preferred to participate in a quiz and 26.6 per cent of students preferred the assignment method for evaluation and the remaining 38.53 per cent preferred both quizzes and assignments. 80.73 per cent of students opined that the assessment and evaluation in e-learning were useful to enhance their learning. 88.07 per cent of students expressed that they were satisfied with the grading procedure.

Figure-5: Evaluation strategy
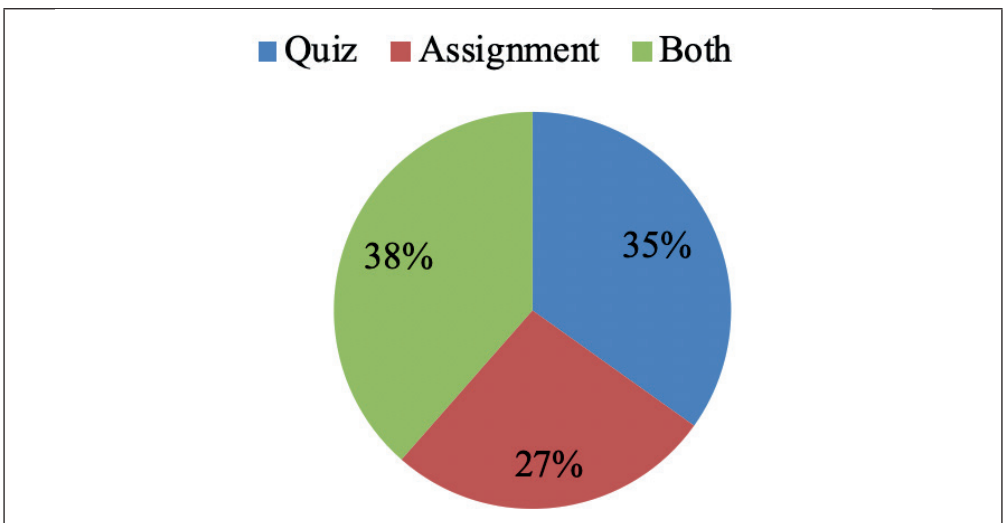
Findings and Discussion based on 21st Century Skills

In the education process, it was believed by the educators that 21st century skills are important for students to succeed in life. The 21st century skills were classified into three areas, namely learning skills, literary skills and life skills. Learning skills that are mentioned in this study include critical thinking, creativity and communication. The literary skills are

information literacy, media literacy and technology literacy. Flexibility and social skills are considered life skills.

Learning Skills: These skills are related to mental processes. Learning skills are important to develop knowledge which includes critical thinking, reasoning, problem-solving, analyzing, research skills and communication. In this study, most of the students have agreed that the e-learning system improves their learning skills.

Literary Skills: Literacy skills include the ability to access digital information through different media and technology. It is also to understand different aspects of content and information without any confusion. The majority of the students agreed that they can access different media and technology devices through e-learning and at the same time they can understand the information. The result was supported by the research done by Suresh et al (2018) stating that e-learning has a positive influence on the academic performance of undergraduate students. They also mentioned that E-learning offers an alternative that is faster, cheaper, and potentially better. E-learning has to be implemented and made available to everyone easily.

Life Skills: In the present study, life skills refer to flexibility and social skills, which students learned through e-learning. The students opined that they can use different apps and devices for communication purposes.

Figure-5: (a,b,c) – 21st Century Skills

5a. Learning Skills
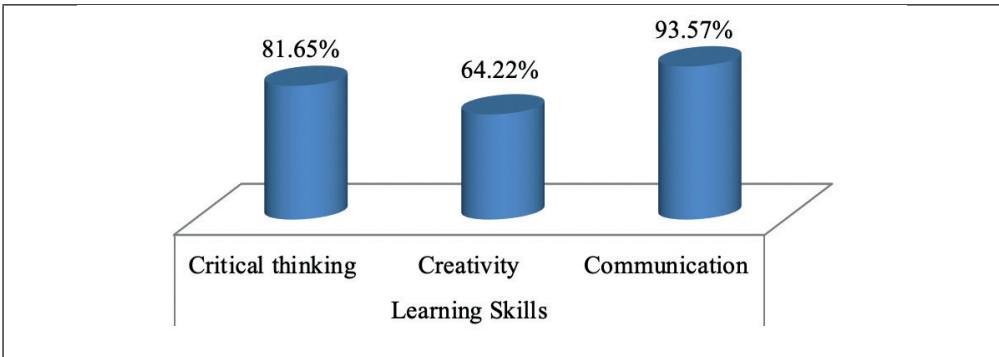
5b. Literacy Skills
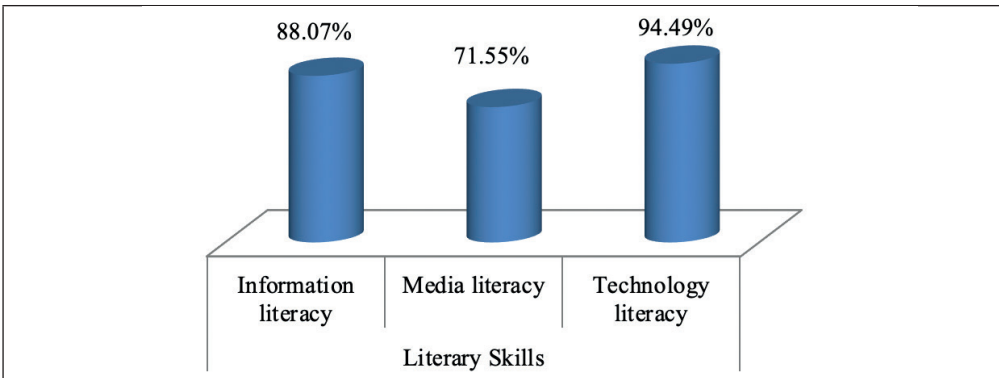
5c. Life skills
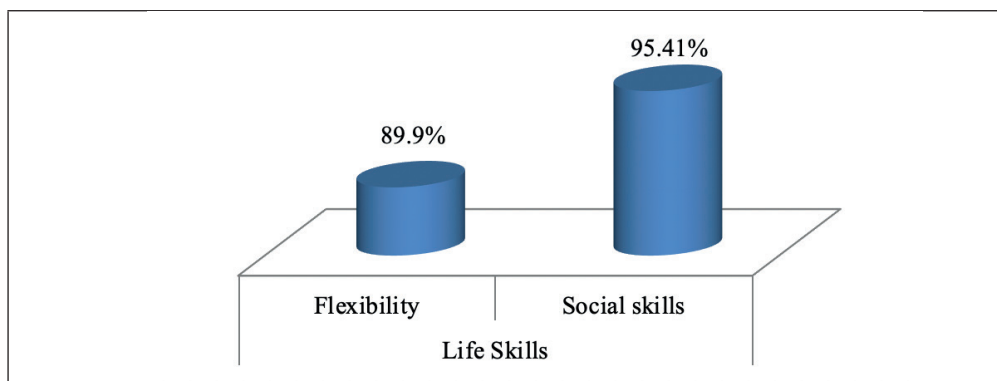
Educational Implications

Successful e-learning depends on the students' interest in searching for information in different media. E-learning has the following implications, namely

- It promotes active and independent learning among the learners.

- It also creates the possibility for the students to make use of self-paced learning and they can choose their learning environment.

- This digital education system helps both teachers and students to share and equip their knowledge which makes the teaching-learning process more effective.

Conclusion

E-learning is one of the fastest growing systems in higher education. Through e-learning, teachers can incorporate 21st century skills where they can create and manage a learners group effectively. Students can improve these 21st century skills such as self-directed learning, critical thinking, analytic reasoning, effective communication and technical skills through digital education. The online education platform accumulates students from different environments and it integrates solutions to meet the educational needs of all learners which enhances the quality of learning among students. The online resources and materials are always available and reachable to the students at anytime and anywhere. The present study was supported by the research done by Wani (2013) that argues that the development of new technologies and the use of e-learning in teaching and learning are of great benefit for integrating digital technology into the educational environment.

Their skills and competencies to work effectively with digital technologies are pre-requisites for successful and responsible solving and presentation of scientific problems and cases. The development of new technologies and the use of e-learning in teaching and learning are of great benefit for integrating digital technology into the educational environment and can increase the efficiency and the quality of the education system. Their skills and competencies to work effectively with digital technologies are pre-requisites for successful and responsible solving and presentation of scientific problems and cases. The development of new technologies and the use of e-learning in teaching and learning are of great benefit for integrating digital technology into the educational environment and can increase the efficiency and the quality of the education system. Their skills and competencies to work effectively with

digital technologies are pre-requisite for successful and responsible solving and presentation of scientific problems and cases. The development of new technologies and the use of e-learning in teaching and learning are of great benefit for integrating digital technology into the educational environment can increase the efficiency and the quality of the education system

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Research Article

Attitude of School Teachers towards the use of Computers in Sundarban Region of West Bengal

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Abstract

Attitude toward computers is the important criteria of a teacher for computer-aided instruction in the teaching- learning process. The study tried to investigate the teacher's attitude towards computers with respect to gender, teaching experience and subject groups. 300 teachers are taken as sample through random sampling from secondary schools of Sundarbans region of North 24 Pgs and South 24 Pgs districts of West Bengal. Computer attitudes scale of Khatoon and Sharma (2011) is used for data collection and collected data are analyzed through t-test and one way ANOVA. The finding indicates that male teachers have a higher computer attitude than female counterparts. In regarding teaching experience above 20 years experience teachers shows neutral computer attitude while below 10 years and between 10-20 years experience teachers differ significantly from above 20 years experience teachers in their attitude toward computer. All subject groups' teachers have a positive computer attitude. Science teachers have a comparatively higher altitude than other groups. The study helps to understand the computer attitude of school teachers and helps the educational administrator to take necessary steps regarding technology introduction in the school educational system.

Keywords: Attitude, Secondary School, Sundarbans, Subject Group, Teaching experience

Introduction

In a traditional way of teaching mostly blackboard and TLM are used by the teachers in a classroom context. At present, due to advancement and upgradation of educational systems, new technologies are integrated in school level teaching-learning process. Computers are one of the tools that interlink most of the advanced educational technologies. In India, most of the schools have been equipped with computers within the last 15 years. The Central and State Governments are trying to provide education to school students with advanced technologies like computers. Effective utilization of computers in the teaching-learning process depends upon the teachers' mental readiness to receive the computer as a medium of instruction. In this context, Huang and Liaw (2005) mentioned that attitude towards computers was the important factor that enhanced the successful use of computers in the classroom. According to Smith, Caputi and Rawstorne (2000) computer attitude indicated a person's general evaluation or feeling of favour or antipathy toward computer technologies and specific computer related activities. A positive attitude enhances computer utilization of teachers in classroom context. Shi and Bichelmeyer (2007) mentioned that a good computer attitude helped the teacher to maintain professional development, increase their ability to focus on content, and change their

practices in accordance with students need and that ultimately improved students' learning. Teachers with fewer computer attitudes always have believed that computer never improve themselves and their students and never get attempts to introduce computer technologies in teaching learning process (Askar and Umay, 2001, as mentioned by Sabzian and Gilakjani, 2013). Beside this, less or negative attitude teachers always have less computer confidence, knowledge, skill and computer interest while they have higher computer anxiety. The versatile use of computer can change the mode of teaching methods as well as teaching strategies that enhance student's attention, content clarity, better understanding of observation skills and critical thinking ability and thus, the educational output will be increased to a great extent. In this context, Teo (2008) said that to achieve student's success with computer technology depends upon the teacher's attitude toward computers.

In previous years, in different countries a lot of studies were done on attitudes towards computer technologies and ICT. Few studies tried to investigate the attitude toward computers of teachers (Saade and Kira, 2009; Tuparova, et. al., 2006; Cavas and Kesercioglu, 2003; Mello, 2006). Osodo et. al (2010) made a study on Geography teachers' computer attitudes towards computers and established that teachers had a positive attitude towards the use of computers in the teaching-learning process. Few previous studies tried to investigate relation of computer attitude with certain categorical variables such as relation to gender (Suri and Sharma, 2017; Campbell, 1990; Kutluca, 2011; Dupagne and Krendi, 1992; Solvberg, 2003), relation to teaching experience and computer experience (Yildirim, 2000; Lockheed and Mandinach, 1986). Te (2008) tried to investigate the

correlation status of teachers' computer attitude with years of computer use in teaching-learning process and level of confidence. According to Dupagne and Krendi (1992), male teachers had a more favourable attitude towards computers than their female counterparts. In contrast Ray et. al, (1999) stated that females had a higher computer attitude than their male counterparts. Besides this Woodrow (1992) reported that the difference in computer attitude was insignificant in relation to gender. In regarding teaching experience Lambert et. al (2008) reported that computer attitude differed significantly with respect to year of teaching experience. In this context Sahin et. al (2016) mentioned that computer attitude decreased with increasing the year of experiences among the teachers.

Emergence of problem

Sundarbans is the heritage site of India and it rests in various parts of the North 24 Parganas and South 24 Parganas districts of West Bengal. Most of the parts of this region are remembered as the backward parts due to poor land communication system, people's economic conditions and other natural obstacles. All the parts of this region gradually develop due to Government's special preference for the development of this heritage site. Due to free and compulsory education policy and social schemes of the Government of India and special initiatives of the State Government, students' enrolments in schools gradually increased in the last decade. School infrastructures are also developed and are well equipped with computer technologies and other teaching-learning instructional materials. The crucial thing is that either teachers are able to integrate computer technologies in the teaching-learning process or they ignore computers

by adopting old traditional methods. Students are either benefited with computer technologies or they have no scope to utilize computers in the learning process. So, it is the issue of investigation and this can be framed as follows:

Teachers are either readily taking and utilizing computers in the teaching learning process or they suffer from lack of utilization skills of computers. Male as well as female teachers eventually either welcome computer technologies in school context or any difference exists between them in terms of using computers in teaching-learning process. All the teachers either unanimously accept computers as powerful tools in teaching or any differences found with respect to different subject groups of teachers. All the teachers irrespective of teaching experience either really improve their teaching techniques by adopting computer technology in classroom learning process or they are still in position of computer resistance.

Objective of the Study

- To study the attitude towards computers among the secondary school teachers in relation to gender and to compare the computer attitude if there any difference exists between male and female teachers.

- To study the attitude towards computer among the secondary school teachers in relation to teaching experience and to compare the computer attitude if there any difference exists among different teaching experience groups.

- To study the attitude towards computer among the secondary school teachers in relation to subject groups and to compare the computer attitude if there any difference exists among different

subject groups teachers.

Hypotheses of the Study

$H_0$1- There is no significant difference in mean score of attitude towards computers of secondary school teachers in relation to gender.

$H_0$2- There is no significant difference in the mean score of attitude towards computers among secondary school teachers in relation to teaching experience.

$H_0$3- There is no significant difference in mean score of attitude towards computers among the secondary school teachers in relation to subject groups.

Methodology

Population

The population of this study includes the secondary school teachers of Government aided Bengali medium schools of Sundarbans region of West Bengal under West Bengal Board of Secondary Education (W.B.B.S.E.)

Sample of the Study

300 secondary school teachers are taken as samples through random sampling techniques from Sundarbans region schools. 8 schools are selected from the Sundarbans region of North 24 Parganas District and 8 schools from the Sundarbans region of South 24 Parganas District. Sundarban area is the deltas of various rivers with huge land communication problems. Due to Covid-19 pandemic situation, few schools are selected from this area on the basis of availability of data through random sampling techniques and thus sample size is restricted to 300. Collected samples are categorized into gender wise, teaching experience wise and subject groups wise (Table 1).

Table -1: Sample distribution with respect to categorical variables

Categorical variables		Teachers numbers	Total
Gender	Male	150	300
	Female	150	
Teaching experience	Below 10 years	88	300
	Between 10-20 years	116	
	Above 20 years	96	
Subject groups	Language group	92	300
	Science group	67	
	Mathematics group	64	
	Social science group	77	

Variables of the study

Major variables: Attitude towards computer
Categorical variables: Gender (male/female)
Teaching experience (below 10 years/between 10-20 years/above 20 years)
Subject groups (language group/science group/mathematics group/social science group)

Tool and Techniques Used

Computer attitude scale of Khatoon and Sharma (2011) is used to measure the attitude toward computers of secondary school teachers. The scale is applicable for measuring computer attitudes of school teachers, university teachers, college and school students. The reliability of this scale is 0.93. The scale contains five areas which are computer anxiety, computer confidence, computer interest, computer as a useful tool and computer career. The scale contains 20 items and among these items 11 items are positive in nature and the rest 9 items are negative in nature. Each item has five alternative responses: strongly agree, agree, undecided, disagree and strongly disagree. On the basis of scores the scale has three levels i.e. positive computer attitude level with a score range (64-100), neutral computer attitude level with a score range (57-63) and negative computer attitude level with a score range (20-56).

The collected data are analyzed through t-test for measuring mean differences between the groups and one- way ANOVA for measuring the differences among the groups.

Data Analysis and Interpretation

$H_0 1$ Testing- Table 2 shows that male teachers' mean score of attitude towards computer =70.86 and female teachers mean score of attitude towards computer =66.74. It is also seen that the calculated value of $t_{(298)}$=2.66 and associated significant value is 0.00 (p<0.05). Thus, t is significant at 0.05 level and null hypothesis $H_0 1$ is rejected. It is safely concluded that the mean score difference of attitude toward computers between male and female teachers is significant.

Table-2: Independent sample test between groups (male and female)

Attitude towards Computer		N	Mean	t-Value	df	Sig. (2-tailed)	Significant status
Gender	Male	150	70.86	2.66	298	0.00	S (0.05 level)
	Female	150	66.74				

$H_0 2$ Testing- Table 4 shows that the f value of ANOVA test is 6.822 and associate sig value is 0.00 (p<0.05). Thus, f value is significant at 0.05 level and null hypothesis $H_0 2$ is rejected.

It is safely concluded that the mean score difference of attitude towards computers among the secondary school teachers in relation to teaching experience are significant.

Table -4: Test of significance among different groups of teaching experience

Source variation	SS	df	F	Sig. value
Between groups	3346.82	2	6.822	0.00 (0.05 level)
Within groups	72844.13	297		
Total	76190.95	299		

Table 5 shows that the mean score of teachers with Below 10 years teaching experience is 71.12 and teachers with between 10-20 years teaching experience is 67.11. Their value of $t_{(202)}$ =1.82 and associate

sig value is 0.06 (p>0.05). Hence, t is not significant at 0.05 level. Thus, the mean difference of attitude towards computers between Below 10 years experience group and between 10-20 years experience group is insignificant.

Table 5: Independent sample test among the groups of teaching experience

Attitude towards computer		N	Mean	df	t-value	Sig. two tail	Significant status
Teaching Experience	Below 10 years	88	71.12	202	1.82	0.06	NS
	Between 10-20 years	116	67.11				
	Below 10 years	88	71.12	182	3.65	0.00	S(0.05 level)
	Above 20 years	96	62.60				
	Between 10-20 years	116	67.11	210	2.08	0.03	S(0.05 level)
	Above 20 years	96	62.60				

From table 5 it is seen that the mean score of teachers with Below 10 years

of teaching experience is 71.12 and teachers with Above 20 years teaching

experience is 62.60. Their value of $t_{(182)}$ =3.65 and associate sig value is 0.00 (p<0.05). Hence, t is significant at 0.05 level. Thus, the mean difference of attitude towards computers between Below 10 years experience group and Above 20 years experience group is significant.

The table 5 also shows that the mean score of teachers with between 10-20 years teaching experience is 67.11 and teachers with above 20 years teaching experience is 62.60. Their value of $t_{(210)}$ =2.08 and associate sig value is 0.03 (p<0.05). Hence, t is significant at 0.05 level and thus mean difference of attitude towards computer of between the 10-20 years group and above 20 years of experience group is significant.

H₀3 Testing- Table 7 shows the f value of ANOVA test is 4.514 and associate sig value is 0.00 (p<0.05). Thus f value is significant at 0.05 level and null hypothesis $H_0 3$ is rejected. It is safely concluded that the mean score difference of attitude towards computers among the secondary school teachers in relation to different subject groups is significant.

Table-7: Test of significance among different subject groups

Source variation	SS	df	F	Sig. value	Sig. Status
Between groups	1965.46	3	4.514	0.00	S(0.05level)
Within groups	42953.53	296			
Total	44919	299			

Table 8 shows that the mean score of a language group teacher is 68.52 and science group teacher is 72.94. Their value of $t_{(157)}$=2.27 and associate sig value is 0.02 (p<0.05). Hence, t is significant at 0.05 level. Thus, the mean difference of attitude towards computers between language group and science group teacher is significant.

Table-8: Independent sample test among the subject groups

Attitude towards computer		N	Mean	df	t-value	Sig. two tail	Significant status
Subject groups	Language group	92	68.52	157	2.27	0.02	S (0.05 level)
	Science group	67	72.94				
	Language group	92	68.52	154	1.27	0.56	NS
	Mathematics group	64	69.64				
	Language group	92	68.52	167	1.67	0.09	NS
	Social science group	77	65.62				
	Science group	67	72.94	129	1.44	0.15	NS
	Mathematics group	64	69.64				
	Science group	67	72.94	142	3.60	0.00	S (0.05 level)
	Social science group	77	65.62				
	Mathematics group	64	69.64	139	1.98	0.04	S (0.05 level)
	Social science group	77	65.62				

The table 8 also shows that the mean score of a language group teacher is 68.52 and mathematics group teacher is 69.64. Their value of $t_{(154)}=1.27$ and associate sig value is 0.56 (p>0.05). Hence, t is not significant at 0.05level. Thus, the mean difference of attitude towards computers between language group and mathematics group teacher is insignificant.

The table 8 shows that the mean score of language group teacher is 68.52 and social science group teacher is 65.62. Their value of $t_{(167)}=1.67$ and associate sig value is 0.09 (p>0.05). Hence, t is not significant at 0.05 level. Thus, the mean difference of attitude towards computers between language group and social science group teacher is insignificant.

The table 8 also shows that the mean score of a science group teacher is 72.94 and mathematics group teacher is 69.64. Their value of $t_{(129)}=1.44$ and associate sig value is 0.15 (p>0.05). Hence, t is not significant at 0.05 level. Thus, the mean difference of attitude towards computers between science group and mathematics group teacher is insignificant.

From table 8 it is seen that the mean score of science group teacher is 72.94 and social science group teacher is 65.62. Their value of $t_{(142)}=3.60$ and associate sig value is 0.00 (p<0.05). Hence, t is significant at 0.05 level. Thus, the mean difference of attitude towards computers between science group and social science group teacher is significant.

Table 8 also shows that the mean score of mathematics group teacher is 69.64 and social science group teacher is 65.62. Their value of $t_{(139)}=1.98$ and associate sig value is 0.04 (p<0.05). Hence, t is significant at the 0.05 level. Thus, the mean difference in attitudes towards computers between a mathematics group and social science group teachers is significant.

Discussion of Result

The study shows that both male and female teachers have a positive attitude toward computers as per scale attitude level. Attitude towards computers differs significantly in relation to gender. This finding coincides with the finding of Houtz and Gupta (2001) and Devi (2018), whereas contradicts with the finding of Teo (2008). This finding also disagrees with the finding of past study of Jeyanthi (2019) and Birisci, Metin and Karakas (2009). Male teachers have better computer attitudes than their female counterparts as male have higher mean values than female teachers which coincides with the previous finding of Woodrow (1992).

The study shows that the attitude towards computers of school teachers differs significantly in relation to teaching experience. This finding coincides with the finding of Yildirim (2000) and Lockheed and Mandinach (1986). Below 10 years experience teachers and above 20 years experience teachers differs significantly in their attitude towards computer and between 10-20 years experience teachers and above 20 years experience teachers also differ significantly in their attitude. But this difference of attitude is insignificant between below 10 years experienced teachers and between 10-20 years experienced teachers. The study shows that the below 10 years experience teachers have a greater computer attitude than other groups of teachers. Below 10 years experience teachers and between 10-20 years experience teachers have positive computer attitude while above 20 years experience teachers have neutral computer attitude as per attitude level of scale.

The study shows that the computer attitude of teachers differs significantly in relation to subject groups. The present finding has a similarity with the finding of Teo (2008). This finding contradicts with the finding of Jeyanthi (2019) who reported that computer attitudes did not differ significantly between arts and science groups. Teachers of all subject groups have a positive computer attitude as per the mentioned attitude level categories of scale. Science group teachers have better aptitude than rest other subject groups. Science group teachers' computer attitude differs significantly from language group teachers and social science group teachers'. Whereas the computer attitude difference is insignificant between science group teachers and mathematics group teachers. Mathematics group teachers' computer attitude differs significantly from social science group teachers but this difference is insignificant with language teachers. Computer attitude of language and social science group teachers does not differ significantly.

Conclusion

The study shows that male and female teachers have a positive computer attitude and male teachers have a higher computer attitude than female. Teachers' attitude towards computers has a significant relation with teaching experience. Below 10 years teaching experience group have higher mean value than between 10-20 years teaching experience group but mean difference is insignificant. So, both groups seem to have a more or less similar attitude. Below 10 years teaching experience group and between 10-20 years teaching experience group differ significantly from above 20 years teaching experience group. Among this three groups below 10 years teaching experience group and between 10-

20 years teaching experience group have positive computer attitude while above 20 years teaching experience group have neutral computer attitude. This indicates that more experienced teachers are less active in the field of using computer technologies in their teaching learning process than their junior teachers. Attitude differs significantly in relation to subject groups. Science group teachers have a higher computer attitude and their computer attitude differs significantly from language group and social science subject group while this difference is insignificant with mathematics group. Mathematics group attitude differs significantly in relation to social science group while this difference is insignificant with language group. language groups have a higher computer attitude as their mean value is higher than social science groups but their mean difference is insignificant. Although there exists attitude differences among the different subject groups but all subject group teachers have a positive attitude. In a nutshell, it is said that all subject teachers are more or less skillful to use computers in the teaching learning process.

Implication of Study

The study draws out a clean idea about the teachers' attitude towards computer of secondary schools of Sundarban areas of West Bengal that will helps to the West Bengal Government to take necessary decisions regarding this context.

The finding with respect to the teaching experience, above 20 years experience teachers shows neutral computer attitude that will helps to the educational administrator for taking steps regarding in-service computer-aided instructional training for above 20 years experience teachers so that their computer attitude level may

increase.

This study opens out a field for future researchers to make valuable research in the teacher's education field. In future, researchers may draw out their study on teachers' computer attitude with respect to other categorical variables which are not taken in this study. Beside this, they also make qualitative studies to judge the finding of this study. They also make correlation studies of teachers' computer attitude with other major variables such as self-efficacy, computer knowledge, computer training, aptitude, locus of control, etc.

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List of Tables:

Table 1: Sample distribution with respect to categorical variables

Categorical variables		Teachers numbers	Total
Gender	Male	150	300
	Female	150	
Teaching experience	Below 10 years	88	300
	Between 10-20 years	116	
	Above 20 years	96	
Subject groups	Language group	92	300
	Science group	67	
	Mathematics group	64	
	Social science group	77	

Table 2: Independent sample test between groups (male and female)

Attitude towards Computer		N	Mean	t-Value	df	Sig. (2-tailed)	Significant status
Gender	Male	150	70.86	2.66	298	0.00	S (0.05 level)
	Female	150	66.74				

Table 3: ANOVA summary statistics

Groups	Count	Sum	Average
Below 10 years	88	6259	71.25
Between 10-20 years	116	7785	67.11
Above 20 years	96	6010	62.60

Table 4: Test of significance among different groups of teaching experience.

Source variation	SS	df	F	Sig. value
Between groups	3346.82	2	6.822	0.00 (0.05 level)
Within groups	72844.13	297		
Total	76190.95	299		

Table 6: ANOVA summary statistics of subject groups

Groups	Count	Sum	Average
Language group	92	6304	68.52
Science groups	67	4887	72.94
Mathematics group	64	4457	69.64
Social science group	77	5053	65.62

Research Article

Effect of Multimedia in the teaching of Geotectonic and its satisfaction level on class VIII students

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Abstract

Research in Teaching–learning process through Multimedia shows many factors affect students' performance. Therefore, the present study aimed to know the problems faced by class VIII students of Bengali Medium School of West Bengal in learning Geotectonic. The purpose of the present study was to know the effect of Multimedia in teaching Geotectonic to class VIII students and to know their satisfaction level of them in Kolkata and Purba Medinipur District.

Researchers aimed to study whether there is any significant difference between the effect of Multimedia in teaching and student's achievement with respect to teaching Geotectonic among class VIII students. All students of class VIII in Bengali Medium Schools of West Bengal Board are considered as the population of the study. The sample comprises 320 students. To assess the effect of Multimedia on teaching, researchers used self-made parallel form tests of achievement and an opinionnaire for students' satisfaction levesl. An Experimental Survey design has been chosen to conduct the present study. The findings of the study revealed that the majority of students achieved high score performance, after the treatment phase. The study also indicates that there exists a significant and positive effect of Multimedia among class VIII students of Kolkata and Purba Medinipur.

Keywords: Class VIII students, Geotectonic, Multimedia, Satisfaction level, Teaching-Learning strategy.

Introduction

Modern education belongs to science and technology; therefore, every individual comes under its impact. In this Era, Students use technology daily and this has an impact on their education. Effective use of Multimedia in the classroom enables teachers and students to be innovative while developing new skills and providing information. It is noticed that students who received instructions based on multimedia instruction carried out better learning than students who were taught in the traditional teaching method (Narzoles, 2013). Nowadays students are using video games, video cams, digital music players, cell phones, computers, and all other tools of the digital age from their birth and those are the essential parts of their life. It is clear that Multimedia-aided Teaching (MAT) is more fruitful than the traditional Chalk and Talk (CAT) and also more effective for the cognitive and attitude development of the students (Saha & Khan, 2015). Specifically, the multimedia

technique is a much better instruction way than traditional ways, which act on students' interest, attention, motivation and participation (Ilhan & Oruc, 2016). In recent times, the increase in the use of technology is shifting traditional classrooms into virtual classrooms by facilitating learning in new ways. Multimedia is used to facilitate learning anytime, anywhere.

Today, learning is not only involved to earn the degree but also involved to earn a depth of knowledge in the subject. The utilization of multimedia in classroom situations cannot be rebuffed anymore. Due to the conceptual difficulties in geotectonic, students often encounter perceptional conflicts that emerge from different interpretations of the same observation. It is also found that the school teachers are unable to solve those difficulties.

So, the main primary purpose of this study is to eradicate the fear of Geotectonic from students by utilizing new technology through multimedia. It is worth mentioning that studies on the following subject will be more effective and presentable if the researcher applied multimedia in teaching to show Geotectonic related matters through video clippings instead of traditional 2D blackboard work. That will make it possible for teachers to give more opportunities to students to be happier and more enjoyable during their studies. By using multimedia, not only different teaching and learning styles are used, but also the approach to learning is different which helps learners to construct their own knowledge. So, in this context researchers decided to study the effect of multimedia in teaching and its satisfaction level on students and also tried to find out the relation between them.

Objectives of the study

1. To find out the effectiveness of multimedia in teaching regarding achievement in respect to teaching Geotectonic.

2. To find out the level of satisfaction among students in relation to multimedia teaching methods.

Hypotheses of the study

1. $H_0 1$: There is no significant interaction effect between locality and school type on the achievement test of students with respect to teaching in multimedia.

2. $H_0 2$: There are no significant differences in mean scores of achievement tests through the traditional method between pre-test and post-test of controlled groups.

3. $H_0 3$: There are no significant differences in mean scores of achievement tests between pre-test and post-test of experimental groups in rural areas after teaching through multimedia methods.

4. $H_0 4$: There are no significant differences in mean scores of achievement tests between pre-test and post-test of experimental groups in urban areas after teaching through multimedia methods.

5. $H_0 5$: There is no significant difference in mean scores of achievement tests through multimedia between the pre-test and post-test of the experimental group.

6. $H_0 6$: There is no significant difference in mean scores of achievement tests between pre-test and post-test of experimental groups in Government aided schools.

7. $H_0 7$: There is no significant difference in mean scores of achievement tests between pre-test and post-test of experimental groups in Private schools.

8. H_08: There is no significant difference in mean scores of satisfaction levels among experimental groups of students with respect to teaching in multimedia.

Methodology

Sample: A random sampling technique was employed for class VIII students of North Kolkata and Purba Medinipur. The data was collected from a total of 335 students of class VIII, but the study consisted of 320 students. Among them, 160 were randomly chosen as samples of the experimental group and the rest 160 were chosen as samples of the controlled group. From each group of 160 students 40 students were selected location-wise (Rural/Urban) and School type wise (Government/ Private).

Tools: For collecting the data, a self-made close-ended opinionnaire was prepared to analyse the views of students regarding their perception of the new teaching strategies through multimedia. The opinionnaire consists of 15 items on a five-point Likert scale. The maximum possible score is 75 and the minimum possible score is 15. For testing the internal consistency or homogeneity among the items of the Opinionnaire, researchers used Cronbach's alpha (α) coefficient, which came to 0.789. On the other hand, the Criterion-referenced Test was prepared to measure the pre-test and post-test scores of the students. This CRT Test was admired by a pilot study through the test-retest method.

Research Design: The present study has used True Experimental Research Design along with pre-test and post-test of randomized experimental and controlled groups to measure the effect of multimedia in teaching regarding class VIII students' achievement in respect to teaching Geotectonic.

Variable: In this study, teaching strategies were selected as independent variables and performance on achievement tests was selected as dependent variables. On the other hand, Location and school type was selected as categorical variables.

Treatment Phase: Researchers were given treatment for the samples in three phases like Phase1-Interior of the Earth, Phase2- Plate tectonics and Phase3- Rocks with the help of multimedia and self-prepared learning design. Each phase takes one week to complete. In the fifth week, post-test was conducted for both controlled and experimental groups.

Procedure of Data Collection: Researchers administered a pre-test (T_1) as a measure of the dependent variable for both controlled and experimental groups. As there was a randomly assigned sample as experimental and controlled group, the researcher introduced the treatment only to the Experimental group for a specific period. At the end of the experiment, the experimental and controlled group was administered the post-test (T_2) as the measure of dependent variable.

Results and Interpretation

H_01: There is no significant interaction effect between locality and school type on the achievement test of students with respect to teaching in multimedia.

Table-1: Inferential Statistics (ANOVA: Two factors with replication for an interaction effect between locality and school type)

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	292.6125	1	292.6125	34.57755	1.03E-07	3.96676
Columns	762.6125	1	762.6125	90.11669	1.53E-14	3.96676
Interaction	56.1125	1	56.1125	6.630724	0.011966	3.96676
Within	643.15	76	8.4625			
Total	1754.4875	79				

Interpretation: It is found that the interaction P-value is 0.011966 ($P<0.05$) and F = 6.630724. So, H_01 is rejected and there is a significant effect between school type and locality on the achievement test of students with respect to teaching in multimedia.

H_02: There are no significant differences in mean scores of achievement tests through the traditional method between pre-test and post-test of controlled groups.

Table-2: Inferential Statistics (Paired Sample t Test for pre-test and post-test of Controlled group through traditional method)

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE TEST_ TOTAL MARKS	15.33	80	3.592	0.402
	POST TEST _ TOTAL MARKS	16.58	80	3.893	0.435

Paired Samples Test									
Mean		Paired Differences					T	df	Sig.
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					(2-tailed)
				Lower	Upper				
Pair 1	PRE TEST_ TOTAL MARKS - POST TEST _ TOTAL MARKS	-1.250	1.747	0.195	-1.639	-0.861	-6.401	79	0.000

Interpretation: It is found that the mean score of pre-test is 15.33 with 3.592 S.D. and the mean score of post-test is 16.58 with 3.893 S.D. Whether the difference of mean is significant or not, the t-test is employed and after analysis it is found that the calculated $t_{(79)}$ = 6.401 and P = 0.001 (P<0.05). So, 't' is significant and H_02 is rejected. Hence, we can conclude that there is a significant difference in achievement test result between pre-test and post-test of controlled groups regarding traditional methods.

H_03: There is no significant difference in mean scores of achievement tests through multimedia between pre-test and post-test of the experimental group.

Table-3: Inferential Statistics (Paired Sample t-Test for pre-test and post-test of experimental group through multimedia)

		Mean	N	Std. Deviation	Std. Error Mean				
Pair 1	PRE TEST_ TOTAL MARKS	16.09	80	3.953	0.442				
	POST TEST_ TOTAL MARKS	18.64	80	4.713	0.527				

Paired Samples Statistics (header spanning above)

Paired Samples Test

		Mean	Paired Differences					t	df	Sig. (2-tailed)
			Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
Pair 1	PRE TEST_ TOTAL MARKS - POST TEST_ TOTAL MARKS	-2.550	2.261	0.253	-3.053	-2.047		-10.088	79	0.000

Interpretation: It is found that the mean score of the pre-test is 16.09 with 3.953 S.D. and the mean score of the post-test is 18.64 with 4.713 S.D. Whether the difference in mean is significant or not, the t-test is employed and after analysis it is found that the calculated $t_{(79)}$ = 10.088 and P = 0.001 (P<0.05). So, 't' is significant and H_03 is rejected. Hence, we can conclude that there is a significant difference in achievement test results between the pre-test and the post-test of experimental groups regarding multimedia.

H_04 : There are no significant differences in mean scores of achievement tests between the pre-test and the post-test of the experimental groups in rural areas after teaching through multimedia.

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	RURAL_PRE TEST_ TOTAL MARKS	15.20	40	4.345	.687
	RURAL POST TEST_ TOTAL MARKS	16.73	40	4.941	.781

Table-4: Inferential Statistics (Paired Sample t-Test for the pre-test and the post-test of the experimental group in a rural area after teaching through multimedia)

Paired Samples Test									
					Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	RURAL_PRE TEST_TOTAL MARKS- RURAL POST TEST_TOTAL MARKS	-1.525	1.754	0.277	-2.086	-0.964	-5.499	39	0.000

Interpretation: It is found that the mean score of pre-test is 15.20 with 4.345 S.D. and the mean score of post-test is 16.73 with 4.941 S.D. Whether the difference of mean is significant or not, the t-test is employed and after analysis it is found that the calculated $t_{(39)}$ = 5.499 and P = 0.001 (P<0.05). So, 't' is significant and $H_0 5$ is rejected. Hence, we can conclude that there is a significant difference in achievement test result between pre-test and post-test of experimental groups in rural areas regarding after teaching through multimedia.

$H_0 5$: There is no significant difference in mean scores of achievement tests between the pre-test and the post-test of experimental groups in urban areas after teaching through multimedia.

Paired Samples Test									
	Mean	Paired Differences					t	df	Sig. (2-tailed)
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	URBAN_PRE TEST_ TOTAL MARKS - URBAN_ POST TEST_ TOTAL MARKS	-3.575	2.263	0.358	-4.299	-2.851	-9.990	39	0.000

Table-5: Inferential Statistics (Paired Sample t-Test for the pre-test and the post-test of the experimental groups in urban areas after teaching through multimedia.

Paired Samples Statistics		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	URBAN_PRE TEST_ TOTAL MARKS	16.98	40	3.340	.528
	URBAN_POST TEST_TOTAL MARKS	20.55	40	3.616	.572

Interpretation: It is found that the mean score of the pre-test is 16.98 with 3.340 S.D. and the mean score of the post-test is 20.55 with 3.616 S.D. Whether the difference in mean is significant or not, the t-test is employed and after analysis it is found that the calculated $t_{(39)}$ = 9.990 and P = 0.001 (P<0.05). So, 't' is significant and $H_0 6$ is rejected. Hence, we can conclude that there is a significant difference in achievement test results between the pre-test and the post-test of experimental groups in urban areas regarding after teaching through multimedia.

$H_0 6$: There is no significant difference in mean scores of achievement tests between pre-test and post-test of the experimental groups in Government aided schools after teaching through multimedia.

Table-6: Inferential Statistics (Paired Sample t-Test for the pre-test and the post-test of the experimental group in Government aided schools after teaching through multimedia)

Paired Samples Statistics		Mean	N	Std. Deviation	Std. Error Mean			
Pair 1	GOVT AID_PRE TEST_ TOTAL MARKS	13.33	39	2.950	.472			
	GOVT AID_POST TEST_TOTAL MARKS	15.46	39	3.425	.548			
Paired Samples Test								
Mean		Paired Differences				t	df	Sig. (2-tailed)
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			

Pair 1	GOVT AID_PRE TEST_ TOTAL MARKS - GOVT AID_POST TEST_TOTAL MARKS	-2.128	2.226	0.357	-2.850	-1.406	-5.970	39	0.000

Interpretation: It is found that the mean score of the pre-test is 13.33 with 2.950 S.D. and the mean score of the post-test is 15.46 with 3.425 S.D. Whether the difference of mean is significant or not, the t-test is employed and after analysis, it is found that the calculated $t_{(39)}$ = 5.970 and P = 0.001 (P<0.05). So, 't' is significant and H_08 is rejected. Hence, we can conclude that there is a significant difference in achievement test result between the pre-test and the post-test of experimental groups in Government aided schools regarding after teaching through multimedia.

H_07: There is no significant difference in mean scores of achievement tests between the pre-test and the post-test of the experimental groups in Private schools after teaching through multimedia.

Table-7: Inferential Statistics (Paired Sample t-Test for the pre-test and the post-test of the experimental group in Private schools after teaching through multimedia)

Paired Samples Statistics		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PVT_PRE TEST_ TOTAL MARKS	18.93	40	2.526	.399
	PVT_POST TEST_TOTAL MARKS	21.73	40	3.700	.585

Paired Samples Test									
	Mean	Paired Differences					t	df	Sig. (2-tailed)
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	PVT_PRE TEST_ TOTAL MARKS - PVT_POST TEST_TOTAL MARKS	-2.800	2.053	0.325	-3.457	-2.143	-8.625	39	0.000

Interpretation: It is found that the mean score of the pre-test is 18.93 with 2.526 S.D. and the mean score of the post-test is 21.73 with 3.700 S.D. Whether the difference of mean is significant or not, the t-test is employed and after analysis it is found that the calculated $t_{(39)}$ = 8.625 and P = 0.001 (P<0.05). So, 't' is significant and H_09 is rejected. Hence, we can conclude that there is a significant difference in achievement test results between the pre-test and

the post-test of experimental groups in Private School regarding after teaching through multimedia.

H₀8: There is no significant difference in mean scores of satisfaction level among experimental groups of students with respect to teaching in multimedia.

Table-8: Inferential Statistics (One-Sample t-Test for satisfaction level among experimental group of students with respect of teaching in multimedia)

One-Sample Statistics						
	N	Mean	Std. Deviation	Std. Error Mean		
EXPERIMENTAL GROUP_ TOTAL_MARKS	80	60.18	3.306	.370		

One-Sample Test						
	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
EXPERIMENTAL GROUP_ TOTAL_MARKS	162.791	79	.000	60.175	59.44	60.91

Interpretation: It is found that the mean score of the experimental group satisfaction level is 60.18 with 3.306 S.D. Whether the difference in mean is significant or not, the t-test is employed and after analysis it is found that the calculated $t_{(79)}$ = 162.791 and P = 0.001(P<0.05). So, 't' is significant and $H_0$4 is rejected. Hence, we can conclude that there is a significant difference in the post-test results of the experimental group regarding student satisfaction level.

Findings of the study

- In this study, it is shown that there is a significant relationship between the pre-test and the post-test results of experimental groups regarding traditional methods and multimedia methods.

- It is observed that there is a

significant effect in the post-test score of students with regards to their learning Geotectonic through multimedia method.

- The mean of the post-test scores is showing that there is a remarkable improvement from the pre-test scores of the students, after introducing a new teaching method.

- The Experimental treatment proved effective and the post-test results improved in this selected topic.

- The results of the mean score by which the post-teaching scores of the students have improved after the implementation of the intervention strategies also show the effectiveness of the treatment given to the students for developing their knowledge.

- It is also observed that there is a

significant improvement in the post-test scores of students in respect of locality and school type.

- The mean of the post-test scores of Private school students was much better than the Government school students. On the other hand, the mean scores of urban area's school students were much better than rural areas.

- On the other side of the research, it was also seen that the score of the experimental group's satisfaction level is high. It is indicated that they felt pleasure through innovative teaching strategies.

- From this study, the researcher finds out that many samples had no idea about the Geotectonic (class VIII geography chapter). Therefore, they got a chance to better their knowledge through multimedia methods.

Suggestion

How a presentation of a teacher in teaching affects the learning of students. This study is also helpful for Geography teachers, they can be enhanced for better development of teaching techniques through multimedia and in turn, they adopt necessary action for better scaffolding and thereby adopt new teaching strategies to present Geotectonic in a more effective and interesting way.

Conclusion

In our teaching-learning process, there is little doubt that the changing role of education is presently being refreshed with the effect of multimedia technologies. This theme has constructed a new paradigm in education and the emergence of new concepts in Geotectonic, which enhance students' learning capabilities. This new learning environment will specifically influence the way teachers teach and students learn. This study has represented and cultivated the use of multimedia in a learning environment to prepare students with critical thinking and problem-solving skills and they will be able to learn in an ICT-oriented learning situation. From the results, we are able to decide that by implementing multimedia into the teaching-learning process, the traditional method is recharged and redirected in a new path of innovation. Students act like active participants in their learning process and are able to use various elements of multimedia to achieve their goals. In this respect, there is no doubt to say that the effect of multimedia in teaching is very useful to help students' learning. (Acknowledgement: Researchers would like to acknowledge all the heads of the schools, teachers, and students of West Bengal Govt. aided and private Bengali medium schools in Purba Medinipur and North Kolkata, who participated in the present study.)

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Online Education during COVID-19 Pandemic: Challenges for Children with Disabilities

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Abstract

The COVID-19 pandemic has hit hard every aspect of life and has affected everyone disproportionately. Due to its viral and contagious behaviour, it forced the closure of educational institutions including those working for children with disabilities. In Kashmir, the schools were closed in March, 2020 and were reopened for a very brief period in March 2021, following a subsequent lockdown in March 2021 only. Consequently, the educational institutions resorted to an online mode of education to avoid any academic losses for the students. While this decision seemed a viable option, the vulnerable groups like children with disabilities and children enrolled in special schools found it difficult to cope with this medium of education. This is particularly for students with visual disabilities, developmental disabilities and hearing and speech impairments. In this regard, this paper is an attempt to unravel the experiences of parents of this vulnerable group. We have followed a qualitative methodology and interviewed twenty parents of children with different disabilities to explore their experiences of the online mode of education and its implications for their children with disabilities.

Keywords: Online classes, COVID-19, children with disabilities, Kashmir

Introduction

Online education has been seen as a promising agent in creating new opportunities for students, faculty and educational institutions (Mayadas, Bourne & Bacsich, 2009). With the invention of the World Wide Web in 1992, the online mode of education was made more accessible and it also paved for more pedagogical models to emerge (Harasim, 2000). Online Learning can be understood as a tool which can aid in making the 'teaching-learning process more student-centered, more innovative, and even more flexible' (Dhawan,2020) and is defined as 'learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access' (Singh & Thurman, 2019 as cited in Dhawan, 2020, p.7). However, the different terms and arguments related to online learning like accessibility, affordability, flexibility, learning pedagogy, life-long learning, and policy (Dhawan, 2020) have a correlation with the target group under consideration.

Children of all ages and from all countries are affected by this pandemic, and among them, vulnerable groups like children with disabilities need extra care and protection in these times (UN Policy Brief, 2020). Schiariti (2020) says that in times of a crisis, 'children with disabilities face additional challenges as a result of their functional limitations; but most importantly, the many barriers

that society throws in their way' (p.661). During the times of crisis, they are most likely to be excluded and left behind from basic services like education and health (UNRWA, 2020). They may have diverse needs in times of this pandemic that may go unnoticed. They can become more vulnerable in these times as they may have greater needs for healthcare, an increased dependency on community-based services and concerns regarding mental health (Aishworiya & Kang, 2020). Similarly, (Asbury et al., 2021) discuss how parents and children in the UK have experienced loss, worry and changes in mood due to the social changes that have occurred. Children with disabilities, especially those with sensory impairments can face barriers in the access to inclusive public health information that relates to the preventive measure during these times and can face barriers to essential services and basic WASH facilities may also be rendered unavailable to them because of poverty and other barriers in accessing these services (UNICEF, 2020). The parents of children with disabilities may be equally vulnerable during these times and can face various psychological problems (Provenzi et al., 2020 a). It may be due to the interruption in daily rehabilitation services and lack of recreational opportunities along with the burden of caring for their 'child with special needs' and balancing their work-life (Provenzi, Grumi, Borgatti,2020 b).

Another important aspect here pertains to the education of children with disabilities. The pandemic has forced the closure of schools across the world, with India being no exception to it. The closure of schools has impacted the overall system of education for children and online modes of education are seen as a viable option. But at the same time, there are various problems associated with such a mode of education as students who are not privileged can suffer due to these digital modes of education (Jena, 2020). In the same line, online modes of education may not be a viable option for children with disabilities and their parents. As Masonbrink & Hurley, (2020) note that the closing of schools indicates a loss of critical resources and special educators for children with disabilities, also their parents are less likely to be equipped with resources to maintain remote learning. Students with disabilities are less likely to be benefitted from the distance learning teaching methods as they mostly rely on face-to-face services (UN Policy Brief, 2020).

Review of Literature

Garbe et al., (2020) have conducted a study to understand the experiences of the parents with remote learning. The study was conducted using an online survey and thematic coding was done to understand the perception and experiences of 112 parents during the COVID-19 school closure. The findings revealed that the parents were satisfied with the decision of the school closure and the level of support provided, yet they faced problems in certain areas which included problems while balancing responsibilities, motivation of the learner and outcomes of learning.

Zhang et al., (2020) have conducted a study to understand the impact of COVID-19 on the students with disabilities and their health concerns. The study was done with 147 students out of which 119 were without disabilities and 28 were students with disabilities/health concerns. The analysis has revealed that students with disabilities faced more problems and adjustments with the online mode of learning than their non-disabled counterparts. They also faced more COVID- related adversities than their counterparts. The study also revealed the anxiety and worry among students with disabilities vis-à-vis online learning and its impact on their grades and financial concerns.

A study done by (Amor et al., 2020) explores the impact of COVID-19 on with people having Intellectual Developmental Disabilities (IDD) and the response employed in Spain during the period of lockdown. The sample for the study was 582 individuals with IDD who shared their perspectives on COVID-19 and its consequences. The analysis has revealed that support was conditioned by the living contexts. The participants living in certain conditions had less natural supports while participants who lived with their families had relied on it. The participants had received information regarding the COVID-19 from the organizations working for the disabled, friends, groups, family and in some cases from health care centres.

Methodology

This study used a qualitative methodology to understand the perception of teachers and parents regarding the online system of education and its implications on children with disabilities. Qualitative data are a source of well-grounded rich descriptions of social processes (Miles, Huberman & Saldana, 2014). A qualitative approach was found to suit best to this study as this approach 'looks deep into the quality of social life. It locates the study within particular settings, which provides opportunities for exploring all possible social variables, and set manageable boundaries' (Holliday, 2016) pp.6. Additionally, non-probability and purposive sampling techniques were used to identify the participants. The aim of qualitative studies is not to generalization but to get a nuanced analysis of the phenomena being studied (Sandelowski, 1995). The inclusion criteria were parents of children enrolled in special schools in Kashmir.

1. Data Collection and Analysis

The data was collected through semi-structured in-depth interviews that were done by the first author. The interviews were tape-recorded with the prior permission of the participants and also notes were taken simultaneously. At the onset, the purpose of the interviews was explained and the meetings were set according to the convenience of the participants. Due to the present circumstances of COVID-19, meeting all the participants at home was not possible. So, telephonic interviews were preferred and as such interviews were conducted accordingly.

The recorded interviews were transcribed and translated from Kashmiri to English. The transcripts were read thoroughly and then coded. After the initial set of codes was identified, we then devised categories and from these categories were narrowed down to three major themes.

2. Ethical Consideration

All the ethical issues were taken into consideration. Informed consent was taken from all the participants. The purpose of the interviews was made clear to all the participants. We also discussed their right to withdraw from the interview at any stage. The interviews were tape-recorded with the prior permission of the participants and pseudonyms are used for this paper.

Participants

The participants for this study were the parents of children with disabilities who are enrolled in special schools in Kashmir. The detailed description is given in Table 1 below.

Table-1: Description of Participants

S. No.	Pseudonym	Occupation of Husband/Wife	Gender of Child	Age of Child	Type of Disability in Child
1	Ahmad (F1) and Asifa (M1)	Business/ Housewife	Male	13 Years	Down's Syndrome
2	Feroz (F2) and Haseena (M2)	Government Job/Housewife	Female	9 years	Down's Syndrome
3	Heena (M3) (Divorced)	Private Job	Female	10 years	Autism
4	Ali (F4) and Mansha (M4)	Govt. Job/ Teacher	Male	12 years	Learning Disability
5	Fahad (F5) and Hafsa(M5)	Private Job/ Housewife	Female	8 years	Learning Disability
6	Showkat (F6) and Fatima(M6)	Govt. Job/ Housewife	Male	11 years	Learning Disability
7	Sahil (F7) and Bushra (M7)	Business/ Private Job	Male	6 years	Down's Syndrome
8	Fayaz (F8) and Snober (M8)	Govt. job/ Housewife	Female	12 years	Hearing Impairment
9	Rasiq (F9) and Zareena (M9)	Business/ Govt. Job	Male	8 years	Autism
10	Hilal (F10) and Shagufta (M10)	Govt. Job/ Teacher	Male	14 years	Visual Impairment
11	Shiraz (F11) and Tehseensa (M11)	Business/ Private Job	Male	11 years	Visual Impairment
12	Shoaib (F12) and Gazala (M12)	Private Job/ Housewife	Male	10 years	Down's Syndrome
13	Aijaz (F13) and Sabreena (M13)	Govt. Job/ Housewife	Female	14 years	Visual Impairment
14	Athar (F14) and Beenish (M14)	Teacher/ Bank Employee	Male	9 years	Down's Syndrome
15	Shariq (F15) and Afroza (M15)	Govt. Job/ Housewife	Female	5 years	Visual Impairment
16	Manzoor (F16) and Amina(M16)	Teacher/ Housewife	Male	7 years	Down's Syndrome
17	Bashir (F17) and Rizwana (M17)	Farmer/ Housewife	Male	10 years	Visual Impairment
18	Alim (F18) and Tahira (M18)	Govt. Job/ Housewife	Female	9 years	Autism
19	Shakeeb (F19) and Nisa(M19)	Business/ Housewife	Female	10 years	Down's Syndrome

20	Waseem (F20) and Bisma (M20)	Teacher/ Housewife	Female	12 years	Down's Syndrome

Findings

After analyzing the data, three themes were identified that narrate the perspectives and experiences of the participants. The themes are:

1. Challenges with Online Mode of education.

2. Issues of Accessibility and Satisfaction with the Classes

3. The Financial Burden.

1. Challenges with Online Mode of Education:

The online mode of education has brought various challenges with it. The COVID-19 pandemic has forced the current system of education to switch to online mode. Various studies have concluded how the online mode of education has burdened the parents, teachers and students. Within this, children with disabilities and their parents form a vulnerable group who face different problems than mainstream society. As M6, shares the experience of their son with online classes as:

> My son is not able to understand anything through the online mode of education. The teachers try hard to keep him engaged but he is unable to cope with this.

Sharing similar thoughts F2 says that:

> Our daughter has Down's Syndrome. She was enrolled in a special school which she attended regularly. But due to the lockdown, she is unable to go to school. Now she is attending her classes online which are not of any benefit to her.

Some of the parents shared their concern about how they felt that the online mode of education was a difficult and different process to understand for them. As M5 shares:

> I am not able to use and adapt to these online classes. How can I expect my child to understand this? It is very different form of learning. Earlier our children used to be at school and we only helped them with their homework but now we have to sit with them continuously and learn everything along.

Similarly, F15 shares that:

> The earlier system of education was one-to-interaction, especially for students with disabilities. Now, the virtual mode has changed this concept altogether. Adapting to this routine has become difficult for both parents as well as children.

Sharing the concern regarding the online mode of education M9 says that:

> My child has autism. He used to go to a centre for special kids. He was showing good progress. But with this online mode of education, his progress has suffered. He is not benefiting from these online classes as he does not make eye contact and does not look at the screen continuously. He needs one to one sessions.

Some of the parents discussed how the teachers had advised them to engage in the sessions and teach their children afterwards. M11 says that:

> My child has a visual disability. He uses braille, and these online classes are of no help to him. His teachers

told us that we should learn braille so that teaching him would be easy. But they don't understand that learning it is equally difficult for me.

2. Issues of Accessibility and Financial Implications.

The second theme discusses the digital accessibility barriers that the parents faced. The theme also explored the satisfaction that the parents felt with the online mode of education for their children. The narratives point out how access to resources like smartphones and high-speed internet had impacted them. F6 shares that:

> After the lockdown was announced, we got a call from the school authorities regarding the conducting of online classes. Accordingly, we had to arrange a new smartphone for her so that she would not skip her classes.

Accessibility becomes an important issue while we discuss using online modes of education. Here M6 shares that:

> Kashmir is a conflict zone. We have witnessed frequent shutdowns and internet blockades. When the pandemic started there was only 2G internet for some months which aggravated our stress.

Regarding the financial implications of the online classes, F12 shares that:

> We don't have access to broadband, high-speed internet or costly phones. I am a poor person and I cannot manage all these things. Initially, my son missed all his classes because of this, then we had to arrange a smartphone for him.

M3 shares that:

> I have three children and I am divorced for 5 years now. Keeping

three separate smartphones for my children is not possible for me. My younger daughter was enrolled in a special school, but she had to skip her classes for two months because I didn't have a separate phone for her. Then a local NGO gave us a phone.

In the same line, F17 says that:

> They switched to the online mode of education without realizing the implications for poor people. They didn't provide us with smartphones, but expected our children to attend the classes regularly.

3. Satisfaction with the Classes

An important point of discussion here remains the satisfaction of parents and students with the online mode of learning. In the previous themes, it was discussed how the parents had gone to any length to arrange the resources for their children so that they won't miss any of their classes or sessions. But, of equal importance remains here to understand their level of satisfaction. Here F10 says that:

> The online mode of education demands time management and other resources. It may prove fruitful to students without disabilities but not for our children.

F8 shares that:

> I feel that assessment of progress through this online medium is not valid and up to the mark. But the current pandemic has forced us to do so.

In the same line M16 shares that:

> Even the teachers are unable to devise appropriate content for children with disabilities. This mode of education has difficulty in meeting the academic discipline... but what else can be done is the

need of the hour.

Drawing a contrast between her disabled and non-disabled children, M20 says that:

> I have four children, three among them are non-disabled. They can manage their classes well and learn something new every day. But as far as my daughter with a disability is concerned, she is not able to cope with the online classes. Their curriculum is different from mainstream schools. As such they are not able to benefit much from these classes.

Sharing a different experience M14 says that:

> I am a working woman and I have two children. My elder son can manage his classes on his own. But my younger son has a disability and he is not able to manage it. I am also not able to help him out as I have a full-time job. This has been a source of stress for me. I don't know if he is benefitting from his online sessions or not.

Adding to this F19 says that:

> The teachers of this Institute are really good and hardworking. My daughter takes her classes through an NGO working for children with disabilities. They also make home visits once a week to ensure that her progress is not hampered.

The parents discussed how they were not fully satisfied with the online mode of classes for their children, yet we're quick to add how it was the only option during the current pandemic. At the same time, we observed how they were discussing that the school authorities and respective governments should take appropriate measures and steps to ensure that children with disabilities are not left out and their progress is not hampered.

Discussion

The themes that have emerged from the analysis of data have shown how parents of children with disabilities in Kashmir are struggling with the online mode of education. There are many problems associated with this mode of education, as the satisfaction with classes, financial implications and issues of accessibility. The participants of our study were not satisfied with the online mode of education, yet they were quick to add that studying in this manner was the need of the hour. Here, it is important to understand that the needs of vulnerable groups during the times of a pandemic should be considered. But we note how children with disabilities were left out of the intervention strategies that were followed to minimize the academic losses. For students with disabilities, 'individual learning plans' are deemed best to create student-centric learning. But this was by large compromise as we switched to an online mode of education. Additionally, the other barriers like financial implications need to be noted, as were discussed by the participants of this study. Here, children with disabilities from lower socio-economic strata faced additional vulnerabilities as their parents struggled to arrange uninterrupted internet and smartphones for them. Children with disabilities are at particular risk of academic losses as schools have resorted to online modes of education. COVID-19 can have an adverse impact on children's education as extended school closure may lead to lower educational attainment (Psacharopoulos et.al, 2020; Masonbrink & Hurley, 2020).

Conclusion

In this paper, we have focused on the experiences of parents having children with disabilities vis-a-vis online mode of education. We have used a qualitative methodology to explore their experiences of the online mode

of education and its implications for their children with disabilities. The narratives point out the difficulties encountered by the participants and some narratives show how some children with disabilities struggle with the online mode of education. It is also known that the COVID-19 pandemic has disrupted every aspect of life and has created disequilibrium in all the phases of living. The current pandemic has affected everyone disproportionately. It has led to the closure of schools, thus forcing the students to take classes online. The current system of education has not considered the concerns of young children with disabilities who are enrolled in different special schools. This category of students is not able to fully benefit from this mode of education and thus may lag behind. This pandemic is not going to end any time soon, so the mainstream population has devised ways and means to adapt and adjust accordingly. So, the concerns of students with disabilities, particularly young students with disabilities should be taken into consideration.

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Effectiveness of Blended Teaching Approach on Students' Achievement to Learn English: An Experimental Study

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Abstract

The present study aims to investigate the effectiveness of the blended teaching approach on students' achievement to learn the pedagogy of the English language. An experimental research strategy with a pretest-posttest equivalent groups design was used. The study sample comprised 28 B. Ed students who were randomly divided into experimental and control groups. The experimental group studied the pedagogy of the English language through a blended teaching approach, an integration of e-learning with traditional face-to-face learning, whereas the control group was instructed solely by the latter. An achievement test was administered between the two groups before and after the experimental treatment. The result of the t-test revealed statistically significant differences between the two groups in the post-achievement test, indicating that the experimental group outperformed the control group. Significant differences were also found in the mean achievement scores of the experimental group before and after the treatment, signifying the effectiveness of the blended teaching approach for learning the pedagogy of the English language.

Keywords: Blended teaching, effective learning, e-Learning, English pedagogy, students' achievement, traditional teaching

Introduction

Teaching cannot be defined separately from learning. It is guiding and facilitates learning, enabling the learner to learn. A teacher's responsibility is thus multifaceted: it is to assist learning, to help learners on their learning path, to know when to intervene (with suggestions, explanations, and encouragements), and when to stand aside and observe (King, 2016). In the current digital era, learners have become technology-oriented, which the teacher must leverage to the fullest extent possible, as learning occurs everywhere and at any time, not just in the classroom.

Students can't be 'taught' – they can only be helped to learn. In a student-centred classroom, a teacher's role is to support and encourage students to develop their skills, but without relinquishing their traditional role as a source of information, advice and knowledge. Here, the teacher and the students are a team working together. (Jones, 2007, p.25)

This becomes true when a blended approach to teaching-learning is practised. It empowers the learners by providing them rich interactive input, giving them just-in-time support, assisting them in becoming independent learners and encouraging them to find new knowledge. Thus, the term 'blended' means combining different learning environments in integrated way−either

learning in the classroom with the teacher's help and support or learning online more independently or with peer support (King, 2016). As Marsh (2012) remarks, "Today blended learning can refer to any combination of different methods of learning, different learning environments, different learning styles" (p.3). Moreover, blended learning is a modern educational strategy that aims at interactive learning, resulting in the blending or mixing of a teacher's role in a traditional classroom with that of a virtual one (Oweis, 2018). In short, the effective implementation of blended teaching is to achieve the 'optimal' learning environment (Marsh, 2012).

Context of the Study

The rapid development of Information and Communication Technology (ICT) has transformed the medium of instruction adopted by academicians to deliver the course content. Most of the teacher educators aiming at effective and joyful learning often intend for a blended approach where e-learning coincides with traditional face-to-face learning. Is this blended approach better than the conventional face-to-face approach? Is blended teaching an effective tool for learning the pedagogy of the English language in a Bachelor of Education (B. Ed) course? Can any significant differences be found between the mean achievement scores of the students learning the pedagogy of the English language based on teaching style, blended or traditional? The present study sought to answer these questions.

Objectives of the Study

The objectives of the present study can be stated as follows:

- To compare the mean achievement scores of the experimental and the control groups before the

experimental treatment.

- To compare the mean achievement scores of the experimental and the control groups after the experimental treatment.

- To compare the mean achievement scores of the experimental group before and after the experimental treatment.

- To suggest an effective method for teaching English language pedagogy based on the findings of the study.

Hypotheses

The study has tested the following hypotheses:

H_o **1:** There is no significant difference between the mean achievement scores of the experimental and the control groups before the experimental treatment.

H_o **2:** There is no significant difference between the mean achievement scores of the experimental and the control groups after the experimental treatment.

H_o **3:** There is no significant difference in the mean achievement scores of the experimental group before and after the experimental treatment.

Significance of the Study

The significance of the study stems from the following considerations:

According to the American Society for Training and Development, blended teaching-learning is one of the top ten knowledge delivery trends (Bawadi, 2009).

Teachers, as we all know, are the engineers of our society. As a result, in a teacher training institution, a mixed approach to teaching and learning will assist student

teachers in becoming effective and competent instructors for our future society.

Instilling in all teacher training institutions a culture of blended teaching to achieve the "ideal" language learning environment.

Teacher educators will gain an understanding of the efficacy of a blended approach, while teaching the pedagogy of the English language to students.

Literature Review

Several research studies have been carried out to find various aspects of blended teaching methodologies in the context of English language learning. **Harker and Koutsantoni** (2005) investigated the impact of blended learning on the effectiveness of English for Academic Purposes (EAP) curriculum for students of various ethnic origins. Comparisons on student retention, achievement levels and satisfaction with the program between the two groups suggested that performance and satisfaction levels were similar in the two groups, the blended learning model being significantly superior only in terms of student retention.

Faced with the need to teach English to a large number of students, **Banados** (2006) developed an innovative Communicative English Program using ICT at the Universidad de Concepción in Chile, consisting of four modules taught across four academic terms. The results demonstrated that the blended learning model, combined with an online interactive multimedia language learning environment, was effective in enhancing students' language skills

According to **Badawi** (2009), blended learning is effective in strengthening prospective teachers' pedagogical knowledge. However, in terms of gaining prospective teachers' pedagogical performance, there was no significant difference between face-to-face and blended learning.

Dowling, Godfrey, and Gyles (2010) explored the connection between students' learning results and two different teaching models: traditional face-to-face and hybrid flexible delivery. According to the findings, the hybrid flexible delivery model increased learning outcomes and was more positively associated with students' final grades.

Yoon and Lee (2010) explored students' opinions and the effectiveness of blended learning as a teaching technique in an ESL writing session. Blended learning improved students' writing skills and motivation, as well as promoted skills such as interaction, autonomy, and collaboration.

Pardede (2012) reviewed existing ideas, practices, and empirical information concerning the nature of blended learning in general and Computer-Assisted Language Learning (CALL), a version of blended learning mainly used in English Language Teaching (ELT), in particular. The study showed that CALL with its variety of activity types enhanced EFL students' achievement.

Al Zumor (2013) investigated English as a Foreign Language (EFL), students' views regarding the advantages and limitations of merging the features of face-to-face language instruction and online language learning via the Blackboard learning management system. The author measured the correlations among students' grade point average (GPA), experience with blended learning and computer literacy. The result showed the clear advantages of the new experience, i.e. blended learning in improving and enriching students' English language skills.

Alseweed (2013) looked into the effects of traditional, blended, and

virtual classroom learning on university students' achievement and attitudes. Results indicated significant differences among the instructional approaches in the achievement test scores and students' attitudes in favour of blended learning.

Banditvilai (2016) did a case study to examine the role of blended learning in improving English learners' language abilities and learning autonomy. The findings suggested that using an online approach in conjunction with classroom training enhanced language learners' language skills, and their autonomy and motivation.

Ghazizadeh and Fatemipour (2017) investigated the impact of blended learning on the development of reading skills among Iranian English language learners in a quasi-experimental study. The researchers discovered that blended learning had a statistically significant positive effect on EFL learners' reading proficiency after comparing the two groups, experimental and control, using a t-test.

Tawil (2018) did a meta-analysis on the blended learning strategy and its application in language instruction. According to the findings, blending learning improved the learner's experience of a new language and increased efficiency in communication and practice.

The above review of the literature reveals that the blended approach became a core research area for many scholars. Although there is enough theoretical and procedural evidence on the blended approach of teaching–learning favouring its effectiveness, no

studies have examined the effectiveness of using the blended teaching approach on students' achievement to learn the pedagogy of the English language in a teacher training college. This aids the researchers conducting the present study.

Methodology

Variable

The study included the following variables:

(a) Independent variables are the two types of teaching approaches, one blended and another is face to face or traditional.

(b) Achievement test in English is taken as the dependent variable.

Sample

The sample of the study consisted of 28 B. Ed students in English from Hooghly B. C. Roy Institute, a teacher training college. All these selected participants were randomly divided into two equivalent groups where; the first was the experimental and the second was the control group, and they studied the pedagogy of the English language via blended and traditional teaching approaches, respectively.

Research Design

An experimental research design with pretest-posttest equivalent groups is chosen by the researchers for the present study. The study followed a pre-test, treatment, and post-test procedure. This design is expressed as follows:

Table-1: Design of the Study

Group	Pretest Score	Treatment	Posttest Score
Experimental	O_1	X_1	O_2
Control	O_3	X_2	O_4

[Here, X_1 is the Blended Teaching Approach and X_2 is Traditional Teaching Approach]

Tools

Blended Learning Course: The researchers developed a blended learning course based on four topics of the pedagogy of the English language and prepared different study materials like audio-visual videos, PowerPoint slides, and the Google Meet platform were used for online learning.

Achievement Test: A self-made achievement test was constructed by the researchers which consist of twenty questions with four options for each one from the topics covered under the area of pedagogy of the English language.

Study Procedures

The study was applied according to the following procedures:

The researchers constructed an achievement test based on the basic knowledge regarding the pedagogy of the English language and applied it to both the groups, i.e. experimental and control to ensure homogeneity of the samples.
The students of the experimental group were taught the pedagogy of the English language through a blended approach of teaching–learning for four weeks. This blended course was designed by the researchers to provide the basic knowledge and practices of pedagogy of the English language to the students of the B. Ed course. Four topics were selected from the prescribed syllabus of The University of Burdwan B. Ed 2nd Semester. The topics were: Methods and approaches to teaching English, Simulated teaching with its skills and component areas,

Pedagogical analysis of the English language and Utilization of learning resources in language teaching. The researchers developed different study materials including videos, PowerPoint presentations, etc. from the selected topics and uploaded them on the WhatsApp group, made particularly for the students of the blended course. Besides attending regular face-to-face learning the students received online synchronous learning on the Google Meet platform.

At the same time, students of the control group were instructed on the same topics using the regular educational materials, i.e. textbooks and a traditional face-to-face approach.

After the completion of different approaches to teaching-learning to both groups, an achievement test was administered. The researchers calculated the mean scores from the pre and post-achievement tests and employed a t-test through Statistical Package for the Social Sciences (SPSS).

Data Collection

According to the study procedures, the researchers collected empirical data from the participants using achievement tests.

Results and Discussion

To test the hypotheses of the study and determine the effectiveness of using a blended teaching approach on students' achievement, descriptive statistics such as mean, standard deviation and both independent and dependent sample t-tests were employed.
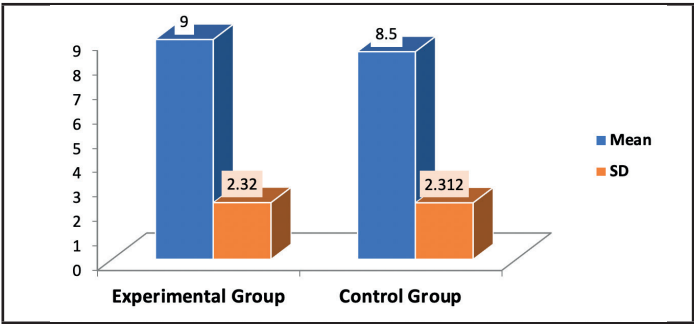
Null Hypothesis 1:

Table-2: Significance of Difference between Mean Scores of the Experimental and Control Groups on Pre Achievement Test (O_1 and O_3)

Group	N	Mean	Std. Deviation	Std. Error Mean	Std. Error Difference	t	df	Sig 2-tail
Experimental	14	9	2.320	0.620				
					0.875	0.571	26	0.573
Control	14	8.5	2.312	0.617				

Table 2 demonstrates the similar mean scores of both the experimental and control groups, i.e. 9 and 8.5 respectively on the pre-achievement test. Here, the computed value of t, i.e. 0.571 is quite smaller than the critical table values 2.06 and 2.78 with 26 degrees of freedom at 0.05 and 0.01 levels of significance, respectively. So, the result is insignificant and the null hypothesis cannot be rejected. The result assures that there is no significant difference between the mean scores of the experimental and control groups before treatment. The two groups were equal in terms of their basic knowledge regarding the pedagogy of the English language which in turn assures sample homogeneity before the experimental treatment. The below pictorial representation explicitly justifies the null hypothesis.

Figure-1: Achievement Scores of the Experimental and Control Groups before Treatment
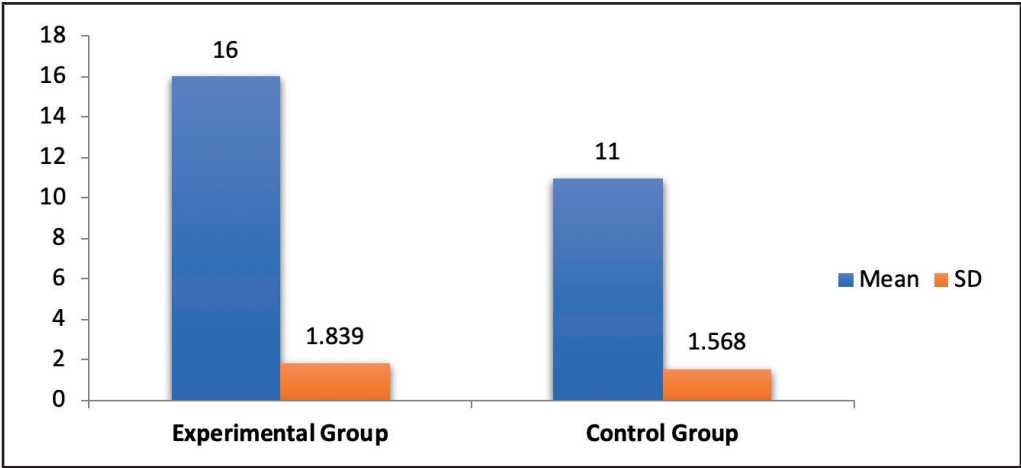

Null hypothesis 2:

Table-3: Significance of Difference between Mean Scores of the Experimental and Control Groups on Post Achievement Test (O_2 and O_4)

Group	N	Mean	Std. Deviation	Std. Error Mean	Std. Error Difference	t	df	Sig 2-tail
Experimental	14	16	1.839	0.491				
					0.646	7.737	26	0.000
Control	14	11	1.568	0.419				

As displayed in Table 3, the mean score of the experimental group 16 is higher than the mean score of the control group 11 on the post-achievement test. Here, the computed value of t, i.e. 7.737 exceeds the critical table values 2.06 and 2.78 with 26 degrees of freedom both at 0.05 and 0.01 levels of significance, respectively. Therefore, the result is statistically significant and the null hypothesis is rejected at both levels of significance. The result shows a significant difference between the mean achievement scores of the experimental and the control group after receiving the treatment. The difference between the mean scores is entirely trustworthy and dependable to say that the blended approach is more effective as a teaching method than the traditional face-to-face method. The following graphical presentation depicts higher achievement scores of the experimental group, which supports the use of blended teaching methods.

Figure-2: Achievement Scores of the Experimental and Control Groups after Treatment

Null Hypothesis 3:

Table-4: Significance of Difference between Mean Scores of the Experimental Group on Pre and Post-Achievement Tests (O_1 and O_2)

| Group	N	Mean	Std. Deviation	Std. Error Mean	Std. Error Difference	t	df	Sig 2-tail
Experimental	14	9	2.320	0.620	0.288	-10.429	13	0.000
Control	14	11	1.839	0.491				

As shown in Table 4, the mean score of the experimental group, i.e. 16 on the post-achievement test is higher than the mean score i.e. 9 of the same group on the pre-achievement test. For the significance at the 5 per cent and 1 per cent levels, the critical table values are 2.16 and 3.01 with 13 degrees of freedom, respectively. Here, the computed value of t i.e. -10.428 crosses the critical table values at 0.05 and 0.01 levels of significance. Hence,

it is to be taken as significant, resulting in the rejection of the null hypothesis. Consequently, it can be said that there exists a significant difference between the pre and post-achievement test scores. The significant difference between the mean scores helps to justify that the blended teaching approach proves more fruitful than the regular teaching method. The improved mean achievement score of the experimental group is highlighted in figure-3.

Figure-3: Pre-test and Post-test Scores of the Experimental Group
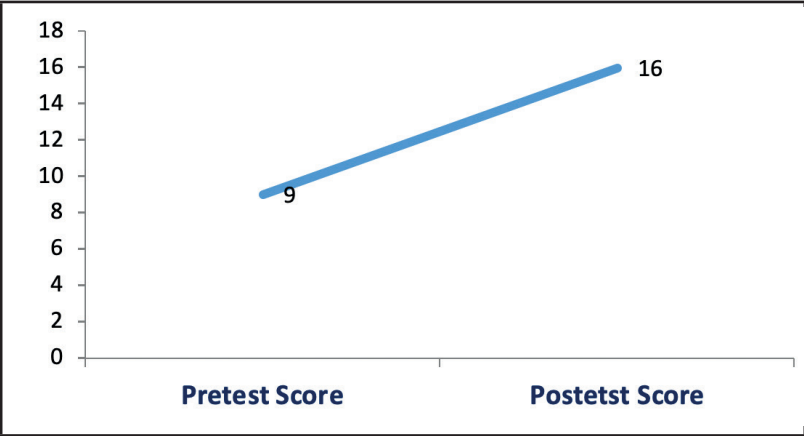
The result shows that learning in a blended environment is more effective and valuable than the traditional teaching-learning method. The findings reveal that the students who learned using a blended approach performed better and secured higher scores in their achievement tests. A blended approach provides the optimum conditions for students to be successful. Therefore, the result of the study implies some suggestions for language teachers to use different teaching approaches so that the learning becomes fruitful and effective.

Conclusion

This study has investigated the learning outcome of the students taught with traditional and blended approaches in a teacher training college. The findings in favour of the blended teaching approach indicate that a blended course provides a comprehensive and comparable learning environment to traditional teaching-learning. It creates a harmonious balance between face-

to-face human interaction and online access to learning. Regarding this once Hinkelman (2005) remarked:

> 'Blended' is not a single approach or a separate alternative to online/ classroom environments, but rather a flexible continuum of various language learning environments. In such a paradigm, there can be no definition of an 'online task' that is separate from a 'classroom task'. The aim of blended learning is then to span this continuum, defining and describing tasks that encompass the different environments. (p. 19)

Such an approach indeed provides the optimum environment for the students of the English language to learn with more interaction and collaboration. As Kocoglu, Ozek and Kesli (2011) commented, "by combining online classes and face-to-face learning, a teacher education program can increase its convenience, flexibility, access, and efficiency while maintaining the quality of the program" (p.1131). As a result, the

findings of this study may encourage teacher educators to incorporate the blended approach into their teacher training programmes, particularly in the pedagogy of the English language.

Recommendations

This study recommends the following based on the results:

> In view of the study's findings, which show that students perform better when a blended teaching strategy is used, computerised teaching and traditional face-to-face teaching methods must be used in the classroom when teaching English.

Further, studies on students' motivational aspects and attitudes towards blended learning, virtual learning, and traditional learning are suggested to be conducted in the future.

More research is needed to address the various teaching-learning approaches that use e-learning environments in conjunction with other English courses.

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Access, use and integration of Information and Communication Technology among government school teachers of Jorhat district, Assam: A status study on trends and problems

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Abstract

This study examines the level of access, use and integration of ICT tools in the teaching-learning process among government school teachers of the Northwest education block in Jorhat district, Assam. Though a large number of teachers own a smartphone, few use it for the teaching-learning process. The use of online resources, particularly, Open Educational Repositories, is relatively high. There is no significant difference between male and female teachers in access and use of ICT in teaching-learning process. However, it is seen that access and use of ICT are higher among younger teachers and teachers with higher educational qualifications while older teachers and teachers with relatively lower educational qualifications are less likely to use ICT in the classroom. Surprisingly, SC/ST-dominated areas are doing much better than urban and rural areas in terms of using ICT tools in classrooms. Lack of proper infrastructure in classrooms, low technical awareness and poor network are some of the major challenges faced by teachers in integrating ICT tools in the classroom.

Keywords: DIKSHA portal, QR codes, Open Educational Resources, SWAYAM, ICT, NISTHA

Introduction

The rapid and explosive growth of information and communication technology (ICT) has transformed the traditional boundaries of work, education, and leisure. Today, it holds the potential to transform the entire process of schooling from pedagogy and teachers' training to administration and governance of institutions (Ali, 2019; Singh, 2019). It enhances the teaching-learning process by enabling a student-centric teaching-learning process through meaningful use of ICT (Castro Sánchez and Alemán, 2011). It improves the quality of education and efficiency of delivery by providing teachers and students autonomy and a creative teaching-learning environment (Chai, Koh and Tsai, 2010; Lowther et. al., 2008; Serhan, 2009). It opens new channels for collaborative learning and distance education (Koc, 2005). It can redistribute knowledge by expanding access to information and help in the development of critical thinking skills (Brush, Glazewski and Hew, 2008; McMahon, 2009).

The use of ICT in school education has received a massive boost in recent years, significantly driven by government initiatives. They include online resources platforms such as the DIKSHA portal and app, the inclusion of QR codes in textbooks, Direct-to-Home TV channels and teachers' training programmes such as NISTHA. Samagra Shiksha scheme has been aligned with New

Education Policy 2020 to promote digital initiatives such as virtual classrooms and smart classrooms. Further, the low cost of smartphones and internet data have massively increased access to ICT devices. More recently, online learning has emerged as the most influential alternative to conventional education during the COVID-19 pandemic.

Meaningful integration of ICT in school education has become an important topic in research on educational reforms. It is seen that mere access to ICT tools is not enough. Rather, they should be embedded in powerful and interactive learning environments with respect to pedagogy, curriculum and school organisation (DEETYA, 1996). In this regard, teachers need to act as catalysts for meaningful integration of ICT by introducing new technologies, establishing innovative teaching-learning practices and developing the right attitude and values towards new technology in students (Watts-Taffe, Gwinn and Horn, 2003). Studies have shown that teachers with prior experience, technical knowledge and personal enterprise have a positive impact on the innovative use of ICT and the digital habits of their students (Drent and Meelissen, 2008; Peralta and Costa, 2007). Thus, teachers play a critical role in inculcating the use of digital habits in students and classrooms and ensuring meaningful integration of ICT in school education. As such, access to and awareness about ICT tools and resources among teachers is important for the use and integration of ICT in teaching-learning process. Access to smartphones and computers, level of awareness about online resources and use of digital tools in classrooms among the teachers are good indicators of the overall state of using ICT in the teaching-learning process in schools. An ICT-ready workforce is central to meaningful use and successful integration of ICT in the teaching-learning process. This study aims to study the state of ICT integration in the teaching-learning process in government schools. Though much work has been published on this theme, studies on the status of ICT integration in schools of the Northeast Indian states such as Assam remain underrepresented.

Objectives

Considering the above facts, this study examines the present scenario of using ICT in the teaching-learning process among government school teachers in the Jorhat district with the following objectives-

- To find out the level of access, use and integration of ICT and e-learning material in the teaching-learning process (TLP) by government school teachers.

- To examine whether there is any difference among male and female teachers in access, use and integration of ICT in the TLP.

- To examine whether there is any difference among different age groups of teachers in access and use of ICT in their teaching-learning process.

- To examine whether there is any difference in the level of access, use and integration of ICT in the TLP among teachers with different levels of educational qualification.

- To examine whether there is any difference among teachers from urban, rural and SC/ST-dominated areas in the integration of ICT tools in classrooms.

- To identify the major issues and challenges faced by the teachers while integrating ICT tools in their classrooms.

Methodology

This study uses a normative survey research method. It is oriented towards examining the present scenario of using ICT in the teaching-learning process among government school teachers in the Northwest educational block of the Jorhat district, Assam. The normative survey method allows the collection and analysis of data obtained from a large number of respondents representing specific populations to study the conditions that currently exist and the trends that are developing (Aggarwal, 1966).

North West educational block of the Jorhat district in Assam was purposefully selected as the unit of sampling for the present study. The area has a sizable number of schools in rural areas and SC/ST-dominated areas that experience an interesting juxtaposition. On one hand, such areas tend to gain the most out of ICT integration in the teaching-learning process, giving them access to vast amounts of information, enhanced pedagogy practices and better learning outcomes. On the other hand, integration of technology in the classroom and use of digital resources are still limited in these areas, depriving large numbers of teachers and learners of the benefits of access, use and integration of ICT. In such a scenario, teachers play a very important role in introducing new technologies, imparting digital skills to students and motivating students to use ICT in a meaningful way.

The schools in the selected block are categorised into three categories according to their respective location: urban areas, rural areas and SC/ST dominated areas including tea gardens. From each of these categories, 10 per cent of schools are randomly selected. A sample of 10 per cent are selected from the teachers of these schools by using snowball sampling and their access, awareness and integration of ICT in the teaching-learning process are examined. Data is collected through unstructured interviews and observation tools. Unstructured interviews are conducted with teachers as well as principals, students and parents. Questionnaires are also used to seek information about students' and parents' perception towards use of ICT in the classroom and in the teaching-learning process. Further, an observation schedule is followed to see the actual conduct of the ICT-based activities.

Results and Discussions

The statistics recorded gives a comprehensive view of access, awareness and integration of ICT in teaching-learning process by government school teachers in the Jorhat district, Assam. The study surveys 270 teachers. Among them, 110 are males and 160 are females. The teachers can also be categorized based on qualification. 44 of them have cleared HSLC and 112 HSSLC while 94 teachers have completed graduation and 20 have completed post-graduation. 24 teachers are less than 30 years old while 100 teachers are in the age group 30-40 years. Further, 64 and 82 teachers belong to the age-groups 40-50 years and 50-60 years, respectively.

Survey of teachers who own smartphones and other devices and use online resources including the DIKSHA platform, QR Codes in textbooks and Open Educational Repositories

Table-1: Number of teachers who have access to smartphones and computers and use them in teaching-learning process

Own smart-phone	Number of teachers (%)	Access to computers	Number of teachers (%)	Using smart-phones in TLP	Number of teachers (%)
Yes	242 (89.63%)	**Yes**	46 (17.03%)	**Yes**	112 (41.48%)
No	28 (10.37%)	**No**	224 (82.97%)	**No**	158 (58.52%)
Total	270	**Total**	270	**Total**	270

It is inferred from Table-1 that only 17.03 per cent of the teachers have access to computers. But a huge majority (89.63 per cent) has access to smartphones. Yet, the use of smartphones in the teaching-learning process is limited to only 41.48 per cent of the teachers.

Table-2: Number of teachers who use the DIKSHA platform, QR Codes in textbooks and Open Educational Repositories (OER)

Using DIKSHA platform	Number of teachers (%)	Using QR codes	Number of teachers (%)	Using OERs	Number of teachers (%)
Yes	112 (41.48%)	**Yes**	68 (25.19%)	**Yes**	160 (59.26%)
No	136 (50.37%)	**No**	142 (52.59%)	**No**	76 (28.15%)
No re-sponse	22 (8.15%)	**No response**	60 (22.22%)	**No response**	34 (12.59%)

It is inferred from Table-2 that only 25.19 per cent of the teachers use the QR code printed in textbooks. Further, only 41.48 per cent of teachers use the DIKSHA platform which can be accessed through the app or portal. Though these features are used only by a minority, a large number of teachers (59.26 per cent) use other Open Educational Repositories (OER).

Gender-wise distribution of teachers who own smartphone and use online resources in teaching-learning process

Figure-1: Gender-wise distribution of teachers who own smartphone and use online resources in teaching-learning process including integration of ICT tools in classrooms
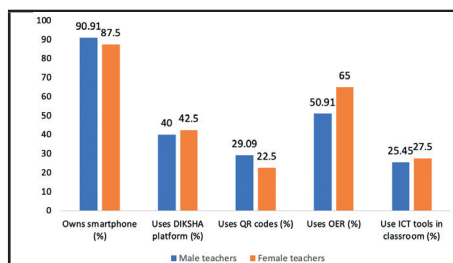
It is inferred from Figure-1, that from the sample of 110 males and 160 females, 90.91 per cent of male teachers and 87.50 per cent of female teachers have access to smartphones. However, only 40 per cent of male teachers and 42.50 per cent of female teachers use the DIKSHA platform. Further, only 29.09 per cent of male teachers and 22.50 per cent of female teachers use the QR codes printed in the textbooks. Integration of ICT in classrooms by both male and female teachers is as low as 25.45 per cent and 27.50 per cent respectively. However, a large number of both male teachers (50.91 per cent) and female teachers (65.00 per cent) utilize OER. Thus, the difference in access and use of ICT and online resources between the two genders is insignificant.

Age-wise distribution of teachers who own a smartphone and use online resources in teaching-learning process

**Figure-2: Age-wise distribution of teachers who own smartphones and use online resources**
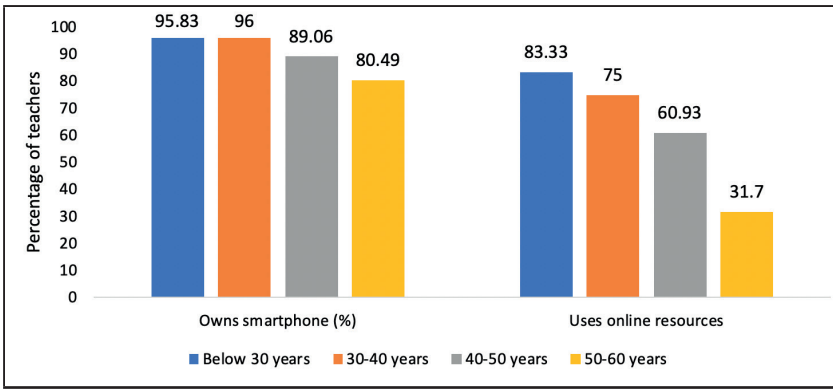
It is inferred from Figure-2 that 95.83 per cent of teachers who are below the age of 30 years have access to smartphones while 83.33 per cent of them use online resources like the DIKSHA platform, QR codes in textbooks and other Open Educational Repositories. 96 per cent of teachers in the age group 30-40 years and 89.06 per cent of the teachers in the age-group 40-50 years have access to smartphones. However, only 75 per cent and 60.93 per cent of them, respectively use online resources. Among the teachers in the age group 50-60 years, access to smartphones is relatively low (80.49 per cent) while use of online resources is much lower at 31.70 per cent compared to other age groups. Thus, access and use of ICT are higher among younger teachers while older teachers are less likely to have access to smartphones and use online resources.

Qualification-wise distribution of teachers who own smartphone and use online resources in teaching-learning process

Figure-3: Qualification-wise distribution of teachers who own smartphone and use online resources
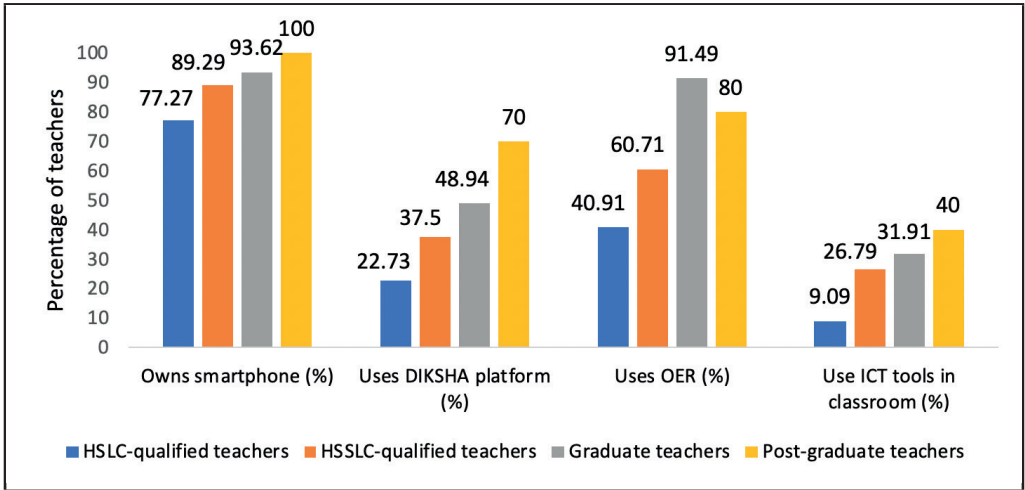
It is inferred from Figure-3 that only 77.27 per cent of teachers who have qualified High School Leaving Certificate (HSLC) examination have access to smartphones. In comparison, 89.29 per cent of teachers who have qualified for the Higher Secondary School Leaving Certificate (HSLC) examination have access to smartphones. The proportion of graduates (93.62 per cent) and post-graduates (100.00 per cent) having access to smartphones are even higher.

Similar trends can be seen in the use of online resources. The use of online resources among HSLC-qualified and HSSLC-qualified teachers is relatively low. Only 22.73 per cent of HSLC-qualified teachers and 37.50 per cent of HSSLC-qualified teachers use the DIKSHA platform. Similarly, the use of OER is also low among them (40.91 per cent and 60.71 per cent, respectively). In comparison, 91.49 per cent of graduate teachers and 80.00 per cent of post-graduate teachers use OER. Similarly, use of the DIKSHA platform is also much higher (48.94 per cent and 70.00 per cent respectively).

Thus, teachers with higher qualifications are more likely to have access to smartphones and use online resources.

Location-wise distribution of teachers using ICT tools in classrooms.

Table-3: Location-wise distribution of teachers using ICT tools in classrooms

Location of the teacher	Number of teachers (%)	Teachers using ICT tools in classrooms (%)
Urban	30 (11.11 %)	26.67 %
Rural	217 (80.37 %)	23.96 %
SC/ST dominated	23 (8.52 %)	60.86 %

From Table-3, it is inferred that only 26.67 per cent of urban teachers have integrated ICT tools in the classroom holistically. A similar trend is seen in rural areas where only 23.64 percent of teachers have integrated ICT into the classroom. However, 14 out of 23 teachers from SC/ST-dominated areas have successfully integrated ICT into their classrooms.

Major challenges faced by teachers in integrating ICT tools in the classroom

Figure-4: Major issues raised by teachers that hamper integration of ICT tools in the classroom
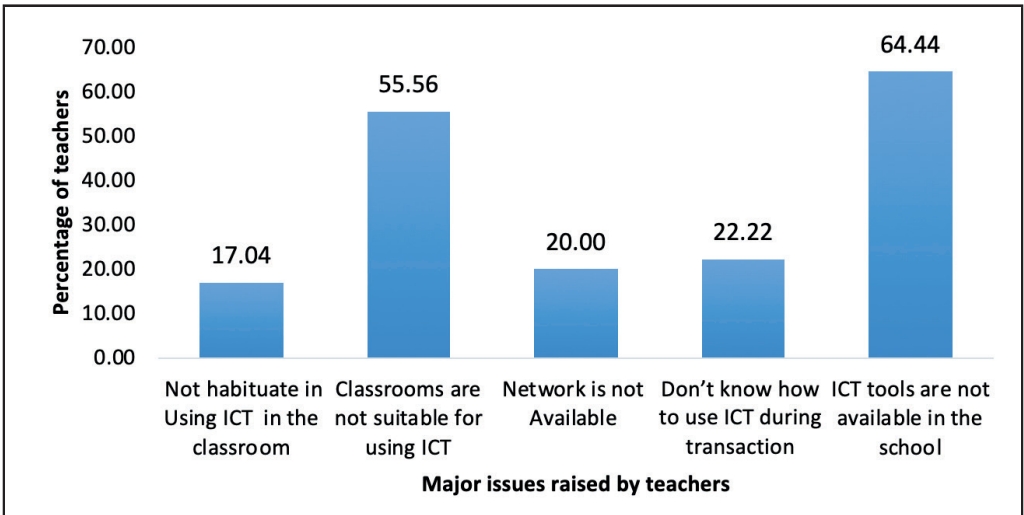

Figure-4 shows the major issues faced by teachers in integrating ICT in classrooms. The issue of lack of ICT tools in the school is raised by 64.44 per cent of the teachers. Further, the majority of teachers (55.56 per cent) feel that classrooms are not well furnished for using ICT tools. Other commonly raised issues are lack of awareness to effectively use ICT during teaching-learning process (22.22 per cent), poor network (20 per cent) and not habituated to using ICT in the classrooms (17.04 per cent).

Conclusion

The following conclusions can be drawn from the results and discussion:-

- Though a large number of government school teachers own a smartphone (89.63 per cent), few use it for teaching learning processes (41.48 per cent).

- Only a small proportion of teachers have successfully integrated ICT in classrooms (26.66 per cent), QR Codes (25.19 per cent) and DIKSHA Platform (41.48 per cent). However, the use of online resources, particularly, Open Educational Repositories, is relatively high (59.26 per cent).

- The difference between male and female teachers in access and use of ICT in the teaching-learning process is insignificant. Important trends are seen in terms of age and qualification of teachers. Access and use of ICT are higher among younger teachers and teachers with higher educational qualifications while older teachers and teachers with relatively lower educational qualifications are less likely to use ICT in the classroom.

- Surprisingly, teachers in SC/ST-dominated areas (60.86 per cent) are doing much better than those in urban areas (26.67 per cent) and rural areas (23.96 per cent) in terms of using ICT tools in classrooms.

- Lack of ICT tools in schools (64.44 per cent), low technical awareness (22.22 per cent) and poor network

(20 per cent) are some of the major challenges faced by teachers in integrating ICT tools in the classroom.

There is no doubt that, in the twenty-first century, ICT-based teaching-learning processes will enhance the outcome of education. To take advantage of that, access to ICT tools and resources is indispensible but not enough by itself. It is crucial that teachers are well-versed with digital skills, ICT-ready and develop the right attitude towards ICT for they not only deliver lessons, but also introduce new technology to students, foster the right attitude towards ICT in them and impart them the digital skills. In this regard, the findings of this study have significant implications for the integration of ICT in teaching-learning process in the government schools of Assam.

Firstly, a robust teachers' training programme such as NISTHA is the need of the hour. E-courses and ICT tools can be utilized to conduct such programmes at regular intervals. It will make the professional development of teachers a life-long journey. Studies have shown that training programmes have a positive impact on the digital skills of teachers (Shanmugaraja, Karthikeyan, & Jayaraman, 2012; Gupta, 2019). As seen above, certain categories of teachers such as those with relatively lower educational qualifications or belonging to older age-groups are less likely to use ICT tools in the teaching-learning

process. Such teachers may undergo special training to develop digital skills required to successfully integrate ICT tools in classrooms.

Further, an incentive system to motivate teachers for integration of technology has shown positive results (Atabek, 2019; Stecher et al., 2018). Adequate training and performance-based incentives enabled through technology will make the experience of using technology an enjoyable one and motivate teachers to actively integrate ICT in a way that is meaningful and relevant for the students.

Finally, the roadmap to meaningful use and successful integration of ICT in teaching-learning process should take into account the infrastructural hurdles, lack of digital skills and socio-economic, cultural and demographic factors. Radio and television followed by smartphones are the most widely available ICT devices. Initiatives such as SWAYAM Prabha DTH TV channels, QR Code and DIKSHA App are appropriate initiatives focussed on integrating of low-level of ICT in appropriate context rather than ineffectively using complex technologies in teaching-learning process and compromising learning outcomes (Reich, Rooney, & Lizier, 2020). Use and integration of ICT in the teaching-learning process is not an event, but a journey from low technology solutions to a holistic technology-driven teaching-learning ecosystem.

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Perception of the Key Stakeholders of Education on the Acceptance of Edutech Platforms in Teaching-Learning Process

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Abstract

EduTech applications have played a vital role in carrying out the learning activities during lockdown periods for the students and educationists. In the future; these platforms are going to change the learning approach for students and educators. This study examines the perception and acceptance of the students and teaching professionals towards the usage of the EduTech applications. The study-in-progress analysed the technology acceptance model (TAM) for work-related tasks with e-learning and used TAM as a basis for hypothesizing the effects of such variables on the use of e-learning as the application. The study concludes that attitude towards use and perceived ease of use significantly affects the intention to use teaching-learning applications. The study suggests that to capture the large market and satisfy participants, it is necessary for the existing and potential EduTech platforms to provide active experience and complete course content to the participants.

Keywords: Education, Technology, Stakeholders, Acceptance, Platforms

Introduction

Teaching Styles have changed significantly from traditional methods to modern interactive methods over a period of time. The initial methods of providing education were through recitation and memorization, whereas the modern approach utilizes online and interactive methods. Stable progress of e-Learning in recent years (Mulder and Janssen, 2013) has also prompted universities and educators to use a variety of online learning techniques, such as Learning Management Systems, Internet-based technology for learning, Information, Communication, and Technology (ICT), and Social Network-based Learning or mobile learning (Liao et al., 2019; Eksail and Afari, 2020; Huang et al., 2020), to improve the effectiveness of traditional classroom instruction by assisting students in learning independently and developing problem-solving abilities. (Liu et al., 2010; Tian et al., 2014). But COVID-19 emerged at the end of December 2019 and this global pandemic has made a significant impact on higher education students' learning because they were in the middle of semesters and the lockdown imposed on them, forced them to change their learning techniques. Due to the pandemic initiated complete lockdown in countries, students were not able to learn on a face-to-face basis with their educators. To cope with this situation students and educators used computer-based or technology-aided methods (teaching-learning applications) for learning. Students and educators used different teaching-learning applications like Google classroom/meet, Unacademy, Byjus, YouTube Channels, Zoom, Jio Meet, etc. Despite the rise in the number of online learners, Online learning has always been associated with a number of dangers, including

the absence of teachers, a lack of peer connection compared to face-to-face learning, low motivation, poor time management, and a lack of individual learning abilities. (Cole et al., 2004; Golladay et al.2000; Hannay & Tracy, 2018; Kirtman, 2009; McKeachie, 2002; Nguyen, 2015; Ryan, 2001; Serwatka, 2003; Xu & Jaggars, 2013). Several researches comparing students' perspectives of e-learning with traditional learning in terms of social presence, social interaction, and satisfaction, discovered that e-learning is evaluated as lacking in social interaction, social presence, and effective coordinated communication., it provides several benefits including convenience and ease of time, an easy understanding of critical concepts and subjects and gives opportunities to work while learning (Cuthrell & Lyon, 2007).

In this study, we investigated the perception and acceptance of teaching-learning applications by students and teaching professionals through the Technology acceptance model (TAM).

Literature Review

This study investigated the use, intention and acceptance of teaching-learning applications based on the theory of TAM, targeting students and educators in the Ahmedabad city. This section consists of TAM Model and online teaching-learning-related research work.

The Technology Acceptance Model (TAM) created by Davis (1989) is one of the most generally utilized models to explain a potential user's behavioural intentions towards using technological innovation. This model, with high reliability and validity as reported in Adams (1992), contained the constructs of perceived ease of use, perceived usefulness, attitudes towards using, and behavioural intention of use (1989). Using the Extended Technology Acceptability Model (ETAM), Prasetyo

(2021) assessed student acceptance of an online learning platform during the COVID-19 pandemic. The results showed that PEU (perceived ease of use) had the highest impact on actual use (AU), followed by UI (user interface) and SQ (system quality). Iaman and Turki (2012) revealed that accessing course materials, looking for relevant information, sharing knowledge, and completing homework were significantly associated with students' perceived usefulness of mobile learning. During the investigation of students' use and acceptance of course websites, Selim (2003) discovered that there is a significant relationship between utilisation and ease of use when it comes to determining how frequently a website course is used. Using Google Meet's media-assisted teaching style, Setyawan et al. (2020) examined how well students learned at home and found out that students taught using Google Meet media-assisted lectures had higher knowledge and learning outcomes than comparison groups. Khan et al. (2021) analyzed the perception of university students toward e-learning during the ongoing COVID-19 pandemic. It revealed students' positive perception of e-learning and thus acceptance of this new learning system. Dorji (2021) studied teachers' preferences for classroom and online teaching in Bhutanese primary and secondary schools. Quantitative data found that over 50 per cent of teachers favoured e-learning, whereas qualitative data revealed that teachers preferred classroom teaching over online education for reasons such as authenticity, comfort, and affordability. According to Gismalla et al. (2021), most medical students like e-learning. During COVID 19 shutdown, 64 per cent of students said E-learning was excellent. A substantial link was found between medical students' opinions on starting E-learning and their level (Pre-clerkship and Clerkship). During

the Covid-19 outbreak, Olayemi et al. (2021) assessed students' readiness for online learning in Nigeria, The majority of respondents reported high levels of ICT skills and abilities required for online learning. Fear of high data costs, inadequate internet services, unstable power supplies, inaccessibility to online library resources, and limited computer access were reported barriers to effective online learning. Aggarwal (2020) assessed among all the other service providers and the competitors, Unacademy proves out to be the favourite among the people as the majority of the people are connected and have applied in Unacademy. Kim (2020) investigated the impact of zoom video lectures on learners' English reading achievement in real time remote video education; the study's findings revealed that zoom video lectures have a beneficial impact on learners' English reading achievement.

Therefore, researchers aimed to investigate the perception and acceptance level of teaching-learning applications by students and educators. The research questions were as follows:

1. Whether students and educators accepted online teaching-learning technology during the COVID-19 pandemic?

2. Which kinds of Edutech platforms are preferable?

Research Methodology

This paper investigates the acceptance of teaching-learning technology and what kind of perception students and professionals have regarding its use with the help of TAM. Our research method consisted of four parts. In the first part, we created the research framework; second, we handled research assumptions; third, we explained the research method and steps and fourth, we examined research objects and sampling methods.

Research framework

In this study, TAM is divided into four aspects: perceived usefulness, perceived ease to use, intention to use, and attitude toward using, as indicated in Chart 1.

Chart-1: Empirical Model for Teaching-learning Technology Acceptance
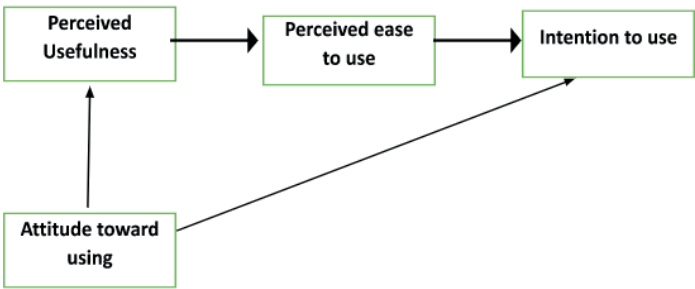
Methodology

The main objective of this study is to identify the perception, acceptance, and attitude of the professionals, students, and other aspirants regarding the use of different teaching-learning applications. To meet the objective the relevant literature has been studied from Google scholar, emerald publication, sage publication, web of science, Research Gate, medley, and other authentic sources. The design of the study is a descriptive and survey method. The variables identified from the literature suggest ease of use, perceived usefulness, and attitude towards use as

the independent variables that explain the dependent variable which is the intention to use the teaching-learning applications. From the literature, the research questions have been identified and some hypotheses are developed. The structured questionnaire has been framed to collect the data. The demographics, and the seven-point scale of perceived usefulness, perceived ease of use, attitude towards use, and intention to use are (Adams, Nelson, & Todd, 1992; Davis et al., 1989; Legris et al., 2003; Venkatesh & Davis, 2000) used for teaching-learning application acceptance. Therefore, 150 questionnaires are distributed, and 142 responses were recorded through the purposive sampling method from February to March 2021 in Ahmedabad city. Those 130 responses yielded valid responses that were used for analysis. The collected data has been analysed through SmartPLS 3 software to perform partial least square structural equation modelling. This study used some design, methods, literature, tools, and techniques that have certain limitations and the same applies to this study. Based on this, we propose the following hypotheses:

H1- Perceived usefulness has a significant effect on the perceived ease to use. According to Davis (1989), perceived usefulness is the notion that using new technology will improve one's professional performance. Multiple times, the favourable impact of this variable on the adoption of information technologies has been demonstrated empirically. (Davis, 1989; Davis et al., 1989; Igbaria, Liveri, & Margahh, 1995; Lederer et al., 2000; Ong, YaLui.)

H2- Perceived ease to use has a significant effect on the intention to use. As previously said, perceived ease of use is defined as a person's perception of how easy it will be to use new technology. (Davis, 1989).

H3- Attitude towards using has a significant effect on the intention to use. The degree to which a user is interested in specific systems is known as attitude, and it has a direct impact on the user's desire to use those systems in the future. (Bajaj & Nididumolu, 1998).

H4- Attitude towards using has a significant effect on perceived usefulness. According to TAM, perceived usefulness has a direct impact on attitudes toward new technology use. The degree to which a user is interested in specific systems determines whether or not that user intends to utilize those systems in the future. (Bajaj & Nididumolu, 1998).

Table-1 indicates the scale of perceived usefulness, perceived ease of use, attitude towards use, and intention to use the teaching-learning applications.

Table-1: List of Variables Used in TAM Model

SECTION - I Perceived Usefulness (USE)	
Efficient Learning on TLA	USE1
Proper guidance & solution of queries on TLA	USE2
I can teach/learn at any place or time on TLA	USE3
SECTION - II Perceived Ease to use (ETU)	
Easy & Convenient for me to use TLA	ETU1
Simple to Understand TLA	ETU2
I can easily interact with students/teacher	ETU3

SECTION - III Attitude toward use (ATU)	
Learning on TLA is fun	ATI1
TLA provides a pleasant way to learn	ATI2
I feel happy & satisfied using TLA	ATI3
I like using TLA	ATI4
SECTION - IV Intention to use (ITU)	
I am willing to use TLA	ITU1
I am Planning to use TLA in future	ITU2
I will recommend others to use TLA	ITU3

Data analysis

Chart-2: Research Model for Teaching-learning application acceptance
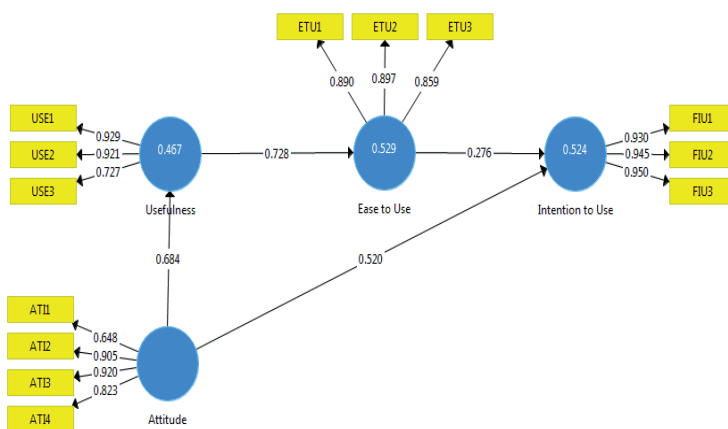
Table-2: Demographics of Respondents

Demographics	Frequency	Percentage
Gender		
Male	52	40
Female	78	60
Age		
Below 20	18	14
20 to 40	108	83
Above 40	04	03
Experience of TLA (Teaching-learning Application)		
Yes	72	55
No	58	45

Status (Key Stakeholders of Education)		
School Student	04	03
College Student	50	38
Pursuing Professional Course	10	08
Preparing for competitive exams	21	16
Teacher/Professor	30	23
Other	15	12

Table-2 indicates that valid responses include 52 male (40 per cent) and 78 female (60 per cent) respondents. The Majority of participants were between 20 to 40 years, with 108 responses (80 per cent). Participants having experience in teaching-learning applications are 55 per cent while those not having experience are 45 per cent. The majority of the respondents are college students (38 per cent), and then comes the teachers/professors (23 per cent).

Table-3: Path Coefficient

	Attitude	Ease of Use	Intention to Use	Usefulness
Attitude			0.520	0.684
Ease of Use			0.276	
Intention to Use				
Usefulness		0.728		
Indirect Effect				
Attitude		0.497	0.137	
Ease of Use				
Intention to Use				
Usefulness			0.201	
Total Effect				
Attitude		0.497	0.657	0.684
Ease of Use			0.276	
Intention to Use				
Usefulness		0.728	0.201	

Table-3 indicates that usefulness has the strongest effect on ease of use (0.728). These two constructs explain 52.9 per cent of the variance of the endogenous construct ease of use (R^2 = .0529). Then Attitude has a significant effect on the usefulness (0.684) and intention to use (0.520).

Table-4: Outer Loadings

Indicators	Attitude	Ease of Use	Intention to Use	Usefulness
ATI1	0.648			
ATI2	0.905			
ATI3	0.920			
ATI4	0.823			
EOU2		0.890		
EOU2		0.897		
EOU3		0.859		
ITU1			0.930	
ITU2			0.945	
ITU3			0.950	
USF1				0.929
USF2				0.921
USF3				0.727

Table-4 indicates that all outer loadings of the reflective constructs EOU, ITU, and USF are above the threshold value of 0.70, which suggests sufficient levels of indicator reliability.

Table-5: R Square

	R Square	R Square Adjusted
Ease of Use	0.529	0.520
Intention to Use	0.524	0.505
Usefulness	0.467	0.457

Table-5 presents the value of R-square for dependent variables. The usefulness variable is nearby 0.40 which indicates weak predictive accuracy of the model. Ease of use and Intention to use variables are above 0.50 which indicates moderate predictive accuracy of the model. The R square value of 0.25, 0.50, and 0.75 describes the substantial, moderate, and weak predictive accuracy of the model.

Table-6: F Square

	Attitude	Ease of Use	Intention to Use	Usefulness
Attitude			0.351	0.877
Ease of Use			0.099	
Intention to Use				
Usefulness		1.125		

Table-6 indicates the effect size of the constructs. The constructs with F-square ≥ 0.02, F-square ≥ 0.15 and F-square ≥ 0.35 represent weak, moderate, and strong effects, respectively (Cohen, 1988).

Table-7: Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Attitude	0.848	0.891	0.898	0.691
Ease of Use	0.859	0.873	0.913	0.778
Intention to Use	0.936	0.939	0.959	0.887
Usefulness	0.827	0.866	0.897	0.747

Table-7 evinces the construct reliability and validity through internal consistency and convergent validity of constructs. The internal consistency and validity of the construct are measured from Cronbach's alpha, composite reliability, and AVE. The Cronbach's alpha of all the constructs suggests an adequate level of internal consistency (Yusoff, 2012). The composite reliability of all the constructs exceeds 0.07 (Hair et al., 2014) which is also adequate. The average variance extracted is more than 0.50 for all the constructs that indicate satisfactory convergent validity of constructs (Hair et al., 2010)

Table-8: Discriminant Validity - (Fornell-Larcker Criterion)

	Attitude	Ease of Use	Intention to Use	Usefulness
Attitude	0.831			
Ease of Use	0.618	0.882		
Intention to Use	0.691	0.597	0.942	
Usefulness	0.684	0.728	0.756	0.864
Discriminant Validity - (Cross Loadings)				
ATI1	0.648	0.325	0.341	0.356
ATI2	0.905	0.581	0.628	0.553
ATI3	0.920	0.606	0.690	0.682
ATI4	0.823	0.488	0.566	0.618
ETU1	0.531	0.890	0.497	0.547
ETU2	0.556	0.897	0.502	0.562
ETU3	0.544	0.859	0.567	0.774
FIU1	0.674	0.562	0.930	0.735
FIU2	0.596	0.550	0.945	0.689
FIU3	0.677	0.575	0.950	0.711
USE1	0.707	0.662	0.805	0.929
USE2	0.663	0.647	0.625	0.921
USE3	0.345	0.582	0.499	0.727

Discriminant Validity - (Heterotrait-Monotrait Ratio)				
Attitude				
Ease of Use	0.705			
Intention to Use	0.751	0.658		
Usefulness	0.775	0.846	0.864	

Table-8 presents the discriminant validity of all the constructs using the Fornell Larcker criteria, cross-loadings, and Heterotrait-Monotrait Ratio and these all are adequate and satisfactory according to thresholds (Hensler et al., 2009) (Chin, 1998) (Hair et al., 2010) (Hulland, 1999). As per the Fornell Larcker Criterion the square roots of the AVEs for the reflective constructs Attitude (0.831), Ease of use(0.882), Intention to use (0.942) and Usefulness (0.864) are all higher than the correlations of these constructs with other latent variables in the path model, thus indicating all constructs are valid measures of unique concepts. This table also shows the loadings and cross-loadings for every indicator. The indicator ATI3 has the highest value for the loading with its corresponding construct ATI (0.920), while all cross-loadings with other constructs are considerably lower and the same approach is followed for other indicators also. The HTMT ratio indicates all values below 0.90, therefore the discriminant validity has been established between constructs. (Hensler et al., 2015).

Table-9: VIF – Variance Inflation factor – Collinearity Statistics (Outer VIF Values)

	VIF
ATI1	1.798
ATI2	3.482
ATI3	3.335
ATI4	2.196
ETU1	3.093
ETU2	3.179
ETU3	1.658
FIU1	3.385
FIU2	4.701
FIU3	4.754
USE1	3.309
USE2	3.228
USE3	1.397

Table-9 presents the variance inflation factor that is VIF, which shows the multicollinearity that states the correlation of variables with other predictors. We conclude, therefore, that collinearity does not reach critical levels in any of the formative constructs and is not an issue for the estimation of the PLS path model.

Table-10: Model Fit (Fit Summary)

	Saturated Model	Estimated Model
SRMR	0.090	0.108
d_ULS	0.729	1.059
d_G	0.652	0.721
Chi-Square	175.683	181.431
NFI	0.732	0.723
Model Fit (rms Theta)		0.276

Table-11: Bootstrapping Path Coefficients (Mean, STDEV, T-Values, P- Values)

		Original Sample	Sample Mean	Standard Deviation	T statistics	P values
ATI	ITU	0.520	0.520	0.132	3.953	0.000
ATI	USE	0.684	0.701	0.077	8.848	0.000
ETU	ITU	0.276	0.276	0.122	2.256	0.024
USE	ETU	0.728	0.743	0.062	11.655	0.000

Table-12: Path Coefficient (Confidence Intervals Bias Corrected)

		Original Sample	Sample Mean	Bias	2.5%	97.5%
ATI	ITU	0.520	0.520	-0.000	0.271	0.771
ATI	USE	0.684	0.701	0.017	0.536	0.833
ETU	ITU	0.276	0.276	0.000	0.037	0.502
USE	ETU	0.728	0.743	0.015	0.603	0.846

Tables-11 & 12 show the mean, STDEV, P values, confidence intervals, and confidence intervals bias-corrected. Assuming a 2.5 per cent significance level, we find that all relationships in the structural model are significant.

Table-13: Goodness of Fit

| Stress and Fit Measures	
Normalized Raw Stress	.18129
Stress-I	.42578[g]
Stress-II	.89766[g]
S-Stress	.36900[h]
Dispersion Accounted For (D.A.F.)	.81871
Tucker's Coefficient of Congruence	.90483
PROXSCAL minimizes Normalized Raw Stress.	
g. Optimal scaling factor = 1.221.	
h. Optimal scaling factor = .847.	

Chart-3: Scree Plot Diagram

The data has been converted into proximities and a Scree plot (Chart 3) is prepared to know the number of dimensions that can accurately present the data. As the scree plot diagram shows that it can have two dimensions that present DAF (Table 20: Dispersion Accounted For) 0.8187. This means that these two identified dimensions can present 82 per cent of data if interpreted accurately. If three dimensions are presented then it becomes ambiguous to interpret the results therefore two-dimensional analysis has been selected.

Table-14: Final Coordinates

Final Coordinates		
	Dimension	
	1	2
Jio Meet	-.309	.237
Zoom	-.247	.741
Google Meet	-.675	.025
YouTube	.124	-.109
Unacademy	.333	-.569
Byju	.773	-.326

Chart-4: Common Space - Perceptual Map of Teaching-Learning participants for the preference for Teaching-Learning Platforms
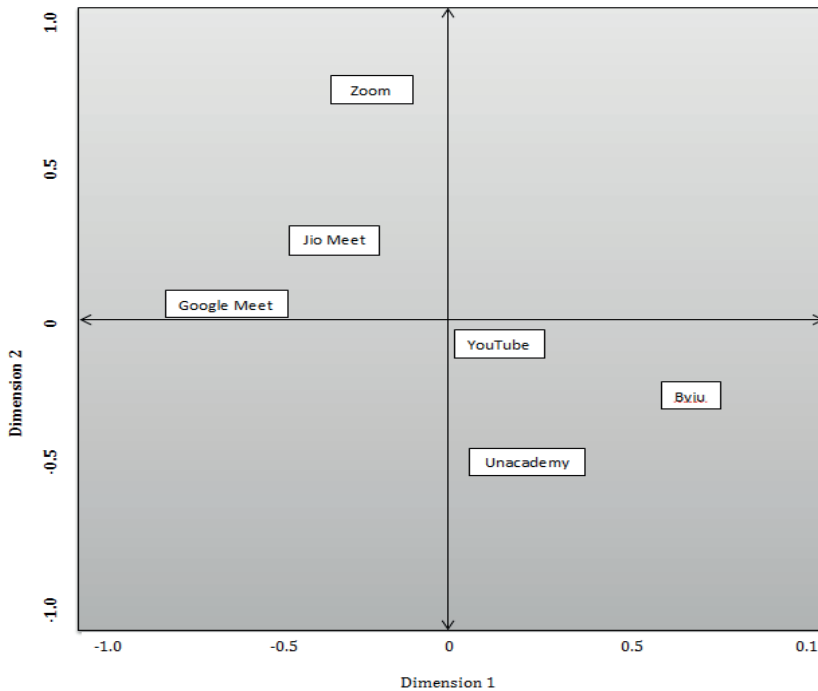
From the study of the goodness of fit table and the chart of a scree plot diagram, two-dimensional analysis has been selected. A common plot and Final Coordinates for two dimensions are prepared. Which are presented in Table 14: Final Coordinates and Chart 4: Perceptual Map of participants for the preference for teaching-learning platforms. Considering the values of different teaching-learning platforms, dimension one is named Active Experience, and dimension number two is Complete Course Content. The data indicates that while preferring teaching-learning platforms the two attributes or dimensions which are considered by users are dimension 1 Active Experience and dimensions 2 Complete Course Content.

Managerial Implications

The EduTech service providers shall focus on building and creating a positive attitude of the key stakeholders of education towards the platforms by offering ease of use and comfort to them. This will have a greater impact on the intention to use the EduTeh Platforms for the stakeholders. The existing and potential teaching-learning service provider platforms shall offer active experience and complete course content to the stakeholders of education to capture a larger market and satisfy them.

Findings and Conclusion

The main aim of the study is to know the perception and acceptance of EduTech applications among students, educators, and others. The study made a preliminary analysis of the reliability and discriminant validity of our model's measurement scale using Cronbach's Alpha, rho_A, Composite reliability, Fornell-larcker criterion,

and heterotrait-monotrait ratio, etc. Research models satisfy all the criteria of these parameters.

The finding illustrates that the ease to use and attitude toward using have a significant direct influence on the intention to use teaching-learning applications. Attitude towards using has a significant influence on the usefulness and usefulness has a significant indirect influence on the intention to use teaching-learning applications. Teaching-learning applications developers can focus more on the ease-of-use criteria of applications and attitude has a major effect directly and indirectly on the intention to use the applications, so EduTech platforms have to give the users that kind of comfort that switch their attitude towards traditional methods of learning to modern online sources of teaching and learning. During COVID-19 Pandemic, these platforms play a prominent role in continuing the study without classrooms and after the lockdown period, now people are comfortable with these online platforms and the opportunity is here, those platforms create more user-friendly, easy to use, and provide quality knowledge, it can acquire major online market.

The perceptual map presents that on the Active Experience dimension the Byju is least preferable and the Google Meet is highly preferable by the teaching-learning participants. On the second dimension i.e., Complete Course Content the Zoom is least preferable and the Unacademy is highly preferable by the users. From the above data, it can be concluded that the teaching-learning participants prefer platforms that offer active experience and complete course content. Thus, to capture the large market and satisfy participants, the existing and potential EduTech or teaching-learning platforms must provide active experience and complete course content to the participants. During the present era, it is important to use information and communication technology (ICT) technologies to support e-learning in education. E-learning has been defined as learning and teaching facilitated online through network technologies with no barriers of time and place (NGai, Poon, & Chan, 2007). E-learning environments reduce the cost of provision and therefore increase revenues for academic institutions (Ho & Dzeng, 2010). They also provide students more study flexibility and improve their learning experience and performance (Christie & Ferdos, 2004). Nowadays, Technology is the future. The education system and sources of learning are also going to change over the period. So, EduTech applications are the future of the e-learning system.

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Online Education and Reproduction of Educational Inequalities: Schooling Practices in India during Corona Pandemic

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Abstract

In India, efforts to make educational systems accessible and inclusive of the needs of students were still in progress, when an unprecedented situation caused by the Corona-virus pandemic 2019 (Covid-19) radically changed the landscape and functioning of the schools all across the country. With schools shifting completely to online mode during the pandemic times, students belonging to disadvantaged groups got placed at risk of missing educational opportunities. The present paper attempts to study the nature of educational practices in an elite private school in the capital city, Delhi, India at the time of nationwide physical school closures due to Covid-19. Using quantitative and qualitative methods, findings from this study suggest that the online mode of education is causing several challenges related to access and participation. Using Pierre Bourdieu's key concepts of field, capital and habitus, findings from the field have been analyzed in light of the theoretical framework of reproduction of inequalities in education.

Keywords: India; School Education; Online mode; Disadvantaged groups; Reproduction of inequality.

Introduction

The past decade has marked significant progress in the domain of school education in India. Landmark legislation of the Right to Free and Compulsory Education (RTE) Act (2009) brought new hopes to many children for whom education was still a distant dream otherwise. Many students got enrolled in government-run schools as their right under the act, and a sizable population of children belonging to economically weaker sections and disadvantaged groups were admitted to private schools across the country under the provision of clause 12 (c) of the RTE Act (2009). The aforementioned clause of the Act made non-minority private schools legally bound to reserve 25 per cent of their admission seats for students from economically weaker sections (EWS) and disadvantaged groups (DG), which were otherwise not accessible to these children due to socio-economic barriers (Sarin, Dongre, & Wad, 2017).

Kumar (2014) posits that discrimination within the classroom is still a reality in present India and schools which are treating students equally are not commonly noticeable. Students get treated differently in the same school depending on their socio-economic positioning in the society and these discriminatory practices become a critical factor leading to dropouts and educational backwardness of children from marginalized communities compared to those from the forefront in socio-economic status (Nambissan, 2009). It is unfortunate that despite several pertinent provisions to make the system inclusive, discrimination against those belonging to Dalit, tribal, and Muslim communities as well as against girls, other gender and the differently-abled, is very high in India

(Bajoria, 2015).

While efforts were still in progress to make schools and educational systems inclusive of the needs of students belonging to disadvantaged groups, an unexpected situation caused due to the Corona-virus pandemic 2019 (Covid-19) radically changed the landscape and functioning of the schools all across the globe. The unpredictable onset and harsh spread of the coronavirus-2019 (Covid-19) pandemic has changed the scenes and functioning of almost every sector of the world. As per information status published by World Bank (EduAnalytics@worldbank. org accessed on 9th May 2020) on 6th May 2020, due to the Corona-virus pandemic 168 countries across the world were completely closed, 12 were closed in select areas, 5 were open with restrictions and only 7 were open. This implicated that the lockdown of schools in countries with full closing of schools impacted the education of 1,276,396,954 students and 412,319,964 students were impacted in countries with partially closed schools. In simplistic terms, the Covid-19 pandemic caused the lock-down of schools for 85 per cent of students worldwide. World Bank Group Education in its report (2020) during the lockdown phase of the covid-19 pandemic expressed serious concerns regarding consequences of the pandemic and lockdowns on education at an immediate level as well as its long-term. Concerns ranged from immediate effects in terms of high drop-outs, declines in learning, lesser school belonging, shrinking of budgets on educational programmes, reduced number of teaching staff, closure of schools, etc. and long-term effects of increased learning poverty, declined human capital, poverty and inequalities increases and possibilities of social unrests, etc.

In India, very soon after the enactment of nationwide closures of educational institutes as a precautionary measure to control the spread of covid-19, numerous private elite schools across the country started to conduct digital classrooms for their students to continue the educational exercises following the school closure orders (Basu, 2020) and this gave scope to various private technological companies to spread their technological services in the field of education.

The practice of technology-assisted pedagogies and assistive e-learning practices may not be new for many of the private schools, especially the high-fee elite schools; however, going thoroughly online has created a very new and exceptional paradigm shift in the field of education. This shift towards online education emerged very rapidly and seemed to have been into enforcement without reflecting considerably on the feasibility of this mode or even assessing the ground realities for those belonging to EWS and DG categories. Delivering as well as participating in the online education not only requires rather absolutely depends on the possession of several facilities such as suitable electronic device (preferably laptop/computer/desktop, etc. or at least a smartphone), smooth internet service and standard e-literacy. While most of the student population of elite private schools can be expected to have possession of the prerequisites for participating in this technology-mediated, device-dependent mode of education, assuming that the students belonging to EWS and DG categories studying in these well-equipped private schools too have possession of these resources should be considered no less than a daydream. With schools shifting completely to virtual/online mode, students belonging to EWS and DG categories get placed at risk of missing or at least falling short of the opportunity to learn due to a lack of the requisite resources. This kind

of education system may add more challenges to their ongoing struggles and can deprive them of their right to education in an inclusive education system.

Pierre Bourdieu's theory of social reproduction presents a critical perspective vis-à-vis class analysis to understand the scenario related to school practices as mentioned above. It relates education (and educational institutes), family and social class to understand the mechanisms of social inequalities—particularly through concepts of habitus, capital and field. In Bourdieu's conceptualisation, the field represents the context of occurrence of the social phenomenon, habitus refers to the dispositions individuals acquire based on their social positions and capital (economic, cultural, social and symbolic) is about possessions and privileges of different kinds. According to Bourdieu's theory, social class differences produce varied capital possession by individuals, and these differences further get deciphered into their assorted habitus. Interaction among habitus, capital and field yield particular experiences for the individuals. While everyone carries different forms and degrees of capitals as well as habitus, an individual's experiences in any field depend on the match or mismatch between possessed habitus and the legitimised habitus of the field in context. Those who possess the habitus that the field legitimises have higher chances of acquiring positive experiences and others who do possess not such a valued habitus may face negative experiences in that field.

In this context, the present paper attempts to study the nature of technology-mediated educational practices in an elite private school in the capital city, Delhi at the time of nationwide lock-down and school closures due to the corona-virus pandemic. It further aims to examine these practices to understand their

engagement with students from diverse socio-economic classes. After presenting details of the setting and methodology adopted for this study, the next sections in this paper attempt to present and discuss the findings related to EWS students' experiences of online teaching practices in school.

Setting and Methodology for Present Paper:

The present paper is based on the study of an elite private school in the capital city of Delhi, India. Located in the South region of the city, this co-educational school affiliated with the Central Board of School Education (CBSE) has a total strength of 1297 students from Nursery to Grade XII. This school has a reputation as an elite school in this region and it caters majorly to upper and upper-middle social strata. The total student population includes 193 students (149 EWS, 32 DG and 12 children with special educational needs (CWSEN)) admitted under the provision of reservation under clause 12(1)(c) of the RTE Act (2009).

Keeping the exploratory nature into consideration, this study utilized both quantitative and qualitative methods for collecting and analyzing the relevant data. Quantitative information was deliberated to explore the degrees and patterns in student's enrolment, attendance and participation in ongoing online classes and qualitative data was collected for advancing the understanding of processes and subjective experiences of teachers, parents and students. Primary as well as secondary data was utilized in the process of this research. Primary data was collected from the school under study and secondary data included academic as well as non-academic literature accessed through various online research journals, newspapers, popular magazines and books. Analysis of primary data was done mainly

through statistics and a thematic approach. Primary data was collected from administrative staff, teachers, students and parents of students belonging to EWS and DG in the school regarding various domains including demographic details of the student population, online learning mechanisms adopted by the school, and subjective experiences of participants.

Due to the nationwide lockdown in the country at this time, physically reaching the respondents was neither feasible nor desirable by the researcher, hence modes of communication were chosen as per the feasibility and comfort of the participants and it encompassed various virtual ways such as emails, video calls, telephonic calls, audio and text messages. After obtaining permission from the school authorities to collect data for the purpose of this research, data figures were collected from administrative officials and teachers on a weekly basis on various educational parameters. It mainly included information on enrolment and attendance of students in the 'virtual home-based learning modules'. Teachers were also requested to maintain a diary to record their experiences of online teaching-learning on a regular basis in a particular format which included aspects related to effective, concerns and challenges from the perspective of teacher, students and parents. Most of them adhered to the suggested format in this regard and shared their notes by the end phase of this research study.

A total of 12 classes from the multiple sections from nursery to grade IX were chosen for this study. Subsequently, 15 teachers, 36 parents (3 parents from each class) and 42 students belonging to EWS and DG categories enrolled in various grades were interviewed using a semi-structured open-ended interview schedule to understand their experiences of the online teaching-

learning process. It seems pertinent to mention here that the present research is part of my doctoral research which is an ethnographic study of the experiences of students belonging to economically weaker sections in a private school. The methodology used in this paper draws mainly from that standpoint. Also, the researcher's earlier research involvement with this school was instrumental in accessing the needed details and communicating with school officials, teachers, students and parents. Most of the respondents interviewed for this research had met the researcher personally in the past as participants of her doctoral research related to the educational and social experiences of students belonging to the EWS category. Data was collected over a period of two months, starting with the occurrence of receiving the information of the school's initiative of starting online modules through their school's Facebook page.

During the phase of data collection, participants were interviewed (telephonically) twice, once at the end of the first week and then at the end of the second month. The language of the communication was mainly Hindi or English depending on their comfort and conversations were either recorded or noted with main points depending on their consent. Interviews were semi-structured in nature however, to reduce the possible biases of the researcher primacy was given to the respondents for leading the conversations. Collected data was later organized quantitatively in the form of frequencies and qualitatively in the form of transcriptions of individual interviews and diary notes. Statistical methods were used to interpret quantitative data and for qualitative data, thematic analysis in form of coding, sub-themes and themes extraction as proposed by Braun & Clarke (2012) was used and qualitative research software Atlas.ti (2019) was utilized to ease the organization of

codes and narratives.

Findings and Discussion

The following section summarizes various sub-themes, themes and analyses that emerged from the data and responses from teachers, parents and students.

The Locale of Virtual Home-Based Learning Modules

'Stay at home announcement' came at a time just before the pre-scheduled opening time for the next session in the school under this study. Students were already off the school for session-transition holidays with an expectation of reopening of school at the beginning of the third week of March 2020. In the light of the non-feasibility of students' presence, authorities of this school had already instructed the teachers to conduct online orientation programmes for parents and students on the scheduled day of school re-opening and subsequently running virtual classes for students till school reopens again. School decided to use the 'Google Classroom' app in its initial step towards an online mode of education. Google Classroom is a free application that can be downloaded on computers, laptops as well as on smartphones. It is based on Gmail and Google Drive and has functions for sharing, organizing and managing the documents. Setting up a Google classroom involves the initial steps of signing up, creating the class by the teacher and inviting the students to be part of it. Teachers were given the task of setting up the Google classroom for every batch and then sending the invite to students to become a part of this platform. Invitations were shared via email and parents were notified about the same in the WhatsApp group of which they all are part and calls were made by teachers to those who didn't accept the shared invitation. Additionally, teachers were instructed to conduct face time with students through Zoom Meetings, Google Hangouts as well as conducting the video conferencing with smaller groups using WhatsApp. Students were expected to do the given tasks and upload it on the suggested platforms, mail it to the given id or WhatsApp to the concerned teacher in case of network issues in uploading. All these procedures foremost require individual's (both provider and receiver) access to gadgets like computer/desktop/ laptop/ smartphone and internet facility along with basic technological skills, e-literacy and functional English proficiency are essential for ensuring this mechanism. This array of prerequisites itself becomes the criteria of inclusion and exclusion of students to become a part of this enterprise.

Students Response to Virtual Home-Based Learning Modules

School initiated the virtual home-based learning modules via Google Classrooms and sent the invites to each student/parent's registered email id by the end of the third week of March itself. It was followed by the facetime via zoom meetings, however after a few days of Zoom classes, school authorities shifted to Google Hangout considering the e-security issues with Zoom. A significant number of students followed and joined given links immediately, these were mostly the students belonging to non-EWS families. Few needed reminders to enroll as per the given instructions and joined subsequently. To understand experiences of students about virtual home-based learning modules, data was collected for 896 students from Nursery to 9th grade. It contained information about the student's enrollment, attendance, degree and nature of participation and assignment submission during the period of research.

Alternate week-wise data on the domain

of enrollment in different platforms was collected from the designated administered official on every last working day of the week.

Table-1: Week-wise Data of Student's Enrolment in Virtual Home-Based Learning Module

Domain	Status	Week Order							
		1st	2nd	3rd	4th	5th	6th	7th	8th
Google Class-room	Total Enrol-ments	705	751	771	783	788	790	793	793
	Non-Enrol-ments	191	145	125	113	108	106	103	103
Demography of Non-Enrolled Students (Google Classroom)	General	35	14	7	4	3	3	2	2
	EWS	128	112	108	103	100	98	96	96
	DG	18	13	6	4	3	3	3	3
	CWSEN	10	6	4	2	2	2	2	2
Zoom Meetings	Enrolled	676	715	-	-	-	-	-	-
	Non-En-rolled	220	181	-	-	-	-	-	-
Demography of Non-Enrolled Students (Zoom Meetings)	General	42	18	-	-	-	-	-	-
	EWS	144	139	-	-	-	-	-	-
	DG	24	17	-	-	-	-	-	-
	CWSEN	10	7	-	-	-	-	-	-
Google Hangout	Enrolled	-	-	757	771	784	790	793	793
	Non-En-rolled	-	-	139	125	112	106	103	103
Demography of Non-Enrolled Students (Google Hangout)	General	-	-	7	4	3	3	2	2
	EWS	-	-	121	115	104	98	96	96
	DG	-	-	7	4	3	3	3	3
	CWSEN	-	-	4	2	2	2	2	2

A frequency analysis of the enrolment data of students regarding Google classroom, Google hangout and Zoom meetings depicted the unevenness across different social groups (Unreserved, EWS, DG and CWSEN) regarding the feasibility and ease to participate in online learning modules. Most of the students who were not enrolled till the end of the 8th week belonged to EWS and DG categories. Although enrolment figures for these categories improved over the period, a significant number of students were not able to join till late. Most of the students who were not able to join these virtual modes were from the EWS category.

Further, after the 8th week, for the next two weeks, attendance records of the students who were enrolled were collected from their respective teachers. Out of 793 enrolled students, 736 were from the general category,

27 were from the EWS group, 23 were from DG and 7 students belonged to the CWSEN group. An independent-samples t-test was conducted using SPSS to compare the difference in mean scores of attendances of students belonging to the EWS+DG+CWSEN group (N= 57) and the General group (N=736). Group statistics are M=4.68, SD=1.43 for the EWS+DG+CWSEN group and M=7.14, SD=1.41 for the General group. Intermediate values used in calculations are t = 12.6949; df = 791 and standard error of difference = 0.194. The two-tailed P-value is less than 0.0001. By conventional criteria, this difference is considered to be extremely statistically significant. Hence, it can be interpreted that variance for the two groups cannot be assumed equal and they are significantly different. Specifically, the result suggests that the average attendance scores of students belonging to the EWS+DG+CWSEN group are significantly less in comparison to students belonging to the General group.

Reasons for Non-Participation in the Virtual Home-based Learning Module

At the end of week 8, students who didn't enrol in the virtual home-based learning modules were contacted telephonically to enquire about the reasons for their non-enrolment in the virtual home-based learning module. Analysis of the factors responsible for their inability to join the virtual modules revealed that scarcity of device and internet service, poor network connection, lack of understanding about the involved processes and absence of e-literate adult's support was the major hindrance for these children to participate in the above-mentioned learning modules.

Interview data revealed that most of the students (especially the ones in Junior grades) and their parents who belonged to EWS were not even aware of the process of login. Several of them lacked requisite understanding about the obligatory internet operations and never had even an email account. In addition, few of them reported that neither anyone else in their family possesses the requisite understanding. Teachers in the interview shared that it was very difficult for them to explain the process of enrolling in the Google classroom to parents or to students because they do not possess the vital vocabulary of virtual teaching-learning modules. One of the teachers said in the interview,

It took me more than an hour to explain to them about all this, what it is and how to go about it, and again I was realizing that what I am talking to appears to be Greek or Latin to them, they were not getting what I was saying.

While laughing sarcastically, one of the parents (whose child is in grade 2) shared in the interview,

Hum kha se aise internet wali padhai karwa payenge bachho ko, mere bachhe ko phone me kaam karna nahi aata aur mujhe to padhna bhi nahi aata, to main kha se madad karu?" (How can we help our kids do this virtual learning? My kid doesn't know how to work on the phone and I can't even read, so how can I help him?).

These parents did get to know about the provision through WhatsApp communication but were unable to proceed further to enrol in the module. There was another group of parents who were not even aware of the provision because they do not check WhatsApp messages frequently especially when there are many messages together. One of the parents said in the interview,

Mam, ye sab messages English me hi aate hein, aur mujhe English aati nahi hein, to main padhta hi nahi hu ye sab messages, kuch bhut urgent baat hoti hein to madam bachhe se kah ke message bhijwa hi deti hein. Ye desh

band k time hi jyda problem hein, hume pta hi nahi chlta kaya karna hein. (Mam, all these messages are communicated in English and I don't understand English, so I don't read the messages circulated on WhatsApp. And if there used to be something extremely important to be conveyed, the teacher used to communicate that by telling the child in person. This lockdown is creating more problems, we don't get to know what we have to do).

Few other parents were not able to enrol because they either did not have any compatible device for the purpose or did not have internet services. It was beyond their affordability to have a laptop or desktop and at maximum, there was only one android phone which was being shared by all and mostly remains in possession of the father. One of the teachers shared that

Android phones can be used for the purpose but it is much better to work on the big screen devices such as desktops and laptops.

Further, in circumstances of lack of any device, it gets really impossible to be a part of virtual classrooms. The process also requires a good internet service with ample speed which is unfortunately not an obvious possession for these students.

During these lockdown times, fulfilment of everyday necessities is more difficult for those belonging to poor strata of society. Most of them used to work as daily wage labourers and bread and butter at the evening to get purchased from the earnings of that day itself. With complete lockdown and lack of essentials, these people have to find some way to earn at least for their survival. One of the parents shared,

Mam, kha dimag chal rha hein humara ki bachhe ko phone pe padhaye, hume to pahle uske khane ka sochna hein, jaise ta ise khane ka hi jugaad karne ki

tikdum mein din nikal jatahein. (Mam, our mind is not directed to get our child educated through the phone, our priority is to ensure the availability of some food for him, the whole of our day passes off in just arranging some food for them by hook or crook).

Another parent said,

Mam, ye sab phone aur computer ki padhai sirf amiro ko hi suit karti hein, es mahamari ke waqt me hum garibo ko aur bhi bahut chintaye hein jo sambhalni hein, padhai par to dhyan pta nahi kab jayega. (Mam, this education through phone and computers suits only rich people. In these times of pandemic, we poor people have much more complications that we need to sort out, we don't know when we will be able to pay heed to studies).

One of the parents (A non-EWS single mother) shared that her timing of work from home clashes with the time of the virtual classes which doesn't allow her to be with the child who can't operate the classes on her own. Two parents (1 non-EWS and 1 CWSEN category) expressed that they feel that virtual learning needs a lot of screen time and they are not interested in joining the programme because they don't believe in its effectiveness of this programme.

After the teacher's intervention and regular inputs from the teachers, a significant number of students belonging to EWS and DG categories got enrolled in the programme over time. However, subsequent interviews with teachers revealed that participation of these students in the classroom discussion and submissions remained very low. Interviews with the teachers and parents on this domain again pointed to the lack of capital required for enduring participation in virtual home-based learning. Factors like lack of resources, unavailability of minimum internet speed and lack of understanding

of the process were featured again in the interview of parents and students regarding low participation. Neither parents of these students are equipped enough to help children for participating in the programme nor do they have other available help. When a parent was not able to proceed despite the support from the teacher, teacher asked the parent if it is possible for the parent to seek support from other fellow parents, to which the parent replied,

"Hum to jyda kisi aur parent se baat kabhi karte hi nahi hein, jarurat padne par ek-do se contact karte hein jo EWS wale hi hai aur unhe to khud hi jyda samajh nahi aa rha." (We generally don't talk to other parents, there are one or two parents to whom we contact in case required, they are also from EWS and they are struggling with understanding the process).

Also, it was reported that some subjects are difficult to learn as well as teach through virtual classrooms. In the subjects falling under the category of visual and performing arts and are almost fully practical oriented, students were expected to access all materials listed for demonstrating such activities at home. Normally in classrooms students have a tendency to share them hence usually it would not get noticed. But virtual classrooms do not permit such options. It was reported by several EWS students that while teachers shared the videos of making paintings and sculptures at home, these students were not able to demonstrate them due to a paucity of requisite materials which made their participation chances much lower. Similar challenges were reported by parents about other activity-based tasks assigned by the teachers.

This economically rooted discrimination is not ending there. Findings revealed that most of the EWS students use mobile phones for participating in online classes because they can't afford laptops or desktops which have larger screens. Along with impacting the learning experiences, it can eventually affect their vision and other related organs (Sadagopan, et al., 2017) and gradually decrease motivation to continue this mode of schooling. Similarly, the issue is getting more complex when there is more demand for the same facility within a family. In some cases where there was more than one student studying under the EWS category in the same school or the different schools, it was getting very difficult for parents to accommodate the requirements of facilities for children together. Parents' responses in this regard indicated preference given to fulfil the needs of male children who are able-bodied against female, younger, or children with disability. Such instances will strengthen the discriminative social practices of our society.

This situation is not exclusive to the Indian context rather most of the developing countries have faced similar issues. Pokhrel & Chhetri (2021) also mentioned similar challenges in their work on the impact of covid-19 pandemic on teaching and learning in the Bhutanese context. They found that larger class size, lack of infrastructure for online teaching and professional development of teachers as well as non-participation of the students made online teaching-learning more challenging in the Bhutanese context. Moreover, the effectiveness of online modes of teaching-learning is also doubtful as of now. Foo, Cheung & Chu (2021) in their comparative study in Hong Kong attempted to study the effectiveness of the conventional face-to-face approaches and online teaching approaches. They found that students who learned through online mode had lower levels of proficiency in key areas of study in comparison to students who were taught by a conventional face-to-face approach.

The data shared in this paper related

to students and parents belonging to economically weaker sections present their struggles and challenges in participating in a newly implemented field of online education. The possessions of capitals (in the form of devices, internet and knowledge) that online education demands as a prerequisite are often not owned by these students. Further, the kind of pedagogies and activities chosen in this mode of education, such as videos and books from paid sources are mostly not affordable to these students, which makes them devoid of desirable acquaintances. This mismatch places them in the state of "fish out of water", a phrase often used to describe the feeling of not belonging to a particular field. It creates a mechanism where capital formed through family-based endowments gets further rewarded or underestimated by the schools and teachers (Tzanakis, 2011).

Findings of this study suggest that pedagogical practices (of online education) are reinforcing the strengths and privileges of students belonging to elite social classes and are ignoring the viability of these practices for students belonging to economically weaker sections. Such a situation is creating an undeniable form of exclusion for them and hence disavowal of their right to receive equitable and quality education under RtE (2009).

Conclusion

As the corona shutdown exposed the possibilities of virtual classrooms for the first time in front of the public, it is speculated to become an alternative strategy to provide education in coming times. Like the virtual schools of the West, institutions that exist and operate in the digital world may be the next level of virtual classrooms in India. As the 'holographic sentient librarian Vox-114' in the film 'Time Machine', a teacher in the digital screen may be presented

as the only option for uninterrupted qualitative teaching aid at places like geographically far away, isolated islands, less populated human habitats and wandering communities. A number of corporations are already directing efforts to consider online education services as a business opportunity and entering the market of online education rapidly. Information technologies have marked many changes in education delivery models and have transformed the education landscape through onsets of online and blended learning (Palvia, Aeron, Gupta, Mahapatra, Parida, Rosner & Sindhi, 2018). It is doubtful that these agencies which are based on capitalism will be able to do justice to the idea of education as a public good.

While state administrations may pursue the idea as the sole option for universalisation of education due to financial constraints, other agencies such as non-governmental organizations (NGOs) can push the idea as the cheapest solution for receiving world-class education in backward regions. In such likelihoods, the investigation into the constraints created by virtual classrooms should be considered of high academic relevance. Data from this study suggests that e-learning programmes are resulting in the exclusion of some students from the regular classroom activities who are facing several challenges for participation. Various factors included reasons such as lack of device, electricity issues causing the problem in battery charge of the device, poor internet connectivity, non-availability of support from someone who has e-literacy etc. are causing them hindrances in joining these classes on a regular basis. Their delayed joining and lower enrolment rates, lower attendance, silence during sessions and subsequently low submission of assigned tasks expose hard realities of digital divides and complexities of online mode of

education among students belonging to the EWS category and society at large. While the primary reason for the non-delivery of such predicted and promised benefits is the absence of minimum needed electronic gadgets and internet speed, the principal reasons are those related to economic and social inequalities existing in the society.

Schooling has already been biased towards the students belonging to marginalized groups and centres mainly on the needs and demands of those from the advantaged group. Modes such as virtual learning are excluding children belonging to marginalized sections from the process of learning. Further, virtual classrooms can create a bipolar society where students of affluent communities distance themselves from others by organizing classes privately (like at residential complexes, community clubs or specially designed educational facilities) with the assistance of a general teacher. When such digital breakthroughs provide more challenges than opportunities to marginalized communities, it is definitely opening up unending opportunities to those who can afford them. This concern of the reproduction of inequalities in education gets accentuated by the reality of the austere digital divide and usage asymmetry in India across groups such as urban-rural (TRAI, 2018-19), rich-poor, male-female and across different age-groups (Muneer, 2020; Parsheera, 2019; Kwatra, 2019; Panda, Chhatar & Mharana, 2013) and those who lack these facilities get devoid from opportunities to learn in online mode (Goradia, 2020). It is worrisome that present practices of online teaching-learning can cause a kind of technological discrimination which can further lead to the reproduction of another level of educational inequalities in India.

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DIKSHA, NISHTHA and CPD: Experiences and Perceptions of School Learning-Facilitators

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Abstract

We live in the digital era and technology plays a vital role in it. We can witness new advances and improvements each day. To keep up with the trends, it becomes important for all of us to be aware of such advances. We can see developments and changes taking place in every field. The education sector is one of the most prominent sectors and is witnessing a lot of changes. The pandemic has put us in a situation where the only option we are left with is to integrate technology with education. We have been witnessing a number of technological innovations daily that are being used to make teaching and learning easier and more effective. More and more ways are being looked upon to reduce the efforts and make learning a joyful experience. Technology is not only helping in the classroom teaching, but also in the preparation of the teachers (learning facilitators) to teach. The role of the learning facilitator has shifted from being the central source of knowledge to being a facilitator. However, the role of the learning facilitator still remains a significant one. Therefore, it is expected that they should be fully prepared to deliver their hundred per cent in the classroom. To increase their efficiency, several professional development courses are taken up. Nowadays, technology is being used as an aid to conduct such training and workshops of the learning-facilitators and learning facilitator educators. The current study highlights the integration of technology in the Continuous Professional Development (CPD) of the learning facilitators. It also takes into account their say on e-training. The perceptions of 20 government school learning facilitators currently undergoing the NISHTHA integrated training programme on the DIKSHA portal have been taken into account. The data was collected using a questionnaire which had open-ended as well as rating scale-type questions. The responses were collected with the help of Google forms. The responses reveal mixed perceptions of the learning facilitators on e-training.

Keywords: Continuous Professional Development (CPD), Technology, E-training, Learning-facilitators

Introduction

Education is a learning cycle and has no end. Education for one and all has been a matter of concern for ages. Making education a fundamental right was a major step towards the universalization of education. The universalization of education provides each and every child with an entitlement to education. As time progressed, more focus started being laid upon the quality and accessibility of education. With changing times, we can see changes in the mode of education as well. In the earlier times, the traditional method of education was prevalent, wherein the focus was on the transmission of knowledge from the learning facilitator (this paper uses the term learning facilitator for the teacher as a teacher facilitates the learning of students through instruction) to

the student. The learning facilitator was the central figure in the school and was considered to be the only source of knowledge. Gupta and Fisher (2011) quoted in their study about the importance of the learning facilitator's role in the classroom. According to them, the learning facilitator is considered to be the central figure in any classroom. This idea is more prevalent in Indian classrooms. Here, the learning facilitator not only controls the teaching-learning processes taking place in the classroom, but also directs the students on a day-to-day basis. The idea of learning facilitator being the central figure in the classroom has been diluted with time with the advent of constructivism and child-centred approach of teaching. With the change in the ideas, learning facilitators had to adopt the new ways of teaching and dealing with the students. The role of the learning facilitator slowly changed to facilitator or supporter. Now, the learning facilitator is not seen as the only source of knowledge, as the supporter of knowledge. Such changes are taking place very rapidly. New concepts and technologies are being introduced in this field each day. Therefore, it becomes mandatory for the learning facilitators to keep themselves updated with such changes.

The National Education Policy, 2020 (MHRD, 2020, now MoE, 2020) clearly highlights the changes that are going to take place in the education sector in the coming years. New ideas, techniques and plans of teaching in the classroom will be implemented which means that the learning-facilitators and the learning facilitator education institutions are in a great need of revitalization. Such changes highlight the necessity of professional development courses even more.

The professional development of learning facilitators is not a one-time thing, but a continuous process,

therefore, the term Continuous Professional Development (CPD). The CPD provides opportunities to the learning-facilitators to learn about the latest innovations and advances in their profession. CPD is not a new concept and has been conducted for the learning facilitators on a regular basis. The mode of CPD, however, had been offline majorly.

In the present pandemic times, everything is being switched from offline mode to online mode. Therefore, the CPD of the learning facilitators has also seen this shift.

The National Education Policy also lays special stress on the online mode for the training of the learning-facilitators. The learning facilitators are currently being trained under the NISHTHA (National Initiative for School Heads' and Teachers' Holistic Advancement). As per the NEP 2020, every learning facilitator and head learning facilitator are required to participate in at least 50 hours of Continuous Professional Development opportunities every year for their own professional development. Currently, NISHTHA integrated training programme 1.0, 2.0 and 3.0 are being conducted in online mode for learning-facilitators teaching at different stages of the school.

The NEP 2020 stresses the integration of technology in education, planning, administration and development of the education sector. The relationship between technology and education is bidirectional in nature. It proposes to set up an autonomous body known as the National Educational Technology Forum (NETF) to promote the use of technology in this sector. Online platforms will be developed where the learning facilitators can share their ideas for teaching and also the best teaching practices. Technology will also be used in the sharing of content and also the continuous professional development

of the learning facilitators. The content will be developed in a number of languages and will be uploaded on the DIKSHA platform. The same platform will also be used for the online training of the learning facilitators and the learning facilitator educators using e-content.

Currently, the Continuous Professional Development (CPD) of the learning facilitators is being conducted under the NISHTHA training programmes (NCERT, 2019). NISHTHA 1.0, NISHTHA 2.0 and NISHTHA 3.0 training programmes are being conducted for different stages of school education.

NISHTHA 1.0 for the Elementary Level (Classes I to VIII)

NISHTHA 2.0 for the Secondary Level (Classes IX to XII)

NISHTHA 3.0 for the NIPUN Bharat (ECCE to Class V)

The training is conducted on a monthly basis through the training courses that are uploaded on the DIKSHA portal and app. The courses are divided into different modules, which in turn are divided into sub-modules. Each course has a variety of content including videos, script of the videos, activities for the trainees, assignments, and quizzes. Each training course remains open for one month. Therefore, the training is time-bound and the certificates are awarded to the trainees only if they are able to secure 70 percent marks in the final assessment.

Review of related literature

The National Education Policy, 2020 very correctly emphasizes on the fact that learning-facilitators play a very important role in shaping the children, and therefore shaping the future of a nation. It highlights how learning facilitators are the respected individuals of a society. However, there has been a subsequent decline in the status of learning facilitators and learning facilitator educators. The NEP 2020 envisages the importance of restoring this status and position of the learning facilitators. The learning-facilitators need to be motivated and encouraged to deliver their best to the children.

Some studies have been discussed further to highlight the importance of technology in the education sector in the present times.

Tunmibi and Aregbesola (2015) conducted a study in a Nigerian school to examine the impact of e-learning and digitalization in primary and secondary schools. The data was collected from both, learning facilitators and the students. It could be inferred from their study that the learning-facilitators as well as the students believed in the effectiveness of e-learning and digitalization in the classroom. The responses suggested that it was a productive way of teaching. The study shows that most students agreed that e-learning helps students to have access to unlimited sources of information. It also reveals connections between subjects, promotes critical thinking and encourages students' way of learning. The study further suggested that both, the learning facilitators and the students agreed that e-learning and digitalization help learning-facilitators and students to share accountability.

If we talk on a global level, to remain competitive in this era of the globalized period, the governments are trying to make moves towards the information society. The National Curriculum Framework 2005 (NCF, 2005, as cited in Ankita & Husain, 2017) also highlights the importance of ICT in the field of education. According to the document, it is important to inculcate the necessary ICT skills in the students. Affordable ICT tools and techniques should be integrated in the teaching-learning process from the beginning. With all

these changes coming up, the learning facilitators are required to be ready to adapt themselves to the changes taking place. They are required to be up-to-date, so that they can achieve their goals of teaching-learning.

We have termed technology as an aid in the classroom which helps the learning facilitator to deliver the content to the students easily and effectively. Learning facilitators are one of the major stakeholders in the education system and also the classroom learning. Their say in what has to be taught in the class and how it has to be taught is to be valued. This would not only make the learning facilitators empowered but also confident about their teaching.

Skenderi (2017) asserts the view that all levels of education are highly affected by the presence of technology in the classroom. She acknowledged the fact that irrespective of our views, we are closely connected to technology and we cannot change it. She addresses the differences in the nature of technologies being used by the developed and developing countries. Where the developed countries talk about artificial intelligence, the developing countries still struggle and talk about not having a sufficient numbers of computers in the labs. She took into account the views of the learning-facilitators on whether technology should or shouldn't be used in the classroom. There was a mixed response from the learning facilitators. They agreed upon the fact that technology enhances student Participation in the classroom, but remained unsure about its role in improving their communication skills.

Almekhlafi and Almeqdadi (2010) studied the perceptions of the learning facilitators about the technology integration in the United Arab Emirates school classrooms. They took into account the perceptions of 40 female and 60 male learning facilitators from

two K-12 schools. The results showed that the learning facilitators were comfortable and integrating technology in their classroom teaching. However, the types of technologies used by males and females differed in their nature.

Another study conducted by Davies, Lavin and Korte (2009) took into account the perceptions of the students about how technology impacts the quality of instruction and learning in the classroom. They conducted a survey of students enrolled in business courses at Midwestern University. The overall response of the students towards the use of technology for classroom instruction was studied.

Rationale of the study

NISHTHA is one of the premiere ventures by the NCERT for the training and professional upliftment of the teachers. Though it caters to the needs of a large number of teachers across the country, the experiences and views of each and every teacher, who is undergoing these trainings is important and significant for the betterment of these programmes. Every programme has scope for further betterment; similarly the NISHTHA programmes also have such scope. The current study, believing in these two aspects that every teacher is important and there is always a scope for feedback and betterment endeavours to collect experiences of a group of teachers who not only underwent NISHTHA 1.0 training programmes but also applied the technology-integration at their respective workplaces after these training sessions. Moreover, it can be understood that the NCERT might have been collecting feedback from such NISHTHA trained teachers, but a third-party study about collecting experiences and feedback would have been more unbiased and fruitful in true manner for the betterment of such programmes. All these reasons motivated the researchers to conduct and execute this

small grouped but significant study.

Objectives

The current paper highlights the use of technology in the Continuous Professional Development (CPD) of the learning-facilitators. Therefore, the objectives of the paper are as follows:

- To take a note of the technology integration experiences of the learning-facilitators on the DIKSHA portal in the NISHTHA programmes for the CPD.

- To suggest improvements in the training courses of NISHTHA programmes on the DIKSHA portal for a better impact on the CPD of learning-facilitators.

Methodology

The methodology is a very significant part of any study. It deals with the methods and tools employed for the data collection. The current study aims to study the experiences of the learning facilitators on e-training. The various elements of methodology are discussed further.

Sample and sampling technique

The learning facilitators for the current study were chosen using non-random purposive sampling technique. The data was collected from twenty learning-facilitators who have been working as Primary learning-facilitator (PRT) or Trained Graduate learning facilitator (TGT). These learning facilitators have been working for a period of minimum 2 years by the time when the study was conducted. All the learning facilitators have been working in the government schools and hence undergoing the NISHTHA integrated training programme in general and NISHTHA 1.0 in specific. The learning facilitators were not chosen subject specifically, but according to their schools. The study

believes that like every learner every learning facilitator is also important, hence even a small sample is significant. There were six Primary Teachers (PRTs) and fourteen Trained Graduate Teachers (TGTs) who responded to the Google form.

Tool

The data was collected using a questionnaire for the learning-facilitators. The questions were a mix of open-ended as well as a rating scale.

The questionnaire had five themes in all. The responses were collected using Google forms. The questions were framed under the following five main themes:

- Mode of training preferred

- Experience of using the DIKSHA portal for e-training

- Timely completion of the trainings

- Usefulness of the modules and their implementation in the classroom teaching

- Suggestions and improvements, if any, required in the modules

Procedure for data collection

The data was collected using Google forms from those selective Kendriya Vidyalaya PRTs and TGTs, who were connected with the NISHTHA training and afterwards for at least two years. For further insights, a few of them were informally consulted too on the various aspects of the programmes and their experiences.

Results, analysis, and discussion

The data collected showed various responses from the learning facilitators on e-training. The data not only revealed the individual perceptions of the learning facilitators, but also helped

in suggesting some improvements in the training modules. The data can be analyzed thematically.

Mode of training preferred

On being asked about the preferred mode of training, about 55 per cent learning facilitators preferred offline training over the online mode. The major reasons for the preference were that the offline mode gives opportunities to see the trainees in person and understand their responses through their facial expressions. Due to the digital divide, more people can attend offline training as compared to the online one. The offline mode also permits the conduction of workshops, where the learning can be implemented simultaneously. The offline mode also permits the mapping of the trainees, as to who is at what level. One of the biggest advantages of offline training, as cited by a respondent, is the on-the-spot clearance of doubts of the trainees. The ones that selected the online mode of training reasoned out that it is convenient in the current pandemic times. The same content can be revisited again and again at any point of time. There is no geographical barrier in this mode of training.

It was seen that the responses were mixed; however, more learning-facilitators were inclined towards the offline mode of training.

Experience of using the DIKSHA portal for e-training

When asked about their experience on the DIKSHA portal, around 78 per cent responded their experience was 'good' and about 22 per cent selected 'average' on the rating scale. This shows that most of the learning facilitators are satisfied with the features and functions offered by the portal.

Timely completion of the training

The training modules under the NISHTHA programme are time-bound. The learning facilitators are required to enrol into the courses and then they can finish the modules at their own pace by the end of that particular month. They are required to complete two courses each month.

On being asked about the timely completion of the training, all the learning facilitators responded on a positive note. The major reason for this could be the time-bound nature of the courses.

Usefulness of the modules and their implementation in the classroom teaching

This part is the most important part of this study. The respondents were asked if they can retain and implement their learning from the training in their classroom teaching. To this, around 77 per cent learning-facilitators responded with a 'yes', whereas around 23 per cent responded with 'sometimes'.

Suggestions for improvement

The learning facilitators responded that they do not get enough time to absorb their learning and implement them in the class. As soon as they finish with single training, they have to gear up for the next one. The training lacks processing time in between.

On being asked about the suggestions for the improvements, some of the learning facilitators responded that the video lectures should be of short duration and should be made more interesting. The training is of the same type and has thus become monotonous. They should therefore be made more interesting. One of the learning facilitators responded that instead of the lecture method in the videos, the trainers can use some other techniques to teach those concepts. Another useful suggestion given by one

of the respondents was that to make the training more interesting and to raise the motivation level of the learning facilitators, certain incentives can also be attached to each course.

Conclusion

DIKSHA portal is good for NISHTHA training programmes for PRTs and TGTs. They are good for retention of learning by the learning facilitators and application by them in the real teaching and learning in the school classroom activities after the training. These programmes are good for timely completion of a training programme. On the other hand, it can also be concluded that although the learning facilitators are being trained on the online portals, not everyone seems to enjoy such training (Kanvaria & Dubey, 2022). The possible reasons for this could be the monotonous nature of the training, lack of extrinsic as well as intrinsic motivation and the digital divide that is still present in our country. Many learning facilitators are still not comfortable in the use of technology. The training, however, can be made more and more interesting. Learning should be a joyful experience, not only for the students, but also for the learning-facilitators.

Recommendations and implications of the study

The output of the study gives an insight into the current NISHTHA programmes. Mode of training, using the DIKSHA portal for e-training, the timely completion of the training, retention of learning from and usefulness of the modules and their implementation in the classroom teaching and variation in various functional aspects of modules are important concerns for NISHTHA training programs. The offline mode may be preferred over online mode for training. DIKSHA portal is good for e-Training. DIKSHA portal is good for the timely completion of training. The retention of learning from the DIKSHA portal is at the higher end. Modules are implementable in the classroom teaching and learning later on after the training. Between two modules, a time period can be given for practice and implementation. The video duration can be decreased and a variety of presentation techniques can be used in the tutorial videos.

Scope for further research

The present study considered a smaller sample size (believing that every learning facilitator is important) to study the experiences of the learning facilitators. However, similar surveys and research can be conducted on a larger scale to take into account the experiences of the learning facilitators about such training. It is important for further improvement. The suggestions can be taken into account and the training can thus be improved so that the learning facilitators also enjoy them and deliver their best in the classroom.

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Research article

Introducing Game Design Elements in Content Learning in New Normal

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Abstract

Incorporating video games in the teaching and delivering of subject content to ensure maximum language acquisition on digital platforms is the new strategy in the new normal. Accompanied by pandemics and chaos, in the last two years an English language teacher is multitasking on a virtual platform, from online classes, assignments, online presentations and online examinations and assessments, everything became digitalized and virtualized. The inclusion of digital game-based learning, such as video games, is becoming much more popular as they are found to have a prolific impact on the acquisition of language. A review of current studies and literature in language learning is introduced, depicting works on the ethics, culture and values of the internet. This research paper will highlight the positive and negative implications of video games on language learning in the new normal. It will also look into the benefits of digital game-based learning and its implication on language learning in the second part of this research. The study includes qualitative quantitative research methods and indicates the implication that digital technologies constitute a new literacy and an essential component of language learning and communication.

Key Words: Language Learning, Digital, Technology, Internet, Video games

Introduction

With the advancement of the new world, people started looking for new things and advanced versions in an easy way. When it comes to teaching, learning and engaging students with the content, it requires many new ways. In addition, along with the Covid-19 pandemic crisis, teaching had merely converted to an online practice from regular chalk and talk methods. This being said, video games involve visual cues, dialogues, tasks and interaction with other speakers, leading to language acquisition. It is undebatable that Generation Z has a natural attraction for digital games and thus researchers and experts have collaborated together which gave birth to the new trends in English language teaching known as Digital Game-Based Learning.

Background of the study

Digital Game-Based Learning is a type of learning where students learn content with the help of educational gameplay. Digital Game-Based Learning plays a key role in balancing the content and game. This very game indulges learners as the pioneers and this made the learners to actively participate in the game with the development of the technology the importance of the platform grew vastly.

a) Interactivity and facilitation of communication with the help of video games- allows a player to enter into a zone past their comfort level and hence, facilitates speaking skills and use of terms and phrases in the English language. For example, Different levels of 'FIFA- football game', IPL and MPL allow prominent

communication to take place.

b) Multiple players with the help of several players, gamers are compelled to communicate and to be focused to have on the spot conversation and make tactical plans. This requires great reflexes and excellent coordination and verbal skills among the players without which the game cannot proceed. For Instance; 'Rocket league' is a car race game that requires a lot of coordination and tactical skills. This also needs verbal communication and collaboration of teamwork.

c) The willingness to communicate with all levels of Gamers and verbally communicate and express body language and act out Role play virtually whilst coordinating with other multi players in different low anxiety environments and hence providing optimum room for English language production. For instance; 'Fortnight' requires a lot of communication among players as there are shooters approaching from all sides and the storm is closing in and the gamers have to reach safety while collecting most treasures.

Research Objectives

1. To critically evaluate the technological changes in language learning.

2. To study the technological impact on the form and context of language use, learning, and teaching.

3. To recommend a methodology that can be employed to enhance language learning by foreign language learners and second language.

Review of Literature

The review of literature in this chapter informs various research articles on the topic impact of digital-based learning. Each of the researchers used different methods and areas to know the impact of digital game-based learning and a few of them also focused on learning instruction vs. entertainment instruction. Digital game-based learning is a newly emerged method of teaching which did not spread in all schools as it took time taking. Even many teachers are also new to DGBL. Apart from teachers, parents' point of view on digital game-based learning is also one of the reasons that are stopping the method to inculcate in learning as it involves digital games with learning. So, those students will actively participate in the teaching and learning process.

Ricardo Casañ-Pitarch in their research paper "An approach to digital game-based learning: Video-games principles and applications in foreign language learning" focuses on foreign language learning, an educational field which investigates that students not only gain theoretical knowledge of vocabulary and grammar. But students also need to develop all kinds of communicative competences and this means experiencing and rehearsing the use of the goal language. The motive of this paper is to outline a few fundamental ideas associated with digital game-based learning, such as serious games and gamification, and to introduce a few theoretical standards on foreign language acquisition and foreign language by the use of video-games based.

Hsiu-Ting Hung, Jo-Ling Chang and Hui-Chin Yeh in their research paper "A review of trends in digital game-based language learning research" found out how far the digital games are currently implemented and the findings suggest that 4 per cent of the articles

are recognized as associated with DGBLL with inside the reviewed corpus, maximum DGBLL researchers employed combined methods, higher education learners are mostly examined a group of participants in DGBLL researches, English become the goal language studied through the bulk of DGBLL researchers, and Off-the-shelf digital games, especially the sort of Massively Multiplayer Online Role-Playing Game.

Yi-hui Chiu, Chian-wen Kao and Barry Lee Reynolds in their research article "The relative effectiveness of digital game-based learning types in English as a foreign language setting: A meta-analysis" talks about the synthesized applicable research to analyse the general outcomes and to observe the differential outcomes of DGBL kinds in English as a Foreign Language setting. Two statistical models are used to provide average impact sizes throughout research: the fixed-effect model and the random-effects model Therefore, the effects from the 2 models are pronounced to expose a complete picture of that research. The model comprehends that meaningful and effective game learning can produce good benefits among learners if drilled and tutored on a daily basis. Therefore, it is believed that engaging in meaningful games can have a better future.

Many researchers and academicians who study the effectiveness of game learning could be formulated within the curriculum of the organisation and can be incorporated with the language laboratory in the particular school or collegiate education.

Methodology

The methodology used by the researchers to study the impact of digital game-based learning and the implication of using video games on language involves a systematic study and analysis of the text from different e-sites and books. The procedures investigate in the research paper take the teacher's point of view. The methods used in the study, including the population and sample of the study, qualitative and quantitative methods, interview sessions, discussions and interactions, were used for the analysis of data.

Population and sample size:

A population of 51 teachers were chosen for the research paper. The target audience teaches at different levels of students U.G, P.G and Ph.D. and a few others from a private school and the faculty members of a private institution. Some lecturers from a National University and Business College also participated in this study. Here it is important to note that all the participants are non-native speakers of English and Teachers of the particular institution teach the curriculum IGCSE and local syllabus affiliated with Cambridge University. Their medium of instruction is English.

Qualitative and quantitative method:

The researcher used both quantitative and qualitative methods in their research paper. In the quantitative method, researchers used data collection for questionnaire and statistical analysis. In a qualitative method researchers used interaction with teachers to know their point of view, ideas and perceptions on the implementation and the impact of digital game-based learning.

Statistical Techniques:

The researchers used statistics to bring an accurate percentage from the data collected in the form of a questionnaire. Pie chart analysis is used in specifying the exact percentage of accurate data collected from the response of the teachers to the given options.

Data Analysis and interpretation:

The researchers analysed and interpreted the collected data in a detailed manner that is conducted in the form of interview sessions and questionnaires. The questionnaire was distributed to teachers who teach preschool, primary, secondary, higher school, and tertiary level students. The teachers answered the questionnaire with their prior experience and keeping their students in mind. The rubrics chosen for the questionnaire consisted of four different options which were changed according to each questionnaire. The researchers analysed the collected data and presented them in the form of charts. Researchers had analysed different perspectives of the teachers on each question in the questionnaire. The analysis made in the research paper is based on teachers' point of view. The results are provided on the interpretations and analysis of the questionnaire.

Survey and Interviews

The researchers conducted questionnaires and interviews with teachers about the impact and implementation of Digital game-based learning and the use of video as a means to inculcate language learning.

Keeping the teacher's responses while interacting with them in the interview and analysing the questionnaire it was found that even though 43.48 per cent of teachers use PowerPoint and digital game-based learning in their teaching 44.68 per cent found it challenging as students of every level, like playing digital games. So, implementing digital game-based learning can make learning easy and at the same time fun but adapting to this learning method requires lots of training and the right games should be implemented.

Findings

Before an analysis is made, all samples collected were entered into a table and formed into bar graphs and pie charts. The questions will then be presented chronologically analyzing each finding with interpretation.

Fig-1: To which level of students do you teach?
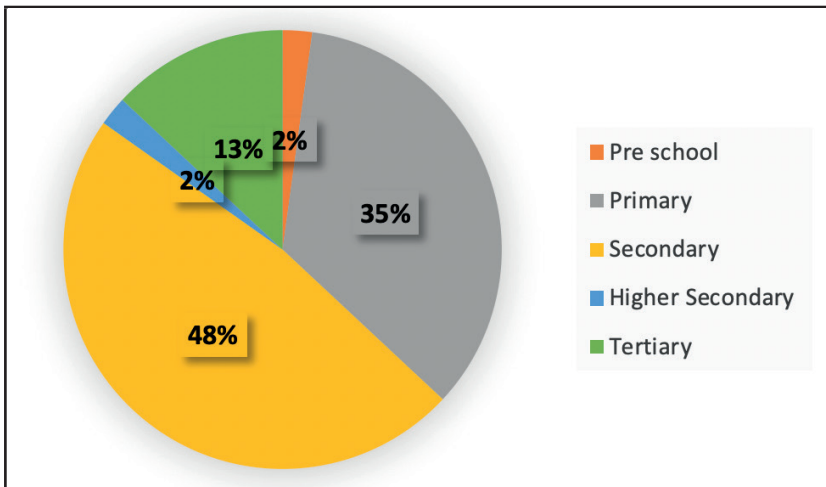
The first question which is mentioned in Figure-1, found out that 13 per cent from the tertiary level took part in this survey and 2.17 per cent from the higher secondary where a maximum of 47.83 per cent partook while 34.78 took part in completing the questionnaire. It was a mere 2.17 per cent of response from Preschool teachers for this survey as well.

Fig-2: Was it challenging to teach on a digitalized platform in comparison to the traditional teaching method in classrooms in the new normal?
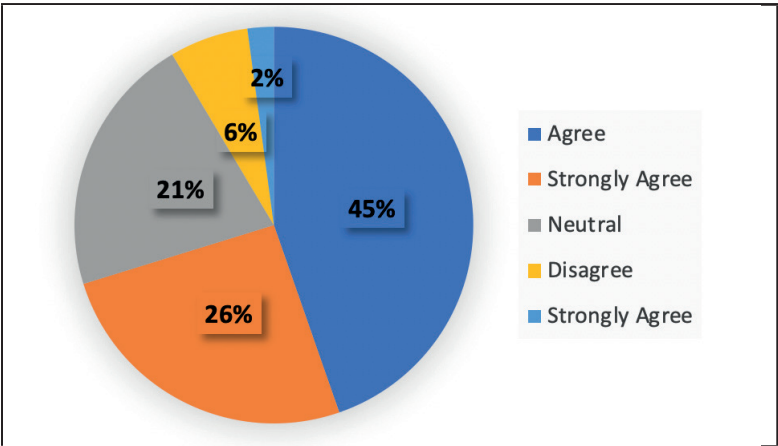
According to the question which is mentioned in Figure-2, 44.7 per cent of the teachers agree that it was challenging to teach on a digitized platform in comparison to the traditional chalk and talk method in the classroom. Though, 21.28 per cent of the participant did not find the virtual platform to be a challenging task during the new normal. The revolving and evolving technology and teachers adapting its use in the everyday classroom could be a contributing factor to this result.

Fig-3: As a teacher, do you feel digital platforms help improve English language acquisition in learners?
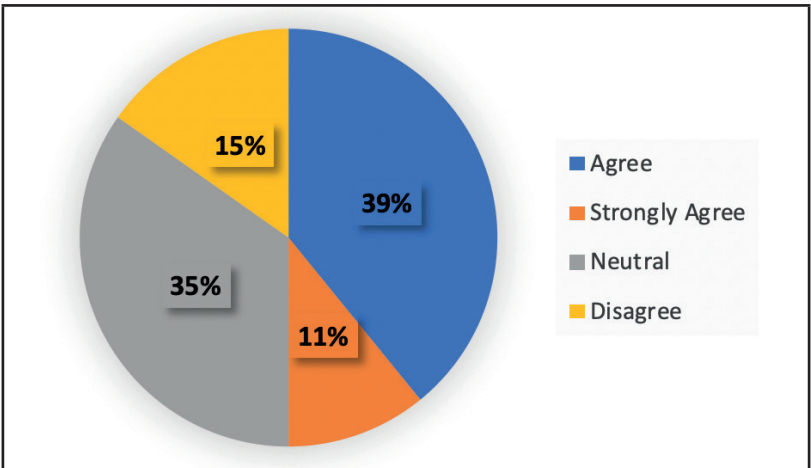
The figure-3 indicates that 39.19 per cent agree that digital platforms increase English language acquisition while 10.87 per cent strongly agree. IF we combine the two percentages, we get a positive agreement of 50 per cent that the digital platform helps in English language acquisition. Though it is vital to note out of the teachers who participated in the study, 34 per cent did not agree or disagree. But a minor 15.22 per cent believes it hinders language performance.

Fig-4: How often do they incorporate Multimedia and PowerPoint and other Digital game-based learning techniques in their subject teaching?
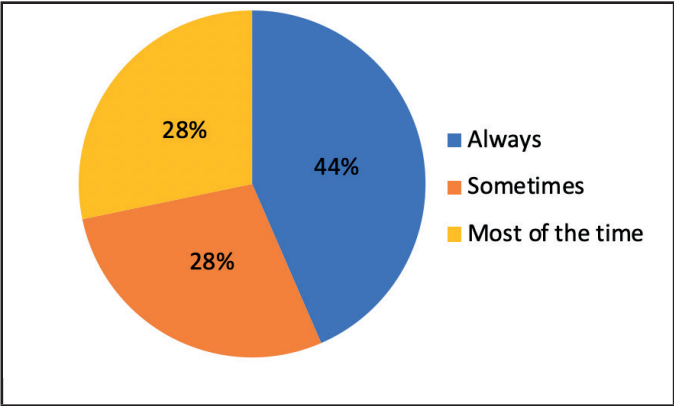

Figure-4 shows a significant 43.48 per cent of learners showing interest to incorporate digital game-based learning techniques in their subject teaching, whereas 28.26 per cent were identified to use some form of DGBL while the same percentage used it most of the time. Therefore, a significant per cent has been using digital games based on subject teaching hence language using was influenced due to this methodology.

Fig-5: If you have been incorporating (DGBL_ Digital Game-Based Learning), Do you feel it helps in language performance?
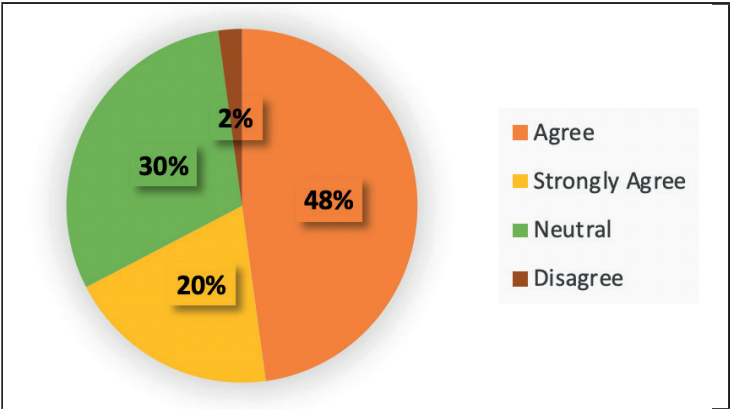
According to the finding, in figure-5, 48 per cent of the learners strongly agree that DGBL facilitates language performance and 47.83 agree in the same manner. A very small per cent of 2.1 per cent disagrees whereas, we have identified a significant 30.43 per cent who have taken a neutral stand in the argument. This could probably be the result that these teachers do not incorporate the DGBL method in their digital platform teaching method. An interesting fact identified is that a vast collective percentage of 67.4 per cent believes in the improvement in language with the use of DGBL in digital platforms while teaching.

Fig-6: Do you believe Digital platforms hinder language learning?
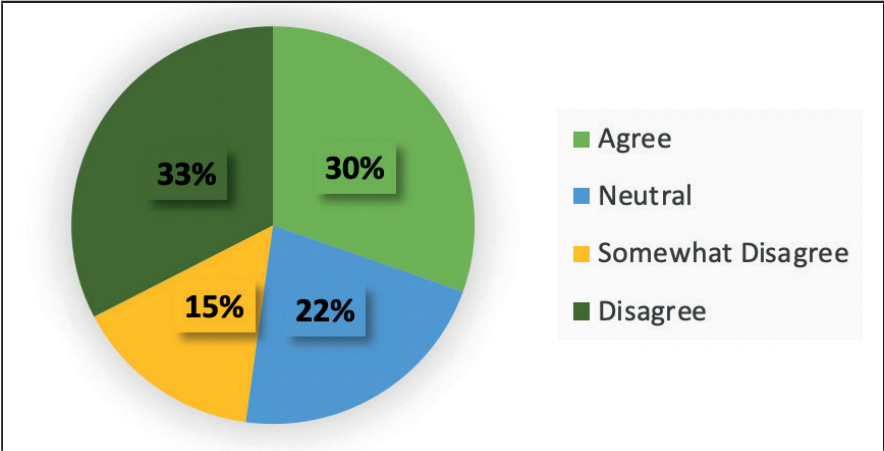
As a result of this question which is mentioned in Figure-6, it was found that a great 30.43 per cent of the participants admit that teaching on digital platforms hinders learners' language performance. This could be that it reduces physical interaction among teacher students and thus, student motivation to participate in class is decreased and students might not get the feel of a real classroom via the screen. Though interestingly, 32.61 per cent disagrees and believes that digital platforms do not have a role in the language hindrance of the learner. The other numbers are very neutral to the response.

Fig-7: Do you inculcate videogames as part of classroom teaching?
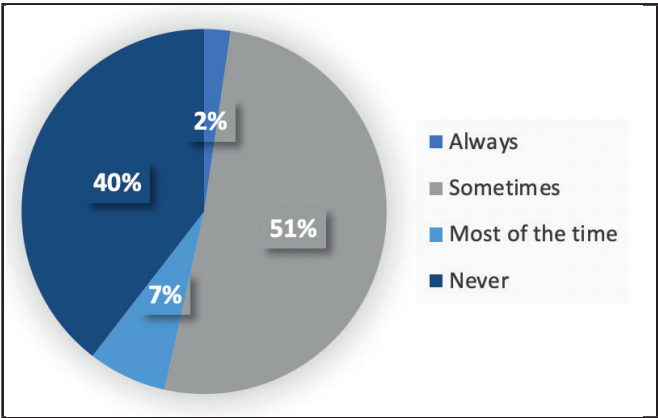
As per the result of the finding in figure-7, more than half of the participants, a great 51.16 per cent of participants, agree that they sometimes use videos as part of teaching while 2.33 per cent say they always use them. And a small 6.77 per cent admits they incorporate it in their everyday lessons. However, a significant 39.53 per cent also claims they avoid using videos while delivering lessons to the learners. This indicates that most teachers use videos to a greater extent in their teaching as they believe it is an important part of language acquisition and helps the learner comprehend the concept of the content taught.

Fig-8: Do you think video games play a role in boosting English Language learning?
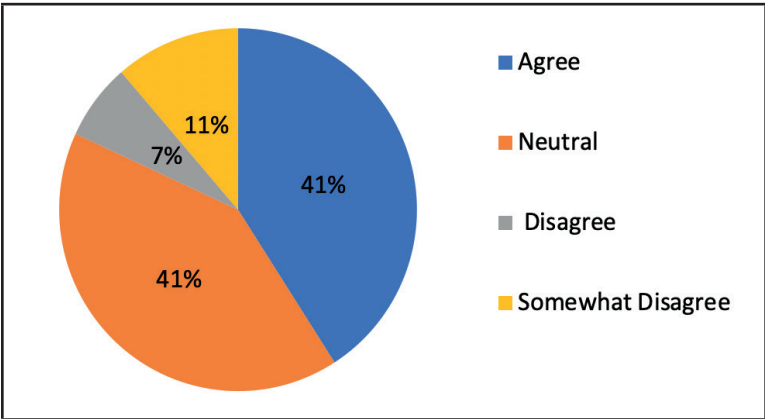
The finding in figure-8 suggests that 40.91 per cent believed video games helped boost English language acquisition whereas, 40 per cent neither agree nor disagree. A minor 11.36 per cent disagreed that video games do not boost English language development. This could be for many reasons as the teachers contributed are from many subjects backgrounds, though the subject content is delivered in English.

Data Analysis and interpretation of Results

The findings highlight the positive implication of video games on language learning in the new normal. With this said, the research finding further indicated that teachers have started identifying the importance of incorporating video games in the teaching and delivering of subject content to ensure maximum language acquisition on digital platforms.

Conclusion

From the finding of the result, we can identify that most of the participants agree that digital game-based learning helps improve students' language learning. With the circumstances that the whole world is currently going through, the education system is experiencing a digital revolution and thus more and more teachers are incorporating digital game-based materials in their lessons every day. Most teachers incorporate this very recent method of teaching as it is beneficial for the development of language learning. Thus, with the research conducted it has become vital to understand that DGBL is an important technique to be incorporated in classrooms with proper planning to achieve communicative competence.

Implication

There are other contributing factors that influence the result of this sample such

as some of the teachers who contributed to the sample, could be teachers not directly related to language teaching and thus, might not assess the learner's language competency. Moreover, the learner's exposure to the language outside the classroom environment and away from games and the learner's own intellectual capability plays a vital role in language acquisition. Moreover, a teacher's teaching technique and student-teacher relationship have influences on the learner's progress in the language. Hence, these are the areas which should be considered in the future when such research should be considered further.

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Demographic Influence on Attitude of Teachers towards using New Technology: A Study after almost One Year of COVID-19 Outbreak

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Abstract

The present study has been conducted to investigate the attitude of teachers' towards using new technology and the influence of various demographic (personal and institutional) variables on it; after almost one year of the COVID-19 pandemic outbreak. The sample of the study consisted of 365 school teachers from different districts of Tamilnadu state. To know the attitude of teachers' towards using new technology the tool 'Attitude towards using new technology scale (ATUNTS)' developed and standardized by S Rajasekar was used. Demographic data were collected by using a Personal Data Questionnaire. The finding of the study revealed that the majority of the teachers of the selected sample showed neutrality; whereas a few of them showed a favourable attitude towards the use of new technology. Variables like; gender, age, marital status and type of family. Teaching experience, locality, school management and teaching level were found to have no significant influence on the attitude of teachers towards the use of new technology Type of board, stream and number of online courses/ MOOCs attended were found to have a significant influence on the attitude of teachers towards the use of new technology.

Keywords: Attitude of teachers towards use of new technology, Demographic influence on teachers' attitude towards use of technology

Introduction

The outbreak of COVID-19 had impacted the education system worldwide, so the Indian education system is no exception. Slowly and gradually all the stakeholders of education modified their knowledge regarding and skills of using ICT tools, modern technological tools to be used for teaching and learning. E-learning is supplementing traditional learning slowly and gradually. Moreover, due to the present situation, the attitude of teachers has also changed towards using ICT tools and new technology for teaching and learning. The worldwide impact of the health emergency caused by the COVID-19 pandemic had initiated the transfer of face-2-face education to online education. Facing the challenge of this new situation, teachers had to adapt not only to new online methodologies but also they had to undergo a lot of stress and various kinds of challenges of online teaching.

Many researchers investigated teachers' attitudes towards the use of new technologies in classroom teaching-learning situations before the COVID-19 pandemic period. Becker and Riel (1999) concluded through their investigation that teachers exposed to computers and having an abundance of instructional technologies that can be used in classrooms showed a more positive attitude towards integrating technology in their classrooms. Baylor and Ritchie (2002) observed that following a comprehensive plan for technology use is the key to success for successfully integrating technology into

the school curricula by many schools. According to Kersaint, Horton, Stohl and Garofalo (2003) use of technology by teachers is greatly influenced by their positive attitude. In a study conducted by Sunita Saikia, teachers despite not having enough experience in the utilization of technology in classrooms had shown a positive attitude towards technology. In a study on teachers of K-12 schools in the United Arab Emirates Al Mekhlafi and Al Meqdadi (2010) found teachers are progressive in using a variety of technological tools in their classrooms. Moreover, the female teachers were found to have more experience, usage and familiarity with the technological tools than their counterparts. Al-Zaidiyeen, Mei and Fook (2010) investigated the level of ICT use for educational purposes by teachers in Jordanian rural secondary schools and found that teachers hold positive attitudes towards the use of ICT, and a significant positive correlation between teachers' level of ICT use and their attitudes towards ICT was found. Basu and Ahmad (2016) found that secondary school teachers have a more favourable attitude towards ICT than the private secondary school teachers of the Budgam district. Kant (2016) studied the attitude of secondary school teachers' towards using new technology and found that gender and the affiliating board does not influence teachers' attitude. Mahajan (2016) examined the attitude of school teachers towards the use of technology in Nurpur and Jawali blocks of District Kangra, and found that about 25 per cent of the teachers had a favourable attitude; gender & teaching experience had no influence on teacher's attitude towards the use of new technology.

In the present scenario, especially after the outbreak of Covid-19 pandemic, use of technology has become a part and parcel of the education system now. Though initial efforts taken by the novice technology user teachers were huge, but now the teachers as well the students are getting used to technology-integrated teaching and learning. Previously, many studies had been conducted in India as well as abroad to know the teachers' attitude towards the use of new technological tools in the teaching-learning process. As, investigations by various researchers worldwide show that during this pandemic period the overall attitude of all the stakeholders has seen a shift from not so favoured technology to favourable towards technology. Recently, Alhumaid et al. (2020) investigated the perception and attitudes of university-level instructors from Rawalpindi, Pakistan towards e-learning during the Covid-19 period. Overall, the respondents expressed a favourable opinion concerning e-Learning acceptance during the lockdown situation and its impacts on students' academic performance. Espino-Díaz et al. (2020) suggested that the symbiosis of ICT and neuro education can make a great contribution to the paradigm shift that is taking place in the present time. A longitudinal national survey conducted by Sokal, Trudel and Babb (2020) at two points early in the COVID-19 pandemic indicated that teacher efficacy, attitudes toward change, and perceptions of administrative support were correlated with teacher resilience and burnout at the onset of the pandemic. Further, this study showed that teachers' cognitive and emotional attitudes toward change became more negative.

To investigate the present attitude of school teachers towards the use of technology in classrooms and demographic influence in the Tamilnadu state of India after nearly one year of the COVID-19 pandemic outbreak this study has been undertaken.

Objectives

The present study was conducted to realize the following objectives:

1. To study the overall attitude of teachers towards using new technology.

2. To study the significant difference in school teachers' attitude towards the use of new technology based on various variables i.e., gender, age, marital status, type of family; teaching experience, locality, management, board of school; level, stream and number of online courses/MOOCs attended.

Hypotheses

1. There is no significant difference in school teachers' attitude towards the use of new technology based on gender.

2. There is no significant difference in school teachers' attitude towards the use of new technology based on marital status.

3. There is no significant difference in school teachers' attitude towards the use of new technology based on family type.

4. There is no significant difference in school teachers' attitude towards the use of new technology based on locality.

5. There is no significant difference in school teachers' attitude towards the use of new technology based on type of school management; i.e. Aided and private.

6. There is no significant difference in school teachers' attitude towards the use of new technology based on the type of board (CBSE and State Board).

7. There is no significant difference in school teachers' attitude towards the use of new technology based on different age groups.

8. There is no significant difference in school teachers' attitude towards the use of new technology based on teaching experience.

9. There is no significant difference in school teachers' attitude towards the use of new technology based on teaching levels; i.e. Primary/Secondary/Senior Secondary.

10. There is no significant difference in school teachers' attitude towards the use of new technology based on stream.

11. There is no significant difference in school teachers' attitude towards the use of new technology based on online courses/MOOCs attended.

Methodology

A descriptive survey method was employed for the present study.

Sample

The sample of the present study consisted of a total of 365 school teachers teaching at different levels (Primary, Secondary and Senior Secondary) of various Aided and Private schools of Tamilnadu, India.

Tool Used

To know the attitude of teachers towards using new technology the tool 'Attitude towards using new technology scale (ATUNTS)' developed and standardized by S. Rajasekar (2011) was used. For collecting the demographic data, a personal Data Questionnaire was used.

Data Collection

The data was collected online using google forms.

Analysis and Interpretation

Table-1: Overall attitude of teachers towards using new technology

S. No	Attitude towards use of new technology	N	%
1.	Neutral	312	85.5
2.	Favourable	53	14.5

From table-1 it is evident that the majority of the teachers 312 (85.5 per cent) out of total of 365 teachers of the selected sample showed a neutral attitude towards the use of new technology; whereas the rest of the teachers 53 (14.5 per cent) showed a favourable attitude towards use of new technology. None of the respondents of the selected sample showed an unfavourable, highly unfavourable or highly favourable attitude towards using new technology.

Table-2: t-test results of attitude of teachers towards using new technology based on various demographic variables

Variables	Categories	N	Mean	SD	df	t	p
Gender	Male	38	101.11	12.304	363	-1.439	.151[NS]
	Female	327	103.87	11.061			
Marital Status	Unmarried	39	101.85	8.558	363	-1.021	.308 [NS]
	Married	326	103.79	11.480			
Type of Family	Nuclear	226	103.99	11.112	363	.888	.375 [NS]
	Joint	139	102.91	11.377			
Locality of the School	Urban	316	103.73	11.254	363	.675	.500 [NS]
	Rural	49	102.57	10.983			
Type of School Management	Aided	57	102.93	11.206	363	-.475	.635 [NS]
	Private	308	103.70	11.225			
Type of Board	State Board	170	101.86	10.663	363	-2.751	.006**
	CBSE Board	195	105.07	11.486			

** - significant at 0.01 level
NS – not significant at 0.05 levels

The following results can be drawn from the t-test results, given in Table-2:

Male and female teachers do not differ significantly with respect to their attitude towards using new technology; t (363) = 1.439, p = .151 even at a 0.05 level.

Married and unmarried teachers do not differ significantly with respect to their attitude towards using new technology; t (363) = 1.021, p = .308 even at a 0.05 level.

Teachers belonging to nuclear and joint families do not differ significantly with

respect to their attitude towards using new technology; t (363) = .888, p = .375 even at a 0.05 level.

Teachers belonging to schools located in urban and rural areas do not differ significantly with respect to their attitude towards using new technology; t (363) = .675, p = .50 even at a 0.05 level. Teachers belonging to Aided and Private do not differ significantly with respect to their attitude towards using new technology; t (363) = .475, p = .635 even at a 0.05 level.

Teachers belonging to schools affiliated to the State Board and CBSE Board differ significantly with respect to their attitude towards using new technology; t (363) = 2.751, p = .006 at 0.01 level. CBSE board teachers (M=105.07) showed a significantly higher attitude towards the use of new technology as compared to State board teachers (M= 101.86).

Table-3: F-test results of attitude of teachers towards using new technology based on various demographic variables

Variable	Sub-variables	N	Mean	SD	F	p	Groups differ significantly
Age-group	20-30 years	62	102.34	9.838	1.101	.349 NS	Not Significant
	31-40 years	143	103.29	11.215			
	41-50 years	135	103.81	11.648			
	> 50 years	25	107.04	11.873			
Total Teaching Experience	1-5 years	106	102.45	10.840	1.073	.369 NS	Not Significant
	6-10 years	109	103.37	11.122			
	11-15 years	82	103.43	11.737			
	16-20 years	39	106.56	10.203			
	> 20 years	29	104.90	12.525			
Level	Primary	106	102.53	9.932	.926	.397 NS	Not Significant
	Secondary	169	103.63	11.026			
	Senior Secondary	90	104.71	12.864			
Stream	Science (1)	187	106.13	11.738	10.467	<.001**	1 & 2 (p<.001)
	Arts/ Humanities (2)	148	100.81	10.077			
	Commerce (3)	30	101.33	9.629			
Online Courses/ MOOCs Done	None (1)	243	101.85	10.987	6.000	.001**	1 & 2 (p=.001)
	1-5 Courses (2)	91	107.13	11.331			
	6-10 Courses (3)	24	106.79	9.330			
	>10 Courses (4)	7	106.29	11.543			

** - significant at 0.01 level
NS – not significant at 0.05 levels

The following results can be drawn from the F-test results, given in Table-3:

Teachers belonging to different age-groups do not differ significantly with respect to their attitude towards using new technology; F = 1.101, p = .349 even at a 0.05 level.

Teachers belonging to different teaching experience groups do not differ significantly with respect to their attitude towards using new technology; F= 1.073, p = .369 even at a 0.05 level.

Teachers belonging to different levels do not differ significantly with respect to their attitude towards using new technology; F= .926, p = .397 even at a 0.05 level.

Teachers belonging to different streams (Science, Arts/Humanities, Commerce) differ significantly with respect to their attitude towards using new technology; F= 10.467, p < .001 at 0.01 level. Further, post hoc analysis using Tukey HSD reveals that only teachers belonging to science (M=106.13) and Arts/Humanities (M=100.81) group differ with respect to their attitude towards using new technology; Science teachers have a more favourable attitude towards using new technology in classrooms.

Teachers belonging to different groups based on online courses/ MOOCs attended differ significantly with respect to their attitude towards using new technology; F= 6.00, p = .001 at 0.01 level. Further, post hoc analysis using Tukey HSD reveals that only teachers who have not done any online courses/ MOOCs (M=101.85) and the teachers who have done 1-5 courses (M=107.13) differ significantly with respect to their attitude towards using new technology.

Findings

1. The majority of the teachers 312 (85.5 per cent) out of the total 365 teachers of the selected sample showed a neutral attitude towards the use of new technology; whereas the rest of the teachers 53 (14.5 per cent) showed a favourable attitude towards the use of new technology.

2. Variables like; Gender, age, marital status, type of family, teaching experience, locality, school management and level were found to have no significant influence on the attitude of teachers towards the use of new technology.

3. Type of board, stream and number of online courses/MOOCs attended were found to have a significant influence on the attitude of teachers towards the use of new technology.

4. CBSE board teachers showed a significantly favourable attitude towards the use of new technology compared to State board teachers.

5. Science teachers showed significantly favourable attitudes towards the use of new technology compared to arts/humanities teachers.

6. The number of online courses MOOCs done by the teacher's influences their attitude towards using new technology. Teachers having done (1-5) MOOCs showed significantly favourable attitude towards use of new technology as compared to teachers who have done not a single MOOC.

Conclusion

The analysis of data regarding demographic influence on the attitude of teachers using new technology during the COVID-19 pandemic revealed some unexpected and some expected results. The majority of the teachers of the selected sample showed neutrality and the rest of the teachers showed a favourable attitude towards

the use of new technology. The extreme responses like highly favourable and highly unfavourable responses were totally missing. The neutral attitude of the teachers may be because by now the teachers have taken the use of technology as a new normal for the education system to run smoothly for some more years. As we can see, none of the respondents has shown an unfavourable attitude towards the use of technology in classrooms; this might be because of the need of time they have accepted technology as a part and parcel of school education in coming times. This acceptance of the use of ICT in school education can be seen as a positive step towards the digitalization of education in the Indian scenario. Various variables like Gender, age, marital status, type of family, teaching experience, locality, school management and level were found to have no significant influence on the attitude of teachers towards the use of new technology. CBSE board teachers showed a significantly favourable attitude towards the use of new technology compared to State board teachers because of more facilities to CBSE school teachers as compared to state board teachers in terms of availability of and skill of using technological tools in classrooms.

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Legal Education through MOOCs: A Study of Select International Online Platforms

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Abstract

The study is inspired by the fact that Massive Open Online Courses (MOOCs) have penetrated the world's higher education system to a great extent and emerged as a sustainable solution in the era of technology, especially during the COVID-19 pandemic; it has gained a broader impetus. The study is carried out by analyzing the actual data available on five major MOOC platforms at the international level; i.e. edX, Coursera, Udemy, LinkedIn Learning, and SWAYAM; offering courses in the subject 'Law.' The findings reveal that the majority of the courses are offered from the Udemy platform. Most of the courses are offered on a payment basis; however, a good number of courses are available either free, or payment is required for certification only. It is also found that most of the courses are offered in the English language as well as most courses are offered for less than or equal to 48 hours duration. The study will provide an overview of the already offered courses through five select MOOCs platforms and encourage and motivate the students and legal practitioners to enrol in a course in their desired area. It may also abet the policymakers and intelligentsia, leveraging the potential of MOOCs to increase the quality of legal education as it exhibits an overall picture of the current scenario of its penetration into the higher education system. The study has excellent usability for stakeholders engaged in legal education and MOOCs research.

Keywords: Coursera, edX, Udemy, LinkedIn Learning, SWAYAM, Online Legal Education, MOOCs

Introduction

With the advent of internet and communication technologies and the emergence of digital media, a radical change has been witnessed in higher education with the significant participation of online learners and a plethora of platforms ubiquitously providing opportunities. The technological landscape has brought a sea change in the methods of imparting distance education, and now online education has emerged as a better solution in comparison to broadcast via radio/television. Online education is more interactive and easily accessible anytime from anywhere through the internet.

MOOCs are the most remarkable technological developments in the area of Online Education in the past decade and are believed to be a game-changer in the higher education system (McGrath et al., 2017; Warusavitarana et al., 2014). They have made the educational process break through the traditional restrictions of time and space and extend the ways to acquire knowledge (Zheng & Yang, 2017). MOOCs learners benefit from expanding their knowledge and skill to a great extent in a multidirectional manner at their own pace with lots of freedom. Despite serving on different platforms, such courses have a common characteristic that they are participatory

and less ambiguous.

Massive Open Online Courses (MOOCs) are aimed at unlimited participation in the open domains through the internet. These are large-scale web-based courses designed and delivered by accredited higher education institutions or Research and Development organizations through MOOC platforms. MOOCs are genuinely open and massive, anyone can register, and there are no admission formalities or other prerequisites. They are generally free, open access, global, video-based instructional content, and forums released through an online platform to high-volume participants aimed to be educated (Baturay, 2015). The participant with a smart device and an internet connection can enrol in a MOOC irrespective of age, gender, geographical location, or educational background.

In 2008, Steven Downs and George Siemens offered the first MOOC course at the University of Manitoba, Canada. The title of the course was "Connectivism, and Connective Knowledge/2008", which received more than 2000 learners unexpectedly, and the course was delivered through educational resources available in the public domain and free such as wikis, online forums, Google Docs, YouTube, and Facebook groups (Liyanagunawardena & Adams, 2013; Marques & McGuire, 2013). In 2011, Sebastian Thrun from Stanford University offered a course, "Introduction to Artificial Intelligence," which received over 160,000 registrations (Aulet, 2013, cited in Corbeil et al., 2018). The year 2012 witnessed three major MOOC platforms Udacity, Coursera, and edX, offering hundreds of courses to worldwide audiences. The New York Times proclaimed 2012 "The year of the MOOC" (Pappano, 2012). By 2020 during the Covid-19 outbreak, rapid growth in MOOCs was evident as approximately 180 million learners emerged to attend the MOOC courses (Shah, 2020). MOOCs have been widely used during school closures due to the COVID pandemic in Iran (Tajik & Vahedi, 2021). The most popular course during the Covid-19 pandemic in 2020 has been "*The Science of Well-Being*" offered by Yale University on Coursera. Moreover, in the recent past, the design of MOOCs is going through a sea change, new and compelling ways of disseminating information are on the rise, and with that, they enable the participants to learn through social media platforms. Nonetheless, such courses have a lot of challenges associated with them. The details of select MOOC platforms are provided in Table-1.

Table-1: Details of Select MOOCs Platforms

MOOCs Platform	Country of Origin	Year of Commencement	Number of Courses offered	Subject	Number of Learners
Udemy	USA	2010	*11431 courses	Business, Finance and Accounting, I.T. & Software, Design, Health & Fitness Social Science, etc.	40 million learners (https://about.udemy.com/?locale=en-us)

Coursera	USA	2012	*7453 courses	Arts & Humanities, Business, Social science, Computer Science, I.T., Math & Logic etc.	76 million (https://www.classcentral.com/report/mooc-stats-2020/)
edX	USA	2012	*4474 courses	Architecture, Communication, Economics & Finance, Humanities, Medicine, Law etc.	35 million (https://www.classcentral.com/report/mooc-stats-2020/)
LinkedIn Learning	USA	1995	*3185 Courses	Data Analysis, Human Resources, Finance and Accounting, Leadership & Management, Social Science, etc.	27 million (https://www.usnews.com/education/learn-linkedin-learning-guide)
SWAYAM	India	2017	*2064 courses	Architecture & Planning, Law, Humanities & Arts, Management & Commerce, Design, Social Science, etc.	16 million (https://www.classcentral.com/report/mooc-stats-2020/)

*Source: https://www.classcentral.com/providers (accessed 12 June 2021)

Legal Education through MOOCs

The Internet era has revolutionized and revitalized the overall scenario of the education system and provided opportunities to make it more democratic and accessible. The stakeholders and policymakers involved in imparting legal education use MOOCs platforms to launch their courses to provide opportunities to learners to get requisite education without the boundaries of time and location. Law is a subject where students are trained to 'think like a lawyer' (Ormrod, 1971), at the same time, it is an intellectual discipline to inculcate distinctive concepts and methods of reasoning as well as a critical viewpoint of day-to-day happenings at national and international level to create a better inclusive society. Legal education pedagogy includes lectures, seminars, group, and individual tutorials, simulated exercises like moot courts, client interviewing and

mediation/conciliation, internships, etc. It also includes practical experiences from society as well as the justice delivery system. The pioneer of legal education in India Prof. N.R. Madhav Menon stressed that the legal profession in India needs to be transformed in order to keep up with the standards of globalization. Bajpai & Kapoor (2018) also opined that in India, legal education pedagogy needs a clear and comprehensive understanding of methods, i.e. collaborative teaching, outcome-based learning, field action projects, clinical method, research methods, etc. and stressed that teaching style and technique could make a difference to enhance the student participation in the teaching-learning process. MOOC being a disruptive innovation has altered the ways people used to acquire knowledge. However, in the field of law, MOOCs have proved a sustaining innovation that showers the rain of information equally to anyone

ubiquitously. For a long time, the concept of blended and flipped learning through the Internet was experimented with by professors and students of Law through 'legalED' by archiving the lectures in online mode (http://legaledweb.com/our-vision). In the year 2013, MOOCs for legal education became available (Schrag, 2014). While advocating the use of technology for teaching law, Corbin & Bugden (2018) argued that behaviourist, cognitivist, and constructivist learning theories must be applied in online law teaching environments. Law professors of prestigious universities worldwide have taken steps to develop MOOCs, launched them through MOOC platforms and provide certifications. The MOOCs developed to support legal education have unique discipline characteristics like subjectivity, logicality, speculative nature of the teaching contents and strong practicality (Zheng, 2020). It has several benefits, including ease of learning, resource sharing, cost savings, and increased learning performance.

Review of Related Literature

MOOCs, since their inception, became an attraction to online learners due to myriad reasons; one of the reasons was their open nature. Since 2010, Massive Open Online Courses (MOOCs) have been one of the most discussed and researched topics in the area of educational technology (Ebner et al., 2020). There are various studies on the advantages and pitfalls of MOOCs. However, they gained a strong impetus in the Covid-19 pandemic as more and more learners were attracted by such courses worldwide.

MOOCs were initially available for Science and Technology courses, the first MOOC for legal education was developed in the year 2014 (Schrag, 2014). At the early phase of the emergence of MOOCs, Binford (2014) opined that legal educators must show their presence in the MOOCs universe. Legal education

has been more receptive to integrating new and innovative technologies in the pedagogical services with MOOC as one of the recent additions. Colbran and Gilding (2014) suggested methods to adopt legal educators to explore the unhindered possibilities. MOOCs and other new teaching modes may help students achieve mutual complementarity between law courses through MOOCs and traditional Law and improve teaching quality (Zheng, 2020). The students' attitude towards legal knowledge absorption directly impacts the quality of law education in universities. Yang & Song (2019) reported that teaching through MOOCs in China is evolving for Law and legal studies, but still there is a need for improvement in pedagogical practices and students' enthusiasm. Pandit (2016) reported that in the Indian context, where a larger portion of the population is residing in remote areas, MOOCs can have an important role in skill enhancement and quality learning.

MOOCs have also been considered a strategy for the internationalization of higher education institutions (Kerr & Reda, 2019). The Law Society of Ireland launched its courses through MOOC in 2014, which has increased the society's flagship by rising enrollments and attracting international students (Grealy et al., 2019). A survey to examine the students' opinion of online learning during the COVID-19 pandemic in Sri Lanka opined that more than 80 per cent of students agreed to integrate online education into their courses in the future. Students perceive online learning as effective as face-to-face learning, enjoyable, able to learn at their own pace, easy access to online material as well as active participation (Akuratiya & Meddage, 2020). Pant et al. (2021) revealed that MOOC programs are popular in those European countries that utilize a lot of Information Technology.

Alhazzani (2020) reported that most university faculty in Saudi Arabia think that MOOCs directly impact improving educational outcomes and the developing of student learning skills. Enrolment in MOOC courses depends on awareness of relevant courses. In countries with economic disparities, MOOCs could play a key role in imparting education to everyone. Still, it is pertinent that there must be some awareness to get a fair idea about the course structure and fees. It is revealed that High-level awareness is evidenced among Science and Law students compared to Humanities (Kundu & Bej, 2020). The study conducted at Assam University, India suggested that the awareness of MOOCs among the students is not up to the mark, and there is a need to spread awareness (Purkayastha & Sinha, 2021). Another study carried out among undergraduate law students in Nigeria revealed that 78.3 per cent of learners intend to use MOOCs and the main source of awareness was the internet; the study concluded that awareness of MOOCs is critical to its use by undergraduate students and recommended that law librarians should create awareness of MOOCs among students (Adebayo & Babalola, 2021). The literature review clearly indicates that there is a dearth of literature to analyze and present legal education scenarios through MOOCs at the international level.

Need and Significance of the Study

The evolution and growth of MOOCs are the most significant development in the field of higher education. During the Covid-19 pandemic, the education system of the whole world was compelled to continue in online mode. Universities of repute have launched several courses as MOOCs, through various platforms for the benefit of learners. As a limited number of studies are conducted to present legal education through MOOCs, this study shows a comprehensive picture of the courses offered worldwide in Law through five major MOOC platforms i.e., edX, Coursera, Udemy, LinkedIn Learning and SWAYAM; creating awareness among law students and practitioners to opt for a course. It analyzes the free courses, which will allow economically weaker sections of the students to opt for their desired courses for free or at a minimal cost. The study may also benefit the policymakers and other stakeholders to evaluate the already available courses through MOOCs and introduce new courses which are not available.

Objectives of the Study

1. To enumerate and compare the MOOCs offered through five major MOOC platforms at the international level i.e., edX, Coursera, Udemy, LinkedIn Learning and SWAYAM in the subject 'Law'.

2. To investigate the free/paid MOOCs offered from the five MOOC platforms selected for the study.

3. To compare the MOOCs offered through five MOOC platforms with reference to their language and course duration (length of the course).

4. To analyze the contribution of Indian Universities/Institutions on the SWAYAM platform in the subject 'Law'.

Methodology

A thorough review of currently published related literature was conducted to prepare the background of this study. The study was carried out using the data available on five major MOOC platforms at the international level- edX (https://www.edx.org/search?tab=course&subject=Law), Coursera (https://www.coursera.org/

browse/social-sciences/law), Udemy (https://www.udemy.com/topic/law/), SWAYAM (https://swayam.gov.in/explorer), and LinkedIn Learning (https://www.linkedin.com/learning/search?entityType=COURSE&keywords=LAW).

These platforms were selected on the basis of the maximum number of courses offered. The data was collected from the websites of the respective MOOC platforms in the month of May 2021. A comprehensive list is prepared with all details of the courses available in the subject category 'Law' from the websites of five select platforms. A total number of 630 courses were found which were further analyzed and compared in view of the study's objectives. Microsoft Excel was used for creating tables and graphical representations of data. References are organized through the Mendeley reference manager using American Psychological Association Style 7th edition.

Analysis and Discussion

A total of 630 MOOCs in the subject 'Law' in five select platforms were analyzed and presented in the following tables and figures. Microsoft Excel was used to show the graphical representation of data, which is further interpreted as per the study's objectives.

Platform-wise Distribution of MOOCs

Figure-1: Platform-wise distribution of MOOCs
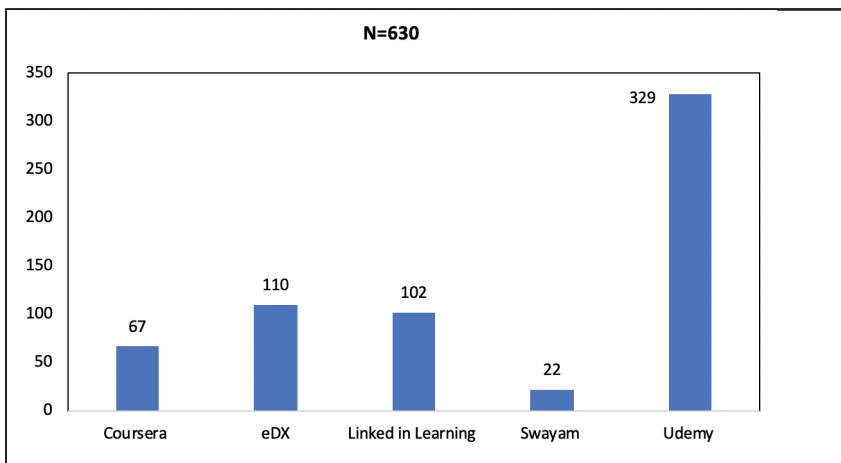
It is evident from Fig.-1 that of the total 630 MOOCs enumerated in Law, a significant number of courses 329 (52 per cent) were offered through Udemy, followed by edX 110 (17 per cent) courses. Similarly, 102 (16 per cent) courses were provided through LinkedIn Learning, this is followed by Coursera offering 67 (11 per cent) courses. The least number of courses, 22 (3 per cent), were provided by the SWAYAM platform. The study is in par with the findings of Binford (2014) that through three major players in the MOOC universe—Coursera, Udacity, and edX—only four MOOCs were taught by U.S. law professors. Similarly, Ivanova (2016) recommended Coursera and edX as the best platforms for accessible technology approaches in designing various learning situations for the organizations imparting large-scale curriculums. Another study conducted to analyze the usability of three popular MOOC platforms: edX, Coursera, and Udacity showed that

Coursera was significantly more usable than edX and Udacity. In addition, interaction efficiency was significantly higher while using Coursera compared to Udacity (Tsironis et al., 2016). The study conducted to analyze learners' satisfaction during the Covid-19 pandemic in China suggested that online education platforms should be improved to escalate online education to promote the reform of information-based education (Chen et al., 2020).

Free/Paid MOOCs

The data presented in Fig.-2 indicates that of the 630 courses offered through five select platforms, 496 (79 per cent) courses were paid, a learner has to pay for getting enrolled in the course and earning the certification. It is followed by 92 (14 per cent) courses that were free with a paid certificate; the learner has to pay a minimal amount of fees to appear in the assessment and get the certification grades. There is no amount to be deposited for enrolment in the course, and the lectures and other material are under an open license. Moreover, it is evident from Fig.-2 that 42 (7 per cent) courses are completely free with free assessment and certification. The learners need not deposit any fees for enrolment, assessment, and certification. Of the total 630 courses, it is clear from the figure that a considerable number of courses are paid (79 per cent) followed by courses with a paid certification (14 per cent). This is followed by completely free courses (7 per cent). Most of the free courses are of short duration. A detailed list of free courses through five select platforms is provided in Appendix 1.

Figure-2: Free/Paid MOOCs
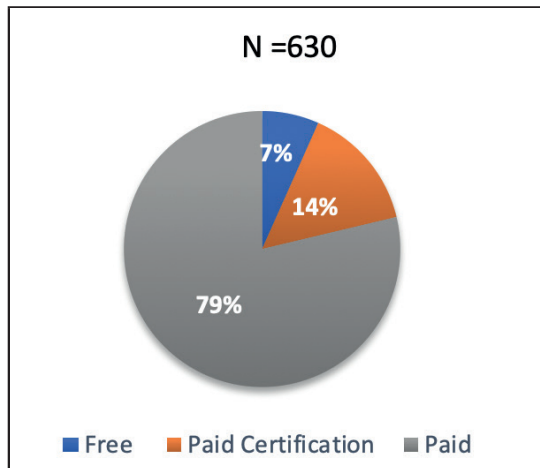
The courses under the free and paid certification category can help the students with weaker sections of society to get updated from legal knowledge and skills with minimal payment. As the courses are offered by well-reputed professors from highly ranked universities at the international level, it is an added advantage for learners from remote areas to get benefitted from it. (McGrath & Stenfors-Hayes, 2017) emphasized that MOOCs can be considered as a moral obligation as it can be articulated as a way of paying back to society, a form of non-reciprocal outreach, a way to share, disseminate, teach but also compensate those who were less able financially to engage in learning at a high level.

Language-wise Distribution of MOOCs

The language-wise distribution of MOOCs offered in 'Law' is presented in Fig.-3. It is evident from the Figure that a total of 630 MOOCs offered through five select platforms in the field of 'Law' were available in eighteen different languages. The data presented in Fig. 3 highlights that 346 (55 per cent) courses are offered in English, followed by Portuguese 86 (14 per cent) language. The other languages in which Law MOOCs are available are German 49 (8 per cent), followed by Spanish 44 (7 per cent), French 24 (4 per cent), Turkish 22 (3 per cent), and Russian 14 (2 per cent). Of the eleven courses, only (2 per cent) are offered in Indonesian and Italian languages, followed by five courses in the Chinese language. Four courses are offered in Japanese and Polish languages, followed by three courses in Arabic language. Two courses are offered in the Hindi language, while one course is provided in Azeri, Greek, Lithuanian and Romanian and Ukrainian languages.

Figure-3: Language-wise Distribution of MOOCs
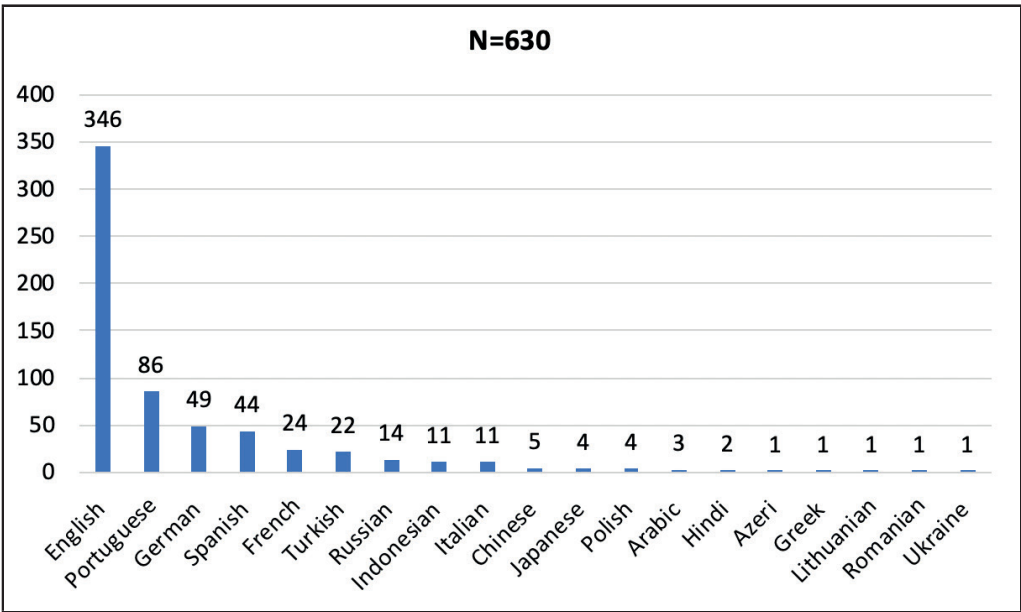
Course Duration-wise Distribution of MOOCs

Fig 4 indicates that course duration is divided into four-time spans, i.e., the courses equal to or less than 48 hours (<=48 hours), greater than 48 hours, and similar to or less than 1 month (>48 hours and <=1 month), greater than one month and less than or equal to 6 months (>1 month and <=6 months) and greater than six months (>6 months) duration. The total number of courses (N=630) is analyzed as per the four-course durations defined and represented in Fig.4. It is evident from Fig.-4 that a significant number of courses, 459 (73 per cent), are offered for a duration more than or equal to 48 hours. 120 (19 per cent) courses follow it for more than one month and less than or equal to six months. Likewise, 39 (6 per cent) courses are offered for more than 48 hours and less than or equal to one month. The least number of courses 6 (1 per cent) are provided

for more than six months duration. The analysis depicts that many courses are offered for less than or equal to 48 hours from the five select platforms; it is also noticed that most of these short-duration courses are provided through Udemy and LinkedIn Learning. In Indian context, the courses offered through the SWAYAM platform range from 4-15 weeks.

## Figure-4: Course duration-wise distribution of MOOCs
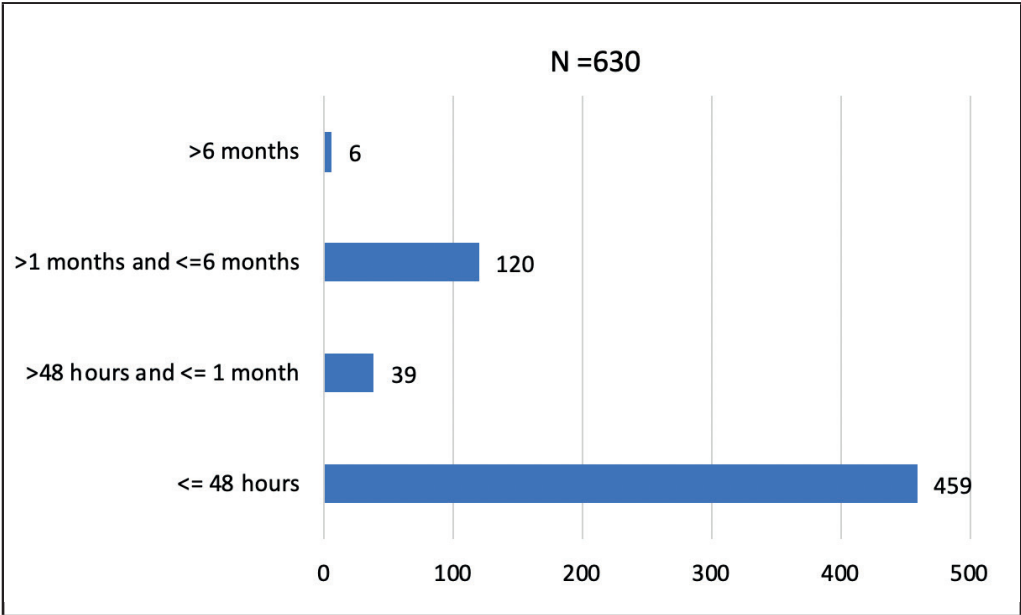
Contribution of Indian Universities through the SWAYAM Platform

The contribution of Indian Universities for MOOCs through the SWAYAM platform in the subject 'Law' is presented in Fig.-4. As per the data available on SWAYAM website (https://swayam. gov.in/explorer?category=Law) in May 2021, a total number of 22 MOOCs will be offered by Indian Universities. The maximum number of courses are offered from NLU Delhi (6 courses), followed by IIT Kharagpur (5 courses) and National Law School of India Bengaluru (3 courses). The English and Foreign Language University, Hyderabad and IIT Madras have offered 2 courses each. West Bengal National University of Juridical Sciences, OP Jindal Global University, RV University Karnataka and the University of Kashmir have offered one course each through the SWAYAM platform. The courses offered through IITs are in the areas of Law & Engineering/ Sciences and IPR. Fees are required for assessment and certification only however, all the content is available under an open license. All the courses are offered in English Language and the course duration ranges from 4-15 weeks. A detailed list of the MOOCs offered through the SWAYAM under the subject 'Law' is provided in Appendix-2.

Figure-4: Contribution of Indian Universities through the SWAYAM Platform
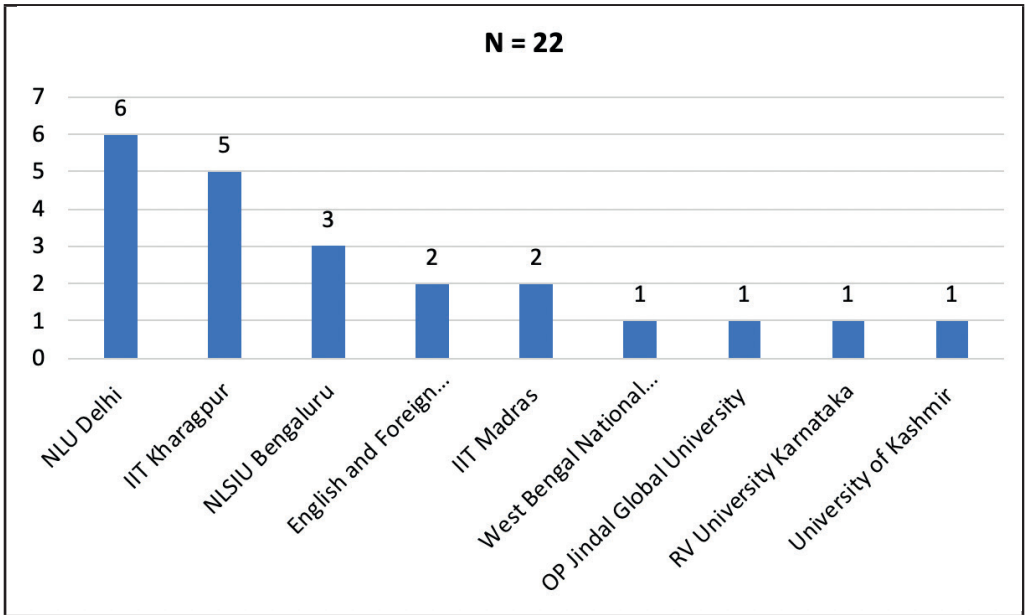
Findings and Discussion

As MOOCs are the most significant development in the field of education in the twenty-first century, contemporary university leaders and policymakers find themselves at crossroads as new technology-enhanced learning approaches, which have the potential to democratize higher education, are emerging at a time when traditional models of higher education are often criticized for being increasingly unaffordable and ineffective for addressing educational inequality (Flavin, 2017). The study aimed to find out the impact of MOOCs on legal education and the platforms contributing to imparting various courses. To identify the platforms that offer maximum courses, the fee structure, and language of instruction have not been researched until now. In the Covid-19 pandemic, digital platforms have played a significant role in reaching out to millions of online learners through ways in their comfort zones. Therefore, to a large extent, it has made learning more individualized, accessible, and democratic. However, there are still some impediments yet to clear to rationalize the MOOCs in comparison to traditional courses. The large and diverse student enrolment in MOOCs, the high dropout rate of MOOCs compared to conventional courses, and the relative lack of instructor presence or support in MOOCs compared to traditional courses (Hew & Cheung, 2014). Schrag (2014) reported that leading universities are in a rush to offer the courses through MOOC platforms and become part of the newest wave of law teaching seeking revenues, but if they value the type of education that their law schools offer, they will give considerable thought to what elements of traditional legal education should be preserved, and how MOOCs can interact with and support, rather than destroy within a few years, a system of legal education that the nation's universities have taken a century to develop (Schrag, 2014).

One distinguishing feature of MOOCs is that they involve more self-directed learning than any other online course.

Apart from that, MOOCs are more flexible in nature and more dynamic, a learner is free to attend the course anytime, anywhere, and there are no constraints of space and time. Therefore, MOOCs are more relevant to the legal fraternity than any other discipline. In the present study, the focus was on the platforms they choose, and the flexibilities in terms of fee and language were taken into consideration; the study highlights that of the total 630 MOOCs enumerated in 'Law' from five major international platforms edX, Coursera, Udemy, LinkedIn Learning, and SWAYAM a significant number of courses (52 per cent) are offered through Udemy. SWAYAM provides the least number of courses, but these are of longer duration. One important motivation for choosing online courses is their fee structure. Usually, people like free courses and studies suggest that up to 90 per cent of dropouts are due to reasons including a lack of incentive, failure to understand the content material and having no one to turn to for help, and having other priorities to fulfil (Hew & Cheung, 2014). In this study, the idea was to accentuate the course fee structure. The study finds that a considerable number of courses are paid (79 per cent), followed by courses with a paid certification (14 per cent), and followed by completely free courses (7 per cent). Most of the free courses are of short duration and available through the Udemy platform. Furthermore, language plays an essential role in the motivation of learning a course. Therefore, it was pertinent to find out the languages through which the courses are being delivered. It was found that the highest number of courses (55 per cent) was offered in the English language, followed by Portuguese (14 per cent) language. The analysis also depicts that a significant number of courses were offered for less than or equal to 48 hours, and most of these short-duration courses are offered through Udemy and LinkedIn Learning. Of the 630 courses, only six courses are offered for more than six months duration. In the Indian context, it is found that a maximum number of Six courses are offered by National Law University Delhi, followed by IIT Kharagpur (4 courses) and NLSIU Bengaluru (3 courses). The total number of courses offered on the SWAYAM platform under the subject 'Law' from Indian Universities is twenty-two.

Conclusion

MOOCs contribute to the universal plan of addressing the digital divide and promoting equity in educational opportunities (Chauhan, 2014; Ma & Lee, 2019, as stipulated in the Sustainable Development Goal, United Nations General Assembly, 2015). On the other hand, a classroom is an opportunity for a global, collaborative, emotional, constructive, and peer dialogue; the same narratives cannot be developed by adopting online education models. Without one-to-one personal interaction, there is a challenge to ensure personalized guidance and mentorship, which leads to a lack of an effective system to measure and validate the learners' progress and uptake. Covid-19 pandemic and the limitations that arise have also compelled the policymakers to rethink the future of the education system in the whole world and constrained them to adopt MOOCs as a full-time credit course for completion of Degrees. A total of twenty-two MOOCs are launched from different Indian Universities through SWAYAM under the subject 'Law'. From the year 2021, University Grants Commission has facilitated to allow upto 40 per cent of the total course through online learning through the SWAYAM platform (UGC, 2021). As per National Educational Policy (2020), the academic bank of credits (ABC) is also proposed, which will facilitate students to opt for

online courses and gain credits for the same. Several Indian Universities are collaborating with foreign universities to launch online courses through other international platforms.

This disruptive technology has created many challenges for educators, administrators, and learners, but it has also brought many opportunities for its stakeholders, especially during the Covid-19 crisis. MOOCs and other alternate technology-based innovations in the higher education system can be used as a means as per the requirement/situations, but it cannot be a replacement for traditional classroom teaching fostering the overall development of students.

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Appendix - 1: List of Free MOOCs through five select MOOC platforms (May 2021)

S. No.	Course Title	Platform	Language
1	Introduction to American Civics: Presented by Zero-L	edX	English
2	Civil Liberties	edX	English
3	Constitutional Interpretation	edX	English
4	Incarceration's Witnesses: American Prison Writing	edX	English
5	The Customs and Traditions of Afghanistan: Pashtunwali and Its Foundations	edX	English
6	فهم صنع السياسات الاقتصادية	Coursera	Arabic
7	Property and Liability: An Introduction to Law and Economics	Coursera	English
8	Law in the Time of COVID-19: A Northwestern Teach-Out	Coursera	English
9	Introduction to Intellectual Property	Coursera	English
10	Searching for the Grand Paris	Coursera	French
11	Firearm Purchaser Licensing Teach-Out: The Background Check Policy Not Enough People Are Talking About	Coursera	English
12	Community Awareness: Police Brutality in the U.S.	Coursera	English
13	The Wonders and Challenges of Bible Education	Coursera	English
14	English Legal System in 60 Minutes: A Fast Track Summary	Udemy	English
15	Launching a Successful 21st Century Law Practice	Udemy	English
16	Cybersecurity Law	Udemy	English
17	Paralegal Power Breaks	Udemy	English
18	Learn the Contract Basics All the Professionals Know	Udemy	English
19	MPRE Review for Multistate Professional Responsibility Exam	Udemy	English

20	Introduction to Child Rights	Udemy	English
21	Pass The California Police Academy Written Examinations	Udemy	English
22	E-Way Bills under Goods & Services Tax	Udemy	English
23	Interpretation of Statutes	Udemy	English
24	Introduction to Health Law in Nigeria	Udemy	English
25	Basics of Indian Environmental Legislative framework	Udemy	English
26	Hukukun Üstünlüğünün Esasları	Udemy	Turkish
27	Explicación General del Derecho Administrativo en Honduras	Udemy	Spanish
28	Curso sobre o Sigilo Bancário	Udemy	Portuguese
29	Lawyer Web	Udemy	Portuguese
30	Advocacia, Site e Divulgação no Google com Custo Reduzido	Udemy	Portuguese
31	Švari Advokato Mantija	Udemy	Lithuanian
32	Diritto costituzionale da zero	Udemy	Italian
33	Direito na escola Experience	Udemy	Portuguese
34	PPh Pasal 22	Udemy	Indonesian
35	Código de Ética do Psicólogo Comentado	Udemy	Portuguese
36	Pengantar Teori Penalaran Hukum	Udemy	indonesian
37	Direitos dos Animais | Curso Básico	Udemy	Portuguese
38	租税法修士論文の基本問題	Udemy	Japanese
39	Modelo de Procuração Particular | Download e Prática	Udemy	Portuguese
40	Comment payer moins d'impôts, et Droit des successions	Udemy	French
41	Aplicación del estatuto del consumidor a proveedores	Udemy	Spanish
42	Introduzione al diritto	Udemy	Italian

Appendix -2: List of MOOCs offered through SWAYAM under the subject 'Law' (May 2021)

S. No.	Course	University/ Organization	Language
1	Access to Justice	NLU Delhi	English
2	Administrative Law	University of Kashmir	English
3	Advanced Constitutional Law	NLU Delhi	English

4	Constitution of India and Environmental Governance: Administrative and Adjudicatory Process	NLSIU Bengaluru	English
5	Corporate Law	NLU Delhi	English
6	Criminal Justice Administration	NLU Delhi	English
7	Entrepreneurship and IP Strategy	IIT Kharagpur	English
8	Environmental Law	NLU Delhi	English
9	Human Rights	NLSIU Bengaluru	English
10	Human Rights in India	OP Jindal Global University	English
11	Human Rights System	RV University Karnataka	English
12	Indian Judicial System: Legal Aid and Environmental Protection	English and Foreign Languages University	English
13	Intellectual Property	NLU Delhi	English
14	Introduction to Law on Electricity	IIT Kharagpur	English
15	Legal and Regulatory Issues in Biotechnology	IIT Kharagpur	English
16	Patent Drafting for Beginners	IIT Madras	English
17	Patent Law for Engineers and Scientists	IIT Madras	English
18	Patent Search for Engineers and Lawyers	IIT Kharagpur	English
19	Private International Law and Alternative Dispute Resolution : Indian Legal Position	English and Foreign Languages University	English
20	Right to Information and Good Governance	NLSIU Bengaluru	English
21	Roadmap for patent creation	Indian Institute of Technology, Kharagpur	English
22	Socio Economic Offences: Nature and Dimensions	West Bengal National University of Juridical Sciences	English

Online Learning Experiments and Experiences through Google Groups: A Case of M.A. Education Programme of IGNOU during Covid-19 Pandemic

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Abstract

This paper is on online Google Groups of the first year learners of the M.A. Education programme of IGNOU who has enrolled in the January 2020 session. During the Covid-19 Pandemic lockdown period, it was difficult to continue the regular curriculum transaction strategy of the programme. It is therefore, an online Google Group for the learners was specially created for providing programme-related information, induction to the programme, addressing various support services and learning needs of the learners as well as to acquainting them with many operational issues. It was thought to use the online Google Groups platform as their number was huge, i.e. 1452 and they were spread across India in almost all the Regional Centres and also in a few overseas centres. The online Google Group was started on 30th March 2020. The article has been prepared based upon the two week experience of the programme coordinator on operating the Google group, i.e. from 1-15 April 2020.

In a single platform of online Google Groups, individual learner queries, various support services and the learning needs of the newly enrolled learners have been addressed very successfully. Data revealed that the learners had successfully accessed the hyperlinks based documents like Self Learning Materials (SLMs), Assignment Questions, PowerPoint presentations, Audio-Video Materials, Term End Examination question papers, Teleconferencing & Interactive Radio Counselling sessions, and have also acquainted themselves with many other operational issues of the programme by using the online Google Groups. In practice of only two weeks through the online Google Groups, this has been realised that the learners had successfully acquainted with the programme and had engaged in studies like writing their assignment responses, participated in discussion forums on various themes and also engaged in peer and group learning processes. It was no doubt a successful experiment of the programme during the Covid-19 Pandemic period and also an eye-opener for the programme coordinators to make it an important part of programme transaction for the future.

Keywords: Online Learning, Google Groups, Self-Learning Materials, Teleconferencing and Interactive Radio Counselling.

M.A. Education Programme of IGNOU: An Introduction

Indira Gandhi National Open University has been offering a Master of Arts (Education) programme since 2008 across India and also in a few overseas Study Centres. This is one of the popular programmes of IGNOU. It receives around 3500 enrolment (approximate) in a year (including both January and July sessions). In the January 2020 session, a total of 1452 learners (including India and Overseas centres) had been enrolled in the M.A. Education programme

(IGNOU SRD, 2020). This programme prepares a group of professionals every year, who are well equipped with a systemic and contemporary knowledge base of education and various educational discourses. The objectives of the programme are to provide learning experiences which will enable students to understand and appreciate knowledge structures and paradigms of education; to develop professionals for effective participation in educational actions in different areas of education; and to create a community of scholars adequately equipped for participation in educational discourses (M.A. Education Programme Guide, 2008).

As per the UGC Regulations, M.A. Education is a two-year master's degree programme. This programme is of total credit of 68 in which the learners study 34 credits each in the first and the second year of the programme. In the first year of the programme, all courses taught are compulsory, which includes basic, core and knowledge generation courses, whereas, in the second year of the programme, courses in specialised areas of education and dissertation are taught. The structure of the two-year M.A. (Education) programme is as follows:

Table-1: Structure of M.A. (Education) programme

| Nature of the Course	Title of the Course	Course Credit
First Year		
Basic Course on Education (Compulsory)	MES-011 Understanding Education	4
Core Courses (Compulsory)	MES-012 Education: Nature and Purposes	6
	MES-013 Learning, Learner and Development	6
	MES-014 Societal Context of Education	6
	MES-015 Operational Dimensions of Education	6
Courses on Knowledge Generation in Education (Compulsory)	MES-016 Educational Research	6
Total Credits (First Year)		**34**
Second Year		
Courses on Knowledge Generation in Education (Compulsory)	MESP-001 Dissertation	10

Specialises areas in Education (Optional) (Learners have to select any one area among the five specialised areas and study all the courses included in that area. Each specialised area is having 24 credit courses)	Higher Education (four courses, six credit each)	24
	Distance Education (five courses. Three courses are four credit each and two courses are 6 credit each)	24
	Educational Technology (four courses, six credit each)	24
	Educational Management (four courses, six credit each)	24
	Adult Education (four courses, six credit each)	24
Total Credits (Second Year)		**34**
Total Credits (Both First and Second Year)		**68**

The programme is offered in English medium whereas the learners can write Assignments, Term End Examination and dissertation proposal and report both in English and Hindi languages.

The programme is offered in Open and Distance Learning (ODL) mode. Keeping in view the nature of the programme, learning needs of the learners, a well-defined transaction strategy has been implemented to transact the programme. The following transaction strategies have been adopted to implement the programme (see Figure 1).

Figure-1: Transaction Strategies of M.A. Education Programme
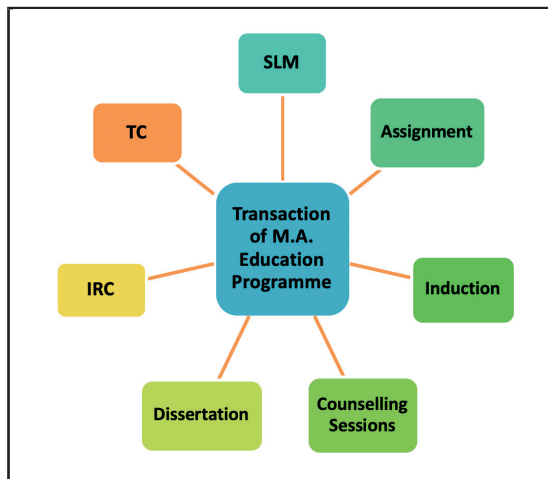
(Note: TC – Teleconferencing, IRC – Interactive Radio Counselling, SLM – Self Learning Material)

Figure-1 explains a detailed curriculum transaction strategy of the M.A. Education programme. A complete package of quality Self-Learning Materials is provided to the learners. Induction as well as counselling sessions are conducted for the learners at the concerned Study Centres and Regional Centres. For developing research skills among the learners, a dissertation component has been incorporated into the programme during the second year of the programme. The course-wise assignment is also one of the important components for continuous learning and assessment of the students which contributes 30 per cent weightage for the courses. Term-end examination which is conducted twice a year, in June and December carries 70 per cent weightage for evaluation of the courses. For direct interaction with the learners, regular teleconferencing and interactive radio counselling sessions are also conducted by using Gyandarshan – 1 TV Channel and FM Radio. Apart from these, audio-video programmes are also made available to the learners at the Study Centre level for their study.

The above are the regular transaction strategies used for implementing the programme from the teachers to the learners. The above transaction strategies of the curriculum are followed in a three-tier system, i.e. at the IGNOU main campus, Regional Centres and the Study Centres. Over the years, the programme has effectively offered to thousands of learners by using the above curriculum transaction methodologies. It has proved that the objectives of the programme for developing a knowledge base in education as well as acquainting the learners in various educational discourses have been achieved. Let us discuss the strategies adopted to transact the programme during the Covid-19 Pandemic period.

Transaction of M.A. Education Programme during Covid-19 Pandemic Period

The Covid-19 Pandemic was initially started in late December 2019. It spread across the world within a very short period. The World Health Organisation declared a global public health emergency on January 30, 2020. On March 11, 2020, WHO declared the Covid-19 outbreak a Pandemic (WHO, 2020). By April 2, 2020, the world passes 1 million Covid-19 infections. Keeping in view the effect of the pandemic over the globe, most countries across the world restricted travel of all means (both international and domestic) and many countries have locked down their markets, business establishments, educational and other institutions and migration of people from one place to another, etc.

Keeping in view the global effect of the Covid-19 Pandemic, India had also taken measures to curb the situation and not to reach at the stage of community transmission. India is a country with more than 1.38 billion (approximately) of population spread in both urban and rural demography. Still many cases have been registered and both the Union and State Governments have taken adequate measures to stop spreading the infection in the community. The following important measures have been taken to stop the infection of the Covid -19 Pandemic in India.

- The government declared a Janata Curfew on 22nd March across the Country from 7.00 am to 9.00 pm.

- All international and domestic flights have been banned from March 2020 onwards.

- Domestic Train services have been banned since the complete lockdown period.All educational and other institutions including all types of offices and business

establishments have been closed during the lockdown period.

- Again the Union Government declared a complete 21 Days Lockdown across the country starting from 25th March 2020 to 14th April 2020.

- Many States have also declared lockdown to be continued till 30th April 2020.

- Many State Governments have also taken the decision to seal the hotspot areas apart from the lockdown.

- The Union Government finally extended the complete lockdown from 15th April 2020 to 3rd May 2020.

Source: Govt. of India Advisory on Covid-19

The above measures bring forward an opportunity for the teachers and academicians to deal with their students and to continue the process of teaching-learning by using many online learning tools and applications. In this regard, on 31st March 2020, MHRD, Govt. of India, issued a letter to all the Central Universities seeking prompt action to continue the study program of the students enrolled with the Central Universities without any impediment from their home by adopting the online method of teaching-learning process (MHRD, 31st March, 2020). In line with the MHRD letter, IGNOU being a Central University undertook many actions to reach their learners by using various online teaching-learning methods keeping in view the nature of the academic programmes and the learning needs of the learners. In view of this, as a part of programme-wise online initiatives, a Google Groups of 1452 IGNOU learners of the M.A. Education programme had been created to address the learning needs of the learners during the Covid-19 Pandemic period.

**Figure-2: Google Group of IGNOU's M.A. (Education) Programme
ma.edu.jan.2020@ignou.ac.in**
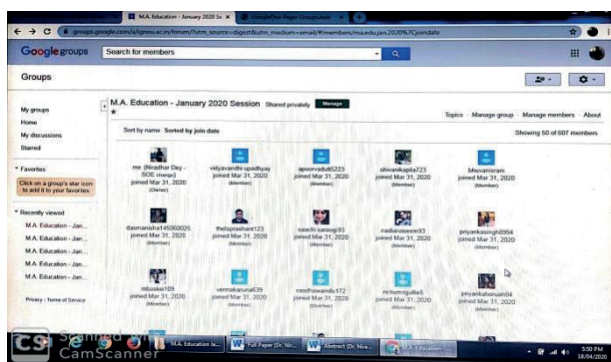
A Case of M.A. Education Programme by using Online Google Groups

Computer based technology is one of the important aspects of the teaching-learning process. In a study on 'use of Wikis, Blogs, Twitter, Facebook, etc.', Laura et.al. (2017), reported that computer-based technology influences student engagement, however, additional research is needed to confirm and build on these findings. Integrating technology into teaching and learning is not a new challenge for universities. For decades, administrators and faculty have grappled with how to effectively

use technical innovations such as video and audio recordings, email, and teleconferencing to augment or replace traditional instructional delivery methods (Kaware & Sain, 2015; Westera, 2015). The study conducted by Armstrong and Thornton reported that students who participated in web-conferencing demonstrated critical reflection and enhanced learning through interactions with others (Armstrong & Thornton, 2012). Analyses of blog posts show evidence of students elaborating on one another's ideas and sharing experiences and conceptions of course content (Sharma & Tietjen, 2016). The practice of Wiki is useful for reflection, reinforcing course content, and applying academic skills (Miller et al., 2012). Social networking is "the practice of expanding knowledge by making connections with individuals of similar interests" (Gunawardena et al., 2009, p. 4). Learning Management System is associated with formal academic interactions while Facebook is associated with informal and social interactions (Camus et al., 2016).

The above studies deal with some of the technology-based tools used in the process of teaching and learning and their effective use in curriculum transactions. Accordingly, engaging students in active learning processes and engaging them in peer and group discussions on various academic themes can also be done by using the online Google Groups. In this study, an experiment on Google Groups of M.A. (Education) learners had been done during the Pandemic time and results were reported.

As mentioned above, on 30th March 2020, an online Google Groups for the M.A. Education first year learners enrolled in the January 2020 session had been created by the programme coordinators of the M.A. Education programme (Google Group Id– ma.edu.jan.2020@ignou.ac.in). As the total number of the learners is 1452, it took 72 hours to invite/direct add members as there is the limitation of including at most 500 members in 24 hours, which is also adding only 10 members in one go. By 1st of April 2020, all the 1,452 learners were invited to the group. The online instructional process was started on 1st April 2020 and the article has been prepared on the basis of a complete two week of experiment in using the Google Groups i.e. by 15th April, 2020.

Figure-3: Creation of Google Groups link for the M.A. (Education) learners
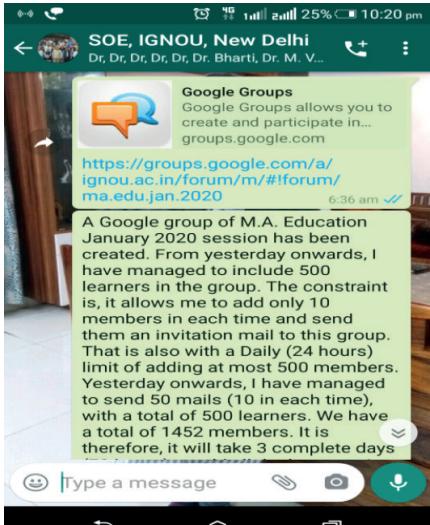
As mentioned above, an invitation was sent to all the learners who had registered with an email id during their enrolment. The programme coordinator had received1360 email ids out of the total 1452 M.A. Education learners enrolled in the January 2020 session (SRD, IGNOU, March 2020). The following figure shows the data about the activation of Google groups for M.A. Education learners first Year January 2020 session.

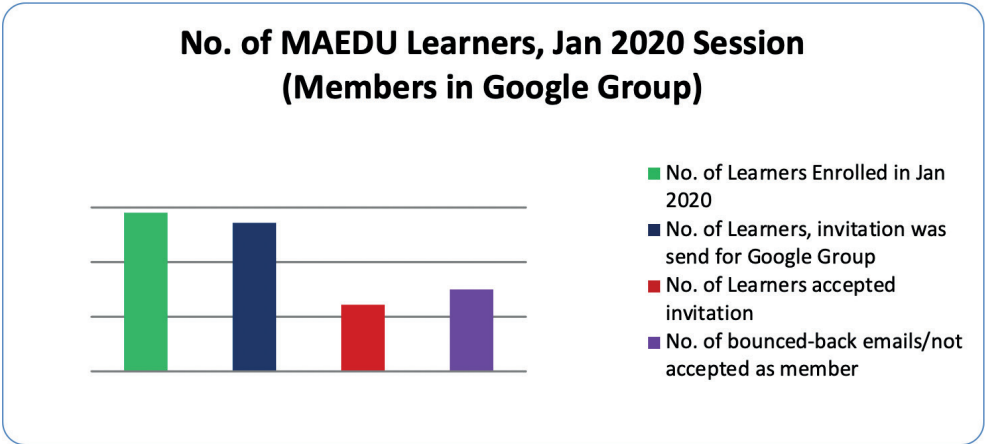**Figure-4: Date relating to activation of Google Group**

Figure-4 shows that 1,452 M.A. Education first year learners enrolled in the January 2020 session and among them, 1,360 learners had given their email id during their enrolment. All the 1,360 learners were invited to be members of the Google group. Among them, 610 learners immediately accepted the membership and were actively participating in the group whereas 750 emails were either bounced back or not accepted by the learners as members in the group. But, this has been observed that everyday new members were accepting their invitation and membership numbers were increasing.

From the day of the original functioning of this group, i.e. from 1st April 2020 to 15th April 2020, a total of 50 posts have been made in the group by the programme coordinator. The group has been created keeping the following objectives in mind:

1. To provide an induction towards the programme to the newly enrolled M.A. Education learners in January 2020 session.

2. To support them to get all necessary information and direct links to get general queries/information, Self-Learning Materials, Assignment and Term End Examination Questions, various audio-video programmes relating to the programme, presentation slides on various issues, other OER-based learning materials, etc.

3. To provide learning support by direct, peer and group interaction through discussion forums on various components and content of the programme.

Based upon the above threeobjectives, very strategically the group was managed. The nature and categories of various postings for a discussion forum in the group were as follows:
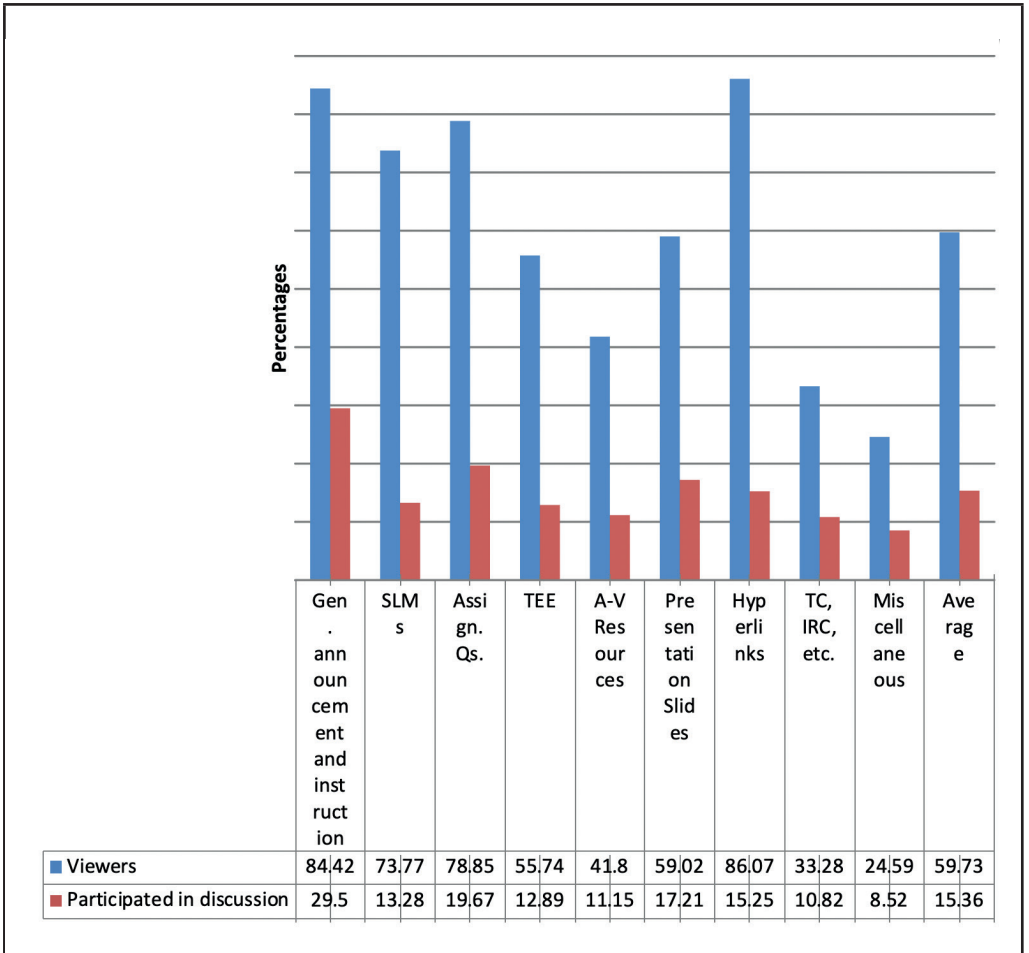
Table-2: Categories of posting in the Google groups from 1st April to 15th April 2020 (Total active members, N- 610) Italicized figures are in %ages

S.N.	Categories	Total No. of Posting by the Programme Coordinator	Total Views (N-610)	Posts made by the Group Members and participate in discussion (N-610)
1	General Announcements and Instructions	5	515 *84.42*	180 *29.5*
2	Self-Learning Materials	4	450 *73.77*	81 *13.28*
3	Assignment Questions	5	481 *78.85*	120 *19.67*
4	Term End Examination	3	340 *55.74*	78 *12.89*
5	Audio-Video Resources	8	255 *41.80*	68 *11.15*
6	Presentation Slides	6	360 *59.02*	105 *17.21*
7	Sharing Hyperlinks of OERs and other important Resources	30	525 *86.07*	93 *15.25*
8	Teleconferencing, IRC, Gyandhara, SWAYAM and SWAYAMPrabha, etc.	5	203 *33.28*	66 *10.82*
9	Miscellaneous	7	150 *24.59*	52 *8.52*
	Total	**72**	**3279 59.73**	**843 15.36**

Table 2 revealed different categories of postings made by the programme coordinator over the said days, and subsequently viewed the postings made by the learners as well as relating postings made by the learners on the themes and participated in direct, peer and group discussion forums in the group. It was reported that the average viewer percentages were more than the average posts made/participated in the discussion. Figure 5 presented briefly the percentage of viewers and posting made/participated in the discussion under each category of posting.

Figure-5: Percentage of viewers and posting made/participated in discussion forum in different categories of posting in the group

|	Gen. announcement and instruction	SLMs	Assign. Qs.	TEE	A-V Resources	Presentation Slides	Hyperlinks	TC, IRC, etc.	Miscellaneous	Average
■ Viewers	84.42	73.77	78.85	55.74	41.8	59.02	86.07	33.28	24.59	59.73
■ Participated in discussion	29.5	13.28	19.67	12.89	11.15	17.21	15.25	10.82	8.52	15.36

The above Figure-5 categorically depicts the percentage of viewers in each category of posting is much better than the percentage of participants in discussion forums in each category of posting as well as in overall viewers and participants in the discussion. It provides a clue for discussion of the findings that learners were active enough to view the posting made in the Google groups but among them very few were turning out for a fruitful discussion on various issues. It was observed that on an average 60 per cent (approximately) of learners were viewing different postings in the group whereas 15 per cent (approximately) were really participating in various discussions in the group. Let us now discuss some of the discussions and postings made in different categories.
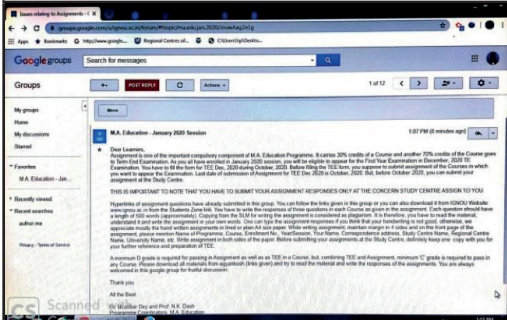
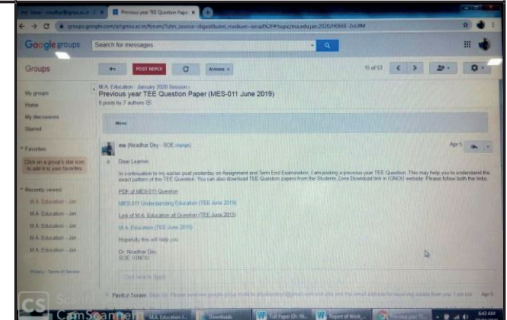**Figure-6: Google Groups posting on various categories (few examples)**
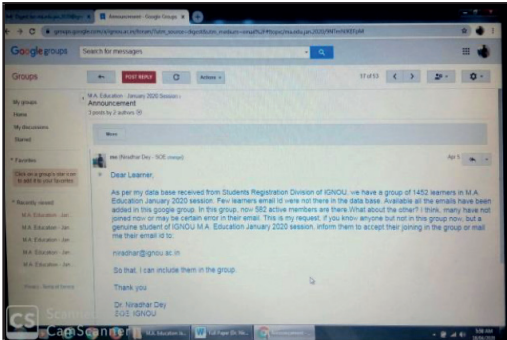
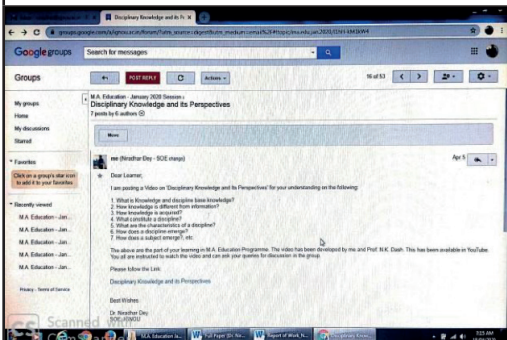Posting on General Announcement and Instruction
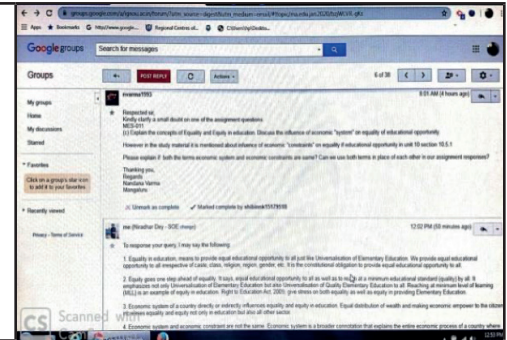
Posting on Self-Learning Materials

Posting on Assignment Questions

Posting on TEE

Posting on Audio-Video Materials
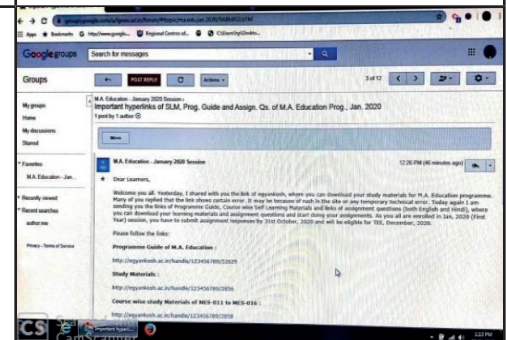
Posting on various Hyperlinks
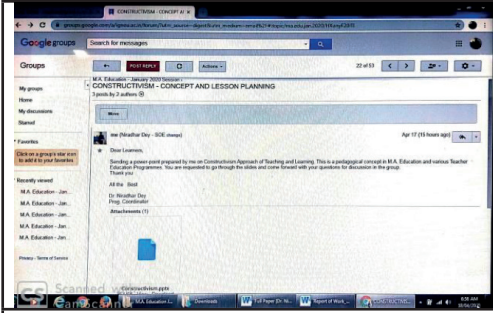
Posting of Presentation Slides	Posting on TC and IRC
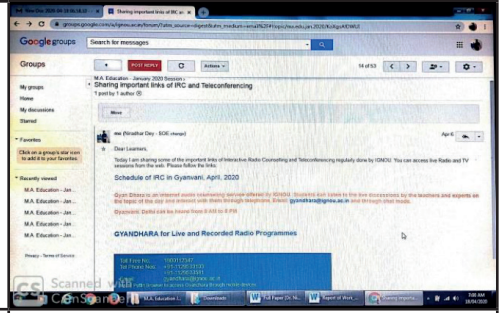
Figure-6 revealed various postings in the Google groups for discussion. As this has explained earlier that the percentage of viewers was much better than the learners who participated in various discussions but it was evident that discussions made in the discussion forum were quite interesting and it was a way forward for quality learning through this Google group. Let us take an example, of how the learners participated in a discussion forum in the Google group and solve their learning difficulties.

Name of the Learner: Nandana Varma
Programme: M.A. Education (January, 2020)
Place: Under RC Bangalore
Theme of queries asked in Google Group discussion forum: Teaching through Assignment
Date: 6th April, 2020

Details of the query asked by the member :
Respected Sir,
Kindly clarifies a small doubt on one of the assignment questions of MES-011.

(C) Explain the concepts of Equality and Equity in education. Discuss the influence of the economic "system" on equality of educational opportunity.
However in the study material it is mentioned about the influence of economic "constraints" on equality of educational opportunity in Unit 10 section 10.5.1.
Please explain if both the terms economic system and economic constraints are the same? Can we use both terms in place of each other in our assignment responses?
Response given by the Google Group owner :

To response your query, I may say the following:

1. Equality in education means to provide equal educational opportunity to all just like Universalisation of Elementary Education. We provide equal educational opportunity to all irrespective of caste, class, religion, region, gender, etc. It is the constitutional provision to provide equal educational opportunity to all.

2. Equity goes one step ahead of equality. It says, equal educational opportunity to all as well as to reach at a minimum educational standard (quality) by all. It emphasizes not only Universalisation of Elementary Education but also Universalisation of Quality Elementary Education to all. Reaching at the minimum level of learning (MLL) is an example of equity in education. Right to Education Act, 2009, gives its recommendations both on equality as well as equity in Elementary Education.

3. Economic system of a country directly or indirectly influences equality and equity in education. Equal distribution of wealth and making economic empowerment to the citizen increases equality and equity not only in education but also all other sectors.

4. The economic system and economic constraints are not the same. Economic system has a broader connotation that explains the entire economic process of a country whereas economic constraint reflects the hurdles and difficulties that the section of people faces because of the system of economic distribution process. Economic system may be a cause whereas economic constraint may be an effect. It has also a direct link towards achieving equality and equity in education.

Further, you are requested to read the materials and present your assignment properly.

Thank you

Owner, Google Group

The above interaction in the discussion forum of the Google group clearly implies that the learners were not only getting information about the programme but also they were actively engaged in their study and were satisfying their learning needs. Likewise, many such active discussions have taken place during the last two weeks which has made the learners engaged in their studies during the Covid-19 Pandemic days.

Apart from these, online discussions have been initiated by the owner of the group on different themes by providing them with various quality resources which are available on YouTube, OER sites, IGNOU achieves, and also specially created by the owner of the group.

It was just an example. Accordingly, many such postings had been made during the days and rigorous discussions had taken place on every issue.

Results and Implications of the Study

Results

The following findings are reported in the study:

- Learners have successfully accessed the hyperlinks base documents like SLMs, Assignment Questions, PowerPoint presentations, Audio-Video Materials, Term End Examination question papers, Teleconferencing & Interactive Radio Counselling sessions, and have also acquainted themselves with many other operational issues of the programme by using the online Google Groups.

- The percentage of viewers on every theme in the posting of the group was really appreciated but the percentage of learners who participated in the group in the discussion forum was not so satisfactory (Table 2 and Figure 5).

- In practice of only two week of learning through the online Google Groups, it has been realised that the learners have successfully inducted with the programme and had engaged in studies like writing their assignment responses, effectively participated in discussion forums on various themes of the programme and have also engaged in peer and group learning processes.

- An add-on with the regular transaction of the programme through using the Google group creates many doors open for the learners as well as for the programme coordinators to think of in changing the transaction strategies of the programme in future.

- Covid-19 Pandemic was an opportunity for the programme coordinators as well as for the learners to engage themselves in the online process of teaching and learning and to explore many opportunities for real-time quality learning.

- It was no doubt a successful experiment by the programme coordinators of the M.A. Education programme to provide various online learning experiences to the learners and to engage them in studies by using Google groups during the Covid-19 Pandemic period.

- The merit of using blended mode for the transaction of M.A. the (Education) programme had been realised and learners had better understood the concept presented in the Self Learning Materials.

Implications

The implications of the study are very widespread. The experiences gained through experimentation with the online

Google groups in addition to regular strategies of programme transaction were quite impressive and it was an eye-opener for the programme coordinators to make it a systemic requirement for implementing the programme for the future. In the ODL system, IGNOU implements a three-tier system of programme implementation, i.e. at the IGNOU main campus, Regional Centres and Study Centres levels. Programme coordinators were getting very little chance to directly interact with the learners and satisfy their learning needs. In view of this, Google group provided an opportunity to directly interact with the learners and accordingly solve their learning difficulties. Therefore, a platform of online learning as additional support for the learners should be established in every programme for better managing the programme and also to satisfy the learning needs of the learners. Though this Google group has been created especially to operate during the Covid-19 Pandemic period still its implications have been felt that the group should work throughout the studentship period of the learners and contribute dedicatedly for solving various issues of the learners.

Apart from the Google group's experience, it has also been realised that various social media networks such as Facebook; YouTube etc. can also be used for engaging learners in authentic learning.

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Abbreviations

A/V Resources – Audio Visual Resources

IRC – Interactive Radio Counselling

MLL – Minimum Level of Learning

ODL – Open and Distance Learning

OER – Open Educational Resources

RC – Regional Centre

RSD – Regional Service Division

SC – Study Centre

SLMs – Self Learning Materials

TC – Teleconferencing

TEE – Term End Examination

WHO – World Health Organisation

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Pandemic and Online Pedagogy: An Exploratory Study of Impact of Gender on Teaching-Learning Process

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Abstract

The covid-19 public health pandemic posed a big challenge to the continuance of school and college education. To shift from classrooms to distant online pedagogy was a challenging enterprise in the absence of digital infrastructures and adequate time available to gain expertise in ICT. Studies on online learning during the pandemic have explored the aspects of socio-educational factors in access, efficiency issues, satisfaction, problems faced by students and teachers etc. The present paper explores the aspect of Gender qua its impact on the online teaching-learning process through an exploratory qualitative study in the light of online pedagogical experiences of final year student-teachers of an elementary teacher education degree programme in a Delhi University college while they transacted various subjects to school children in the online mode during their mandatory school internship, as well as their own lived experiences shared while doing a course with the author, combined with the author's own observations. The study brings out that girls had a disadvantageous experience in the shift to online pedagogy. Existing gender disparities got accentuated in times of technological-pedagogical transition wherein boys had greater access and claims than girls. The loss of physical classrooms also adversely impacted various aspects of the lives of girls.

Keywords: gender, covid-19, online pedagogy, social interaction, voicing, gender socialisation, multitasking, gendered behaviour

Introduction

The Covid-19 pandemic not only shook public health systems and economies across the world but also brought unforeseen challenges in the field of education. The sudden closure of schools and educational institutions ruptured the normal academic calendar and compelled governments and private institutions to push the online education system to everyone's doorsteps. However, it neglected an important aspect which is whether students have access to the digital infrastructure that is computer, tablet and smartphone including access to internet (Bheemeshwar et al. 2020). Lack of attention to the accessibility factor has led to gaps in the education of economically weaker and marginalised sections, especially girls. Accessibility is not just economic but mediated by socio-structural factors in which gender is an important determinant. Gender equality, the Sustainable Development Goal 5, which focuses on empowering girls, seeks to redress existing disparities. In the words of Kofi Annan, former UN Secretary General, "there is no tool for development more effective than the education of girls". This paper is an attempt to explore and examine how not just economic factors but also the institutions of patriarchy and gender mediate with the access and utilization of technological resources creating several barriers to learning. The exploration has been done through the lived and

direct experiences of student-teachers of a teacher education programme and their observations while teaching young learners during the internship in a pandemic year, along with the author's observations while supervising their internship teaching, and during online teaching the course of Gender and Schooling to these student-teachers. The societal structures enmeshed with patriarchy cause disadvantage to girls in gaining access to online education and deepen gender disparities, this study underlines.

Rationale and Scope

Digital mode of education and online teaching-learning has been in use by several Universities and institutions offering courses mainly in distance mode. What was new during this period was the complete switch-over of the universal classroom teaching-learning to the digital platform due to a public health compulsion, which was not backed up by infrastructural as well as socio-cultural and economic enabling structures and environments. This shift to online pedagogy has come up for study by researchers on several aspects such as the effectiveness of teaching-learning, student attention, perception and acceptance of technology, satisfaction, preparedness, attitude, challenges faced by educators and students, eLearning readiness of faculty in higher education, online teaching experiences and strategies, implications for interaction and collaborative learning, awareness and utilisation of social networking etc. This body of research literature mostly covers aspects of interface with technology without going deep into the socio-cultural and economic structures and processes that interfere in the access to and utilisation of online pedagogy. A reason for this could be that majority of these studies are quantitative in nature having gathered their data through survey questionnaires on Google platforms and have an inherent limitation in not being able to bring out the larger social dynamics, i.e., caste, class and gender etc. that mediate between the education system and its recipients. Socio-cultural realities which affect and are affected by technology can be captured through qualitative Social Science methods, i.e., observation, narration, experience-sharing, case study, interview, discussion etc. which can serve as guide towards the underlying factors and dynamics at play. The present study tries to explore the gender dynamics and its impact on the teaching-learning process when there was a switch over from traditional classrooms to online classrooms across all stages- schools and colleges.

Methodology

This paper is based on an exploratory study employing qualitative research methodology and techniques. The study sample comprises 52 students of the final year Bachelor of Elementary Education programme (B.El.Ed.) in a Delhi University college. It uses as data their experiences narrated during the transaction of the 'gender and schooling' course by the author. The author used a direct observation method also to make some observations while transacting the course. They are referred to as 'student-teachers' because they are 4th year students who have to teach school children (class I to VIII) during their internship (practical teaching) course. Non-participant observation by the author was another method of data collection while supervising the online classroom teaching by these student-teachers, along with a few interviews taken for greater elaboration. The study uses ethnographic narrations to delve into deeper aspects. Convenience sampling is used to collect some qualitative data such that the better articulated ethnographic narratives find mention in the paper to better

explain the context and situations. The names of all respondents have been anonymised adhering to the norms of research ethics.

The paper carries the experiences of student-teachers derived while transacting school subjects to primary-level children between August 2020 to February 2021 in some government schools and some run by voluntary organisations. The final year students have to be associated with schools as interns between the months of August to February for 17 weeks to do teaching and share other responsibilities. Of these, one week is spent in classroom observation and getting to know the school culture. In the next 11 subsequent weeks, the teaching of English/Hindi, Maths and EVS take place in primary class's I-V. In the last five weeks, the student-teachers teach English, Maths and Social Studies to upper primary classes (VI-VIII). Due to the Covid-19 restrictions, the school internship in 2020 and 2021 had to be carried out in online mode. Student-teachers engaged with school students on various platforms as per the school norms such as Zoom, Google Meet or Microsoft teams. Student groups and continuous interaction are maintained on WhatsApp video calling, Google Classroom or Wise App as per the school's requirements. The author has in the past several years visited internship schools for supervision where student-teachers taught as interns. Due to the shift to online mode, the supervision also was done in online mode, leading to certain direct non-participant observations by the author reflected in the present research.

Research Questions

The study tries to ascertain the following aspects, which are interlinked and overlapping:

• Does technology create new

barriers to equality in the teaching-learning process?

• When technology becomes a 'critical resource' for learning (meaning, to education possible only through Information Communication Technology) who lays greater claims over it?

• Whether gender differentials become pronounced in the course of online teaching, unlike offline teaching?

• Whether online pedagogy accentuates gender deprivations within the home set-up?

• How does gender issue affect learning in the online pedagogy system?

• How does online pedagogy compare with classroom pedagogy in reinforcing or overcoming gender barriers?

Background: Review of Literature

Before the Covid-19 pandemic struck, efforts to enhance the state of girls' education had begun to reap benefits in India. The female literacy rate grew from about 9 per cent in 1947 when India became independent to 70.3 per cent in 2017-2018 according to the National Statistical Office (NSO) Survey. The Gross Enrolment Ratio (GER) of girls in primary school which increased from 61 per cent in 1970 to 115 per cent in 2015 is much higher than male GER (Sarkar 2021). However, the Covid-19 pandemic has reportedly reduced the 70 years' worth of growth (Rodriguez 2020).

As much as the Covid-19 pandemic has pushed the economy back, it has also reversed much of these gains made in the state of girls' education. The Right to Education (RTE) policy brief estimates that due to the pandemic around 10 million secondary school

girls in India could drop out of school. This could subject them to the risk of early marriage, early pregnancy, poverty, trafficking and violence (RTE 2021), recognizing that education is the most effective way of empowering girls to not suffer patriarchal predicaments. Indicators also reveal the existence of inequality in multi-dimensional ways. In 2021-22 academic sessions, according to the data submitted to the Haryana Education Department by private schools, only about 1.7 million students had enrolled against nearly 3 million, the year before. Similarly, in Andhra Pradesh in the academic year 2020-21, more than 60,253 students seem to have dropped out of the system, with a large proportion of dropouts being girls (Sarkar 2021).

To ensure access to online education, students first of all require access to smartphones, broadband and wireless internet connections. However, whether all strata of society would be able to afford these remains a question. Only around 27 per cent of the Indian population has smartphones. In 2019, E-market Edu suggested that nearly 35 per cent of the population utilises internet services through smartphones in India, exhibiting remarkable digital exclusion in our country. Between rural and urban areas, such a divide is further aggravated. Only 21 per cent of the population in rural areas have internet connectivity compared to 61 per cent in urban areas. The World Bank report highlights that 1.063 billion people in India lack access to online media (Lenka 2020). The Annual Status of Education Report (ASER) 2021 noted the fact that although the availability of smartphones has increased from 36.5 per cent in 2018 to 67.6 per cent in 2021, it does not translate into access for children. More than 26 per cent of enrolled children had no access to it (ASER 2021).

In India, the gender gap in mobile internet users is 50 per cent. Thus, 21 per cent of women and 42 per cent of men use mobile internet (GSMA 2020). Similarly, more boys than girls have access to digital infrastructures such as mobile phones, internet services, radio, and media. Since girls have much lower access to technology, therefore digital schooling further disengages girls from education and broadens the educational inequalities among learners In India, the poorest girls and especially those residing in rural areas have much lesser access to technology than boys. Studies suggest that only 33 per cent of women, unlike 67 per cent of men, have access to internet. In rural India, gender disparity is stark since 72 per cent of men while only 28 per cent of women have internet access. In addition, mostly intra-household allocation of information and technology (ICT) resources is mostly gender-biased hindering the capacity of girls to access home-schooling resources in times of the Covid (Kundu and Sonawane 2020:9).

There is a growing body of literature in academic journals on digital education, its benefits and various facets. During covid-19, several new research publications have appeared because online teaching became a mass phenomenon. The results of these studies are diverse and each had its limitation of having been carried out over the digital platform and were mostly survey questionnaire dependent. A majority of these were on the advantages and disadvantages of online learning- student attention, materials used, modes of study etc. (Pandey and Kiran 2021), the acceptance level of online learning by students (Srivastava and Dave 2021), challenges of online learning like access, connectivity, distraction, technophobia, misuse/online abuse (Harini and Verghese 2021) etc. However, the gender aspect has not been stressed. Among the relevant ones for the instant

study, a study by Malhi et al. (2022) on perspectives on learning outcomes show that from the perspectives of teachers that only 11.8 per cent of teachers felt that online teaching led to superior learning vis a vis face-to-face learning while about 50 per cent opined that it led to inferior learning. Toor and Singh (2022) in their study on socio-educational and family factors affecting internet usage in higher education have observed that there is no significance of gender in terms of internet usage of internet. However, there are other studies on gender as a significant factor in internet usage and purpose (Bimber 2000). Moreover, Toor and Singh's study brings out that maternal education is a significant factor in determining their ward's internet usage- the higher the educational level of the mother, the higher is the probability of the student to be in a high internet use group. This could mean that the education of women actually breaks the barriers of tradition and leads to empowerment that transmits to future generations and greater gender equality. Some other relevant studies have been cited later in this paper for the purpose of building contextual clarity and strengthening the research findings.

The National Policy on Education 2020 emphasizes that the use of technology for online and digital education should adequately address concerns of equity. It recommends that Pre-service teacher education should prepare teachers for suitable training and development to be effective online educators, if and when required (NPE 2020: 58-59).

Challenges of Home Setting: College Girls

This section contains the accounts of the student-teachers as students themselves in the college as well as the author's own direct observation while teaching the gender and schooling course to them. Their experiences in

engaging with young learners are quite insightful as are their own experiences of struggling with their own education amidst domestic responsibilities and care giving roles, coupled with lack of mobility and freedom.

Multitasking

The author's own experience of teaching in an all-girls' college reveals that due to various pressures at home and outside, girls are compelled to compromise on their educational goals to fulfil their familial roles. To illustrate, many students stated the following:

> 'I remain engaged in household tasks all the time', 'While the classes are going on online on Google Meet, I simultaneously keep washing utensils or cooking food or helping in other works', 'If we stay home, we have to do homework' (Classroom Discussions).

Most of the student-teachers expressed difficulty in attending classes on their mobile phones for a longer duration. One issue of course was that eye-related stress arose in many cases. Laptops or bigger size computers were not available in many homes. But it also surfaced that wherever these were available, in most cases (16 out of 22), the boys at home (their brothers) used those devices while the girls had to manage with mobile phones, causing the eye-related stress. Interestingly, many girls stated that they used mobile phones because it was handy to be kept alongside in the kitchen or wherever they worked while simultaneously attending class. None of the girls reported that their brothers engaged in multitasking while learning as they had to (Classroom Discussions). The availability and choice of the device to attend the online class points to a gendered notion of entitlement as well as labour: boys have more entitlements over better technology resources while girls have to bear an additional burden

of domestic work in the process of online learning. A study by Khan et al. (2021) shows that distractions are an issue for student engagement with online classes, in that they get diverted due to the desire to open social media sites, check messages etc. They observe that in their study sample, in tiny overcrowded households, the difficulty of having just one ICT device which is shared among siblings is leading to gender inequities as parents preferred boys' education more instead of girls' education.

Limits to Free Expression

In online classes, a common feature noticed was the reluctance of the girls to freely express their thoughts. Many of them lacked their own personal space since their families resided in tiny settings. They would remain silent when any question was asked and refused to speak out for fear of being overheard by their family members. They appeared more comfortable writing down their experiences in the chat box of Google Meet. Lack of free space at home to share their ideas and family restrictions in freely expressing themselves came out quite vividly in many instances (Classroom Discussions). As the one below by Shobha would illustrate:

> I feel hesitant to talk because everybody at home listens and says why do you discuss such issues in class? Family matters are private matters. That's why I like to write in the chat box rather than speak (Shobha, Classroom Discussions)

The online class could not provide the girls with a break from their patriarchal home set ups, something the offline classes in college could, being separate from the home and offering the girls a space of relief and liberty. The loss of the de facto classroom was also a loss of their social sphere where they would spend time and share with their peers, giving voice to their feelings and thoughts freely. This points to a phenomenon that online pedagogy in the home environment could reinforce a *culture of silence* among girls while offline classrooms in the colleges gave them a scope for voicing. It is to remember that historically the shift from homeschooling within the four walls of the household to the public schools in public space was a watershed in the status of women's education and empowerment in that it not only broke the societal restrictions on the movement of girls outside their homes and taboos on their education but also marked the freedom of girls and women to venture out, meet their peers and take part in the outer world as boys did. To voice out sufferings, share and care are crucial in overcoming gender barriers.

Gender Impact of Economic Stress

The massive loss of jobs and livelihoods due to the pandemic-induced lockdown has had an impact on the lives of girls. Because of job loss, salary cuts and reduced pay packages of their parents due to COVID running the household turned out to be quite a tough proposition. Many student-teachers reported that they have had to supplement their family income by giving tuition which formed a major chunk of their daily routine, along with domestic chores. These college students shared that they had to multitask alongside online classes. They not only engaged in domestic chores while taking classes but also gave tuition to supplement the family income. Student-teacher Reeta stated:

> "My father lost his job and it became difficult to manage household expenditure; we had to contribute in whatever ways possible. What I could have done was to give tuition and earn. My brother didn't do any job because nothing was available"

(Reeta, Classroom Discussions)

Although part-time jobs helped the family in overcoming economic distress, they also brought about undue stress and anxiety, creating difficulties in managing their regular studies (Classroom Discussions). There was a phenomenal rise in paid private tuition during the pandemic (from less than 30 per cent in 2018 to 40 per cent in 2021). The increase happened highest among the less advantaged - among 'low' parental education category children, tuition taking rose by 12.6 per cent compared to 7.2 per cent in the 'high' education category (ASER 2021). Such paid tuition work is what these student-teachers mostly avail to supplement their family income.

Although it is an economic impact of the pandemic and not of online education per se, the point here is that economic stress is borne by poorer sections and within them, the girls and women have to sacrifice or compromise their education. The access of girls to online pedagogy and utilisation thereof is also got shaped by larger socio-economic processes. Many girls had to sacrifice their studies to earn or supplement the family income to support families.

> My father's salary was reduced to half of what it was earlier and I have two siblings also. In order to run the household, I started giving tuition along with my college online classes and school internship classes to supplement the family income and assist my father in running the household. It was a difficult time for our family (Neetu, student-teacher, Interview).

The economic impact of the pandemic was more severe on the working class and the deprived and marginalised sections of society. Online pedagogy should be situated in the larger socio-economic dynamics and within that the gender dynamics to understand who got deprived and who could access and how much.

Unmuting Gender Issues: Situation of School Girls

Low Attendance of Girls in Online Classes

During the online School Internship Programme, the foremost issue observed was the lack of availability of digital devices for the primary class students to access online classes. Student-teachers reported low attendance of girls in the online classes. The attendance of most of the girls depended on the availability of digital devices and also that it did not clash with their brothers' classes. Secondly, it was due to their preoccupation with household tasks. Even little girls were found to be looking after their younger siblings and feeding them when their mother was busy at home. The student-teachers often expressed their hard struggle to ensure the participation of girl students. It was difficult to sustain their interest and keep them motivated amidst numerous calls to run short errands. Moreover, their access to digital devices remained limited since their brothers usually had an upper hand in using gadgets. To ensure their attendance, they would call them up telephonically before the class began. In a particular case, a girl student missed many classes because at the time of her class, often her parents would be out of home for some work and she did not have any device to join her online class. Consequently, a lag in learning becomes evident, underlining the adverse impact of the pandemic on learning. This has also been highlighted in the Annual Status of Education Report 2021 (Editorial, EPW 2021).

Routinisation of Domestic Realm

Several studies on gender disparities

reveal that boys enjoy more entitlements than girls within the family in terms of nutrition, education, expenditure and access to gadgets, not to mention the property in de facto terms (Dreze and Sen 2002). The participation of girls in online classes usually remained low because they lacked both the resources and the entitlements to join these classes, as seen above. An instance from student-teacher Rama's class II would reveal it vividly.

> Around 3 pm, before I was about to call Hamza (a 7-year-old student of Class-II) to take her online class, she rang me up to inform me that she would not be able to attend the class as she was expected to feed her younger brother. Hamza was often busy in child-rearing and took care of her siblings. Hamza did not know if Delhi is a part of India but she accurately knew the time it takes to warm the milk such that it is not too hot or cold to give to her little brother (Rama, Classroom Discussions).

Families generally rely on the labour of girls for various domestic chores. As Sunderi, student-teacher of class V stated:

> 10-yr old Preeti in my class finished household tasks like washing utensils and clothes and helping her mother in the kitchen and then only sat down to attend her online class. Even in between the class she attended to calls for domestic tasks (Sunderi, Interview).

Similarly, student-teacher Vidya reported that an eight-year-old girl, Sirisha, a student of Class-III, was unable to focus on her studies.

> After Sirisha washed the dishes, she took a pan bigger than her little fingers to cook rice. She was unable to hold the pan with just one hand since she had inflicted a wound on the other hand while cutting vegetables. Afterwards, she woke up her siblings and baked chapatis for them (Vidya, Classroom Discussions).

Student-teacher Shraddha also reported that most girl children in her class (class IV) only responded over audio and kept their videos switched off so that they could attend to routine domestic chores in the meanwhile.

The student-teachers identified the following reasons for low attendance of girls: engagement in domestic tasks, family responsibilities, low accountability towards girls' education and lack of access to equipment/devices to take online classes, among others. Families also usually delegate the task of looking after the younger and older family members to girls (Classroom discussions).

Taken for Granted Status

The marginal status of girls in households is the main determinant of their low educational status (Wazir (ed.) 2000). In an incident, it was learnt that a class IV girl student Tanya's family wanted a boy child and vowed to shave their daughter's hair if blessed with a son. When her brother was born, Tanya's head was shaved off. As a result, she refused to show herself in class, feeling conscious of her tonsured look and being sad about losing her hair. Such instances underline the taken-for-granted status of girls within the family which impacts their lives and educational contexts.

Gender Socialization

Silence is a major aspect of their gender socialisation and is taught early to girls. Girls learn to express their thoughts in socially acceptable ways and avoid mannerisms and behaviour that might result in their negative representation

of the image. To illustrate, during a role-play activity in a student-teacher's class during the internship, wherein learners had to play the role of vegetable sellers, the girls chose male names and identities and dressed up like males with moustaches and beards highlighting as if only males play such professional roles which is not congruent with reality because vegetable vending is also done majorly by women. Similarly, during another activity, the student-teachers asked the learners to share their future goals. A girl wanted to be a dancer while another one wanted to be a singer. On the other hand, boys either wanted to be doctors or pilots or IAS officers. Boys appeared to be more aware of their future goals as compared to girls they also seem to possess more sense of entitlement than girls (Classroom Discussions). Gender socialisation nurtures girls and boys in quite stereotyped roles (Dube 1988)

Girls often tend to internalise that their brother's academic engagement is more significant and remunerative than their own. They start considering their brothers superior to them in many ways. This is a consequence of their gender socialisation at home and community. As student-teacher Pushpa, teaching in class VIII narrated:

> Mala (class VIII) always left her class 15-20 minutes early as her brother had to attend his class. She said that she has to ensure the timely participation of her brother in the online class since both of them shared a mobile phone (Pushpa, Classroom Discussions)

Thus, Mala missed crucial time to engage in the teaching-learning process and compromised her own education to an extent.

The focus that existed in offline classes seemed to be missing in online classes. Students have by now learnt how to multi-task at home and during classes they usually are also busy finishing other household chores or family engagements. A student-teacher found out that a girl student had to assist her parents in the family shop while attending her classes. On the other hand, her brothers only attended their classes and were not involved in any other household activity. Thus, gender bias in participation in learning was clearly evident in online pedagogy. This aspect of the gender burden of family labour has already been discussed in the context of college girls as well.

Gendered Behaviours in Online Classes

Gender socialization begins early in life and we can see its role in the realisation of femininity among girls and masculinity among boys. The pandemic has reinforced such divides whereby girls have become more reclusive while boys continue to be more outgoing and vociferous. Online education has pushed children back to the screens, making them more acquainted with various applications like Zoom, Google Meet and WhatsApp. However, more boys than girls now possess their own phones or other gadgets. As a Class-V student Mini stated:

> I have to borrow a phone from my mother/father to attend classes while my brother always has easy access to the phone. Father says he won't buy phones for every child and asks me to adjust till the regular school resumes (Mini, Direct Observation)

Both boys and girls were quite conscious of their screen images. They wanted to look smart and presentable. Girls especially appeared more conscious of their looks and only with some reluctance agreed to keep the video on (Classroom discussions). Student-teachers had to devote the initial time of the class to ensure the attendance

and participation of the learners. As student-teacher Sita observes:

> I have to repeatedly request students to switch on their cameras. Some, especially girls, are quite hesitant to do so (Sita, Classroom Discussions).

Online education is a novel means of communication facilitating learning during pandemics and epidemics. The virtual world made itself real for children and they learnt to cope with adversities and pursue education. However, diversions and distractions have also surfaced adversely impacting the goals of education. These patterns of distractions also exhibit gendered characteristics. Often, boys were seen engaging in games based on video games and play stations which are app-based while girls engaged in discussing household routines (Observation of internship classes). Most boys usually have both resources and space to manoeuvre as per their interests and hobbies. Girls usually have little interest or time to include such games as part of their daily routines. These are rooted in the early process of gender socialization. During the supervision of student-teachers, often more boys than girls were observed changing their screen backgrounds and trying to apply different images on the screen in the online class (Direct Observation; Classroom Discussions). This adventurism with digital gadgets by boys has to do with issues of socialisation and masculine behaviour, access and a sense of carefreeness which boys tend to adopt early in life, while girls remain behind.

Online Classes and Degrees of Unfreedom

Social interaction has a significant impact on successful e-learning as it promotes learning engagement (Carini et al. 2006). Sher (2009) observes that student-instructor interaction and student-student interaction play an important role in ensuring student learning and satisfaction. As per Song et al. (2004) the online courses do not succeed in giving scope for social group formation among students. A study by Mutluri and Kumar (2022) reveals that there is very little student-student interaction in online classes. In their study 46.5 per cent of the respondents reported that there is 'very less interaction' a significant 33.1 per cent of the respondents mentioned that there was no interaction at all. Similarly, Verma and Verma (2022) in their study on the transition from traditional to online pedagogy report that lack of interaction is the second biggest challenge faced by educators and students, following internet/network issues.

In offline classroom discussions during the 4th year 'Gender and Schooling' course for student-teachers, sharing of personal experiences and reflections on events, places and people form important aspects of classroom pedagogy for understanding concepts. However, in online classes, students frequently abstained from sharing their thoughts, ideas and beliefs or feelings with the class. They were conscious of the presence of their family members around them who perhaps would not appreciate their ideas or expressions. In this sense, the online class could not succeed in creating a "classroom" as much as the liberating environment that the classroom offers to girls. As a limited solution, the chat box in Google meet came to be of help in putting forth and expressing their critical ideas related to gender and sexuality (Classroom Observation). As student-teacher Tara stated:

> I enjoyed coming to the class because it was a relief from the home environment and neighbourhood. I used to sit and read in the College library where I could have time

and focus. Now with these online classes, we are virtually confined and education seems just reading and writing. I feel my personality development has been hampered by not being able to come to College (Tara, Classroom Discussions).

Though girls openly hesitate to admit this fact yet they express how they miss the space to delve deeper into educational theories and practices. Home somehow is unable to provide them with that space to expand their academic horizons or explore their underlying thoughts or to build networks of academic discourse (Classroom Discussions).   In family situations, many students felt helpless and depressed because of the lockdown when they could not go outside. As student-teacher Laxmi shared, "I miss my friends and time out with them which made me feel happy and relaxed" (Interview). Such cathartic moments in physical interaction and social groups are necessary to ensure their state of calm, well-being, mental and emotional health.

Restrictions on Mobility

The mobility of girls usually gets restricted early in life due to sexuality-related aspects. The fear of bringing dishonour and shame to the family creates a burden on young girls early in life (Bhasin 1993). The lockdown again pushed girls to consider the four walls of their house as their destiny. During the pandemic, girls have further got stuck in the domestic space with little respite. The student-teachers themselves expressed their desire to explore the world outside and breathe fresh air.

> At home, my brother could go outside for short errands and feel the air outside. However, since I was required for domestic work, I could not venture out of the home on any pretext. Corona was not only for me but also for my brother yet

I remained indoors for months. I like coming to the College and being on my own. I enjoy being with my friends. All of it is so cathartic and relaxing. I missed it so much (Rama, Classroom Discussions).

With gradual opening up and relaxation of lockdown restrictions later, the male members of the family could relatively move freely while the female members were expected to avoid going outside since that mostly disturbed the household work (Classroom Discussions).

Conclusion

As discussed, the online system of education has created opportunities but also posed challenges. It has also contributed to gender-based inequality at home due to the lack of digital devices to log onto virtual classrooms and the expectation that they have to attend to household chores which preoccupy them, reducing their chances of finishing homework and preparing for their next class in advance. Access to technology is based on the availability of devices which as research has shown is difficult to ensure for most girls. The differential access to digital technology and devices, which are prerequisites of the online education system, has deepened the gender disparities among boys and girls in homes, taken away the freedoms enjoyed by girls in the school/ college classroom education system and pushed gender boundaries back to the disadvantage of girls. The new situation of online classes has thrown up new variables which cut across the domains of household, economy, family composition, gender divides and social situations.

Online education has widened the gendered spaces in the homes thereby restricting the freedom of girls. Their unequal access to learning is due to the gendered environment inside the

home. Online education has pushed the classroom to the homeroom. The mere fact of girls coming out of their homes and going to school or college used to mark a decisive break in the life of a girl for whom confinement was the norm. In the school space, girls could claim greater equality and freedom. Covid-19 has demonstrated that in crisis circumstances, mostly women would have to bear the burden of work and suffer neglect in other spheres which can empower them. For boys and girls, the availability and usability of online technology in education are not going to be equal given existing unequal power relations and gender discrimination at home. Household work, sibling care and pressure to earn a livelihood and bear the financial burden of the family in the wake of financial insecurities and hardships due to the loss of employment of the family breadwinner have posed numerous challenges for young girls.

The loss of the physical classroom setting and shift to online education due to the pandemic brings in fresh insights to understand the home as a reinforcer of gender inequality even when girls technically have access to education. Findings from the field underline the role of patriarchal structures in creating unequal access to learning. Experiences of student-teachers and reflections on their own lives can be immensely useful to form an understanding of gender dynamics within the family, society and educational realm.

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Self-Regulated Learning through Technology: A Study Review

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Abstract

With the Covid-19 Pandemic, almost every educational institute has resorted to digital classes by utilizing accessible technology. These paved the way for the students to maintain and develop Self-Regulated Learning as students have greater responsibility to manage their learning outcomes. In the present classroom scenario, technologies have become an indispensable tool to facilitate teaching-learning and with advancement, online learning is growing rapidly; concurrently students are responsible for their learning as the role of the teachers is only to guide or facilitate. The need for hence, Self-regulated learning and Technologies to achieve the optimal learning outcome.
This paper aims to review the findings of related literature concerning technologies promoting Self-Regulated Learning. It further gives implications from the reviewed literature.

Keywords: Self-Regulated Learning; Technology, Promoting Self-Regulated Learning

Introduction

In the past few decades technology has been progressing rapidly; therefore, with the advancement, it has become an indispensable instructional tool for student-teacher teaching-learning to facilitate optimal learning outcomes. Under Higher Education, the National Education Policy (2020; Part 2, Chapter 23) also emphasizes the use and integration of Technology in Education and has pointed out the key initiative and the recommendation of technology in teaching-learning such as online education, online assessment and online examination, etc. With an emphasis on the blending of technology in teaching-learning comes to a greater responsibility on the students to self-regulate and manage their learning performance. This called the attention to the students to be independent learners in managing their learning, henceforth, Self-Regulated Learning comes to light as it enables the students to know how to regulate themselves and how to regulate one's learning outcomes.

Self-Regulated Learning is defined as 'students' self-generated thoughts, feelings and actions which are systematically oriented towards the attainment of their goals (Zimmerman & Schunk, 1989). Pintrich (2000) also describes Self-Regulated Learning as an active constructive process whereby the learners set goals for their learning and attempt to monitor, regulate and control their cognition, motivation and behaviour guided and constrained by their goals and the contextual features of the environment.

Zimmerman(1989), as cited in Underwood & Banyard(2005), describes that Self-regulated learners draw on their knowledge and beliefs to devise an interpretation of a given academic

task, then set goals and think about the skills and strategies for achieving these goals. Self-regulated learners also monitor their progress toward the goals by judging their success against these goals". According to Zimmerman (1998), Self-Regulation involves the processes of planning, monitoring and evaluating. The term-Technology is very broad and complex hence, in a narrow term; it is a tool, technique or machine that may contain hardware and software to enhance human activities. There are various technologies for enhanced learning such as Technology Enhanced Learning Environment (TELE), ICT, e-learning, web-based learning, etc.

Objective of the Study

1. To review the findings of the related literatures concerning technologies promoting Self-Regulated Learning

2. To give implications based on the reviewed literature

Methodology

This study is based on qualitative methods only. The findings and implications of the study will be based on the review of related literature.

Criteria for inclusion

1. Only the topic of studies relating to the use of technology for promoting self-regulated learning was identified for the study.

2. According to the aim, review articles and books in the period 2004-2021 will be selected.

Data collection

The research study on the topic is very limited in number however through a search database for research articles relating to Self-regulated learning and Technology variables were identified from which 33 articles were selected based on the most relevant literature and according to the aim of the review.

Study review on Self-Regulated Learning through Technology

Self-regulated learning has gained wide attention from researchers over the last two decades and many studies have been conducted on other variables too. Studies have shown that students with high Self-Regulated Learning achieve better learning outcomes as compared to students with low Self-Regulated Learning.

The teaching-learning paradigm has been shifted to a learner-centred approach along with the expanding prominence of technology which means individualizing the learning environment. Technology and Self-Regulated Learning are pivotal in today's teaching-learning context and it will be inevitable in the fast-changing world. As Learning becomes more learner-centred and individualized, technology is also becoming more personalized and user-centred (Underwood & Banyard, 2005), these changes will enable the students to self-regulate their learning by setting their own time and space to achieve goals. In a learner-centred environment, greater responsibilities are placed on the individual learner therefore Self-regulated learning skills are needed. Seeing this need, researchers and educators have been conducting studies to find out whether technological tools promotes self-regulated learning techniques such as the study conducted by Kaufman (2004) to investigate strategies that teachers can use to improve self-regulated learning by using web-based learning. A note-taking method which is one of the strategies in web-based learning was found to be predicting SRL. In a note-taking method, students take notes of information that were considered important from the lecture or online material sources. According to Cosnefroy (2014), the

note-taking method in online learning demands more autonomy as it enables a learner to exercise control and hence students may develop self-regulated learning skills. The study revealed that most students revisited online source material enabling them to reorganise notes and increase usefulness.

Studies such as Bartlome et.al., 2007; Wong and Baarsa et.al., 2018; Alkhasawnh et.al, 2019; Hsu, 2020; Min and Nasir, 2020; Urbina et.al, 2021 pointed out that a Technology-enhanced learning environment (TELEs) promotes self-regulated learning. According to Antoniotte (2005), the needs and goals of the learner and educator in a Technology-enhanced learning environment (TELE) may mismatch therefore students can be informed by the teachers about the needs and goals of learning. The teacher's needs and goals for the students (external definition) may overlap the students' needs and goals (personal definition) so it is important to make them aware of the external definition. When a teacher guides the students with the external definition each student comes out with different strategies, skills or thinking styles to achieve their needs and goals. Once the students are exposed to a technology-enhanced learning environment, they have a better knowledge about the environment and develop a mental model of the environment which can help them further re-modify goals, strategies, skills and thinking styles. The mental model of the environment will further inspire the behavioural plan to be executed.

Frank & Dommaschk (2005) under the initiative of the Department of Media Education and Further Education at the University of Leipzig conducted an online Seminar that tested the implementation of Self-Regulated Learning in Technology Enhanced Learning Environment (TELE) among higher education students in the subject of Media Literacy.

The seminar had three terms, in the first term the students were engaged in an online course led by student tutors, the tutors gives a reflection on the group work, with the increasing confidence of the participants the tutors gave lesser advice and eventually the participants engaged in planning and designing their course, which in the due course of the term, individuals were contributing actively in the learning process and was highly involved and thus promote Self-Regulation within the groups.

Technology is rapidly advancing and it is complex, therefore students in this kind of learning environment can be easily distracted which is why Self-regulated learning is important to stay goal-oriented, use strategies and monitor performances.

Paraskeva (2007) conducted a study on 188 IT of 1st year and 4th year students to determine the relationship between self-regulated strategies and computer self-efficacy in IT courses. The study findings revealed that the 4th year students performed greater and incorporated more use of self-regulated learning strategies because they were equipped with advanced knowledge of computers and experience as compared to the 1st year students. It was found that 4th year students use cognitive and metacognitive strategies more often than 1st year students, they were focused on their goals and better in managing study time and organizing study space.

Alexioua and Paraskevaa (2010) examine the computer science, university students, by implementing an e-portfolio and its potential to enhance self-regulated learning skills. Both quantitative and qualitative statistical analyses were used to evaluate, and the result indicated that higher levels of cognitive factors were associated with higher levels of motivational and affective factors, across all phases of

self-regulated learning and e-portfolio implementation. Thus it was concluded that the process of structuring an e-portfolio as a learning strategy can be used to enhance self-regulated learning skills.

Self-Regulation can be developed in several ways such as explicit instruction, problem-solving, and a collaborative approach Technology can also support the development of SRL skills. In the book "Self-regulated Learning in Technology Enhanced Learning Environments: Problems and Promises", Bartolomé and Steffens (as cited in, Beishuizen, 2010,p-27) identified three requirements for technology-enhanced learning environments supporting SRL:

• Learners should be encouraged to plan their learning activities. To be able to plan, students should have the opportunity to develop planning and time management skills.

• Learners should be encouraged to monitor their activities.

• Learners should be encouraged to evaluate learning outcomes with the help of performance criteria provided by the TELE.

Similarly, Bartlome and Steffen (2011, p-23) in the book "Self-Regulated Learning in Technology Enhanced Learning Environments; A European Perspective" gave the characteristics to a Technology Enhanced Learning Environment (TELE) should have to support SRL. Following are the given characteristics:

• A TELE should encourage the development of Planning skills and Time Management Skills (blogs, Personal Learning Environments.

• It should give a feedback form. (E-portfolios).

• Provide Criteria for the teacher and students to evaluate their learning outcomes.

According to Bernacki et. al,(2011), Students who engaged in Self-regulated learning show a higher rate of learning in Technology Enhancing Learning Environment as compared to their peers who practised lesser Self-Regulated Learning. Research studies also show that technology can enhance SRL skills in students. This is supported by studies such as Barber et.al., (2011) who conducted a study on undergraduate students to examine the extent to which technology can facilitate Self-Regulated Learning. MyGrade Application in Blackboard is a technology that allows instructors to post students' grades on all course assignments, exams, quizzes and other projects and show running course percentages which students can access anytime. It was found that students who access the MyGrade Application were better able to monitor their grade performance and have significant improvement in their exam performance as compared to those who did not use the application. The students also reported that accessing the application helped adjust their study habits as well as classroom habits.

Johnson et.al (2014) mentioned in their studies that the elements of the Digital Learning Environment (DLE) facilitate the development of self-regulated learning strategies as it provides curriculum material and instructional procedures which enable students to clarify understanding of the task, develop effective plans and monitor personal mastery of learning requirement.

According to Barak (2014), as stated,"Technology education has the potential of being one of the best platforms for fostering students' self-regulatory behaviour in school for several reasons".

• Firstly, technology studies deal with issues that could interest

students personally, enhance their imagination, relate to daily life or concern the needs of individuals and society, for example, individuals with special needs.

- Secondly, technology studies put into practice the notion of 'learning by doing,' which educationalists recognized long ago as being an essential ingredient in developing an individual's cognitive and social aptitudes.

- Thirdly, technology studies take place in a rich learning environment, which includes, for example, materials, tools, instrumentation and computers. Moreover, while in many disciplines computers and communication technologies serve as aides for instruction and learning, in technology education the students often use computers and other interactive technologies as an integral part of the systems they design and construct.

- And fourthly, in learning technology students get feedback not only from their teachers and peers but also from their success or failure in their efforts to design, construct, troubleshoot and improve original and useful artefacts and systems.

Zhao, Hong and Chen, Li (2016) studied

the relationship between self-regulated and e-learning 2.0 environments, the findings indicated that e-learning influenced self-regulated learning significantly by information quality, communication quality, and user satisfaction. The findings also show that System quality and service quality influenced self-regulation by way of communication quality and user satisfaction as the intermediated variable. Fung et al. (2019) also found that self-reflection prompts in the personalized weekly e-Learning Journals improved the self-regulated learning

(SRL) of university students.

Kizil and Savran (2016) conducted a study on 777 university students of English as Foreign Language (EFL) learners to examine the use of ICT tools to self-regulate their language outside the formal instruction setting. The survey study revealed that EFL learners used ICT to regulate a different aspect of the language learning experience by using self-regulated learning factors such as goal commitment regulation, active regulation and resource regulation. Similar findings of ICT supporting self-regulated learning is confirmed by the study of Dettori et.al, 2008; Celik et.al, 2012; Onivehu et.al.,2018; Khampirat, 2021; Su et.al., 2021.

Chelgoum (2017) studied the EFL classes to identify the effectiveness of online platforms on the self-regulation of students for which findings indicated that experimental group students have improved in their self-regulated learning as compared to control group students.

Dominguez and Marcelo(2017) conducted a study on 711 university students to find out whether students use technology to self-regulate their learning. The study revealed two groups of students with different self-regulated levels; though the students used the technology frequently they did not use technology to regulate their learning process, however, when learning another group of students used self-regulated strategies with technology. The study also revealed that students used Internet information search and instant communication tools continually of all technologies analysts.

Wong et.al (2018) conducted a study in primary schools with a sample size of 147 students; the traditional teaching method classroom was replaced with an i-classroom such as online educational resources, mobile and classroom technological tools to investigate

its effectiveness in promoting self-regulated learning strategies in three key aspects: learning motivation, planning and management, and self-monitoring.

These key aspects of self-regulated learning were investigated by comparing students' grades and academic performance. The result indicated that after the implementation of the i-classroom students were found to be active in learning, search for learning material and are aware of suitable learning and teaching methods for themselves however they were not good at self-assessment.

Blended learning is inevitable in classroom teaching-learning, as teachers deliver lessons with technology as supplemental tools for more efficient and effective learning. Uz and Uzun (2018) conducted a study to study the influence of blended learning on the development of SRL among University students. The sample consisted of 167 students and was divided into three groups, one group is the experimental group in which blended learning was applied and the other two were the control group. The study shows that the experimental group in the blended learning environment progressed better in terms of improvement in Self –Regulated Learning skills than the first and second control group.

A study conducted by Bahri et.al (2019) also supported the findings that technology supports the improvement of self-regulated learning skills as the students who inferred moodle-based learning were found to be effective in developing self-regulated learning skills. Furthermore, Uysal and Gundogdu's (2019) study also shows that there was a positive correlation between the attitudes toward web-based instruction and self-regulated learning skills among University students.

Supriyono et.al. (2020) study revealed a significant positive correlation between technology acceptance and self-regulated learning, thus technology acceptance contributes to self-regulated learning. The finding further indicated that students use technology to regulate their language through various self-regulatory skills.

In summary, the reviewed literature depicted that technology was supporting self-regulated learning.

Implication

From the above review of related literature the following implication can be drawn:

Technology is becoming more personalized and hence it enables the students to plan and manage their learning. For example, Personalized Learning Environment (PLE) allows students to plan their own goals and organize learning in a personal web environment. Personalized student computers will enable students to enhance their lesson planning as well as schedule time for task completion; this will enable them to have a clear vision of the task completed within a time framework. There are also lesson planning applications and websites on mobile phones that students can easily access which can assist them to plan out lessons. Note-taking methods in web-based learning will also enable students to take note of important information while going through online learning resources and thus enabling them to reorganize notes.

There are various applications, learning management systems and online classroom platforms that will enable the students to monitor their learning; technologies like E-Portfolios and Google classroom will enable students to monitor their performances and keep track of their grades, project work,

and areas in need of improvements, achievements or performances in different activities. This will help them be aware, motivated, and monitor learning to reach the desired goals. Applications like 'MyGrade' and 'Grade' can be used by students to monitor their semester exam performance, and check their progress by the total averages and semester average; students can also set reminders and goals and adjust their study habits. Information and Communication Technnology (ICT) used in the classroom can also be used for the promotion of self-regulated learning behaviour. Introducing computer knowledge and skills to students at an early stage and integrating through a transitional phase from easy to difficulty level is recommended as Paraskeva (2007) mentioned that computer self-efficacy enables a student to confidently use learning strategies.

Learning Management Systems such as Moodle, Blackboard and various other teaching apps allow teachers to create online learning resources and assignments for the students; these allow students to create their own learning material with meaningful, accurate and accessible information. These digital learning allow students as well as the teachers to monitor students' progress. One of the great advantages of Technology in enhancing self-regulated learning is Evaluation. It can be in the form of peer review or feedback. The teacher can give feedback on the student's performance or students evaluate their overall performance in the feedback form. Technology like Google classroom will enable the teachers to give immediate feedback on students' assignments and activities performance. This will help the students to reflect on their behaviour, skills, performance etc hence re-modify goals, strategies or thinking styles if necessary.

Metacognitive, Behavioral, and Motivation are very important components of SRL. Thus, Technology can promote these SRL components to some extent as it allows them to plan, monitor and evaluate learning by portraying a clear mental picture of their learning goals and strategies and execution, availability of learning resources, feedback, etc.

Conclusion

The finding from the reviewed works of the literature shows that technology can be used to enhance or promote Self-Regulated Learning. Technology facilitates learning and influences the development of Self-Regulated Learning. It is a tool that enables a learner to plan, monitor and execute strategically as well as motivates the learning process. However it can be complex therefore, it has to be carefully carried through and introduced to the students with plans, strategies and expected outcomes. In a learner-centred environment, a teacher is a facilitator, so keeping this in mind during the initial stage; a teacher should guide the student with the concept and knowledge of technology. If the growing competence in the students is observed, the students can go on with their independent learning, setting their individual desired goals and strategies for achieving the goals. It is important to introduce the concept to the students so that they would not proceed blindly with trial and error but with objectives and strategy in mind.

Teaching-learning paradigm is a learner-centred approach, therefore technology and self-regulated learning skills will be helpful for students to attend optimum learning i.e. Life-Long Learning. Through the review of literature on the study 'Self-Regulated Learning and Technology', it has been realized that only a limited number of studies have been carried out and therefore more empirical research is needed with conclusive findings. In conclusion, the

present review study calls for the need for quantitative research and tools construction for Technology enhancing Self-regulated learning skills.

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Trends in Use of Virtual Reality (VR) Technology in Science Education: A Systematic Review

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Abstract

The purpose of this review was to systematically identify the general trends in the use of virtual reality technology in science education. For this study, two databases ERIC and Web of science were selected for review of related articles. PICO framework was used as a review protocol. Based on inclusion-exclusion criteria 22 articles were found to be eligible for the present study. The content analysis method was employed to analyze and synthesize the data into findings. Finally, the results regarding the study objectives are graphically presented and discussed. The findings of the present review throw light into the gaps or inconsistencies in the literature as well as provide insight on the overview of the use of virtual reality in science education.

Keywords: Virtual reality in Science, Science Education, Systematic review, Trends in virtual reality

Introduction

Virtual reality is a computer generated three-dimensional learning environment that allows interaction and visualization of the non-observable imagined physical world. According to Christou (2015), it replaces the user's sensory input with a computer-generated 3-dimensional simulation. Burdea and Coifett (2003) define virtual reality as real-time interactive graphics with three-dimensional models mixed with a display technology that allows the user to manipulate the model world directly and immerse him or herself in it. Virtual reality is not a new concept; rather it has existed since the early 19th century in the form of panoramic paintings. These paintings were created to give the illusion of being somewhere we are not, such as a historical event or a scenic location. The popular stereoscopes were based on this idea. Morton Heilig in 1956 invented a sensorama and gave the basic idea of immersiveness experience which is still alive today and used as a key feature of modern virtual reality technology. Since 1962, government agencies, contractors and software and hardware companies have been researching and developing virtual reality technology for research, administrative, and training purposes. Ivan Sutherland, a computer scientist, introduced interactive computer graphics in 1963 with his sketchpad application and in 1965 with his Ultimate Display, which allows users to interact with objects in an artificial environment that defies the laws of physics. From 1990 onwards, virtual reality-based gaming machines appeared along with various types of headsets. Palmer Luckey developed the first prototype of the modern, lightweight Occulus Rift in 2010 for gaming purposes which was thought to be a truly immersive virtual reality headset which was later purchased by Facebook in 2014. In 2014 Google announced their cardboard stereoscopic headset for smartphones, aptly named Google Cardboard and in 2015; Samsung released their Samsung

Gear VR headsets which were compatible only with Samsung smartphones making VR more accessible to a larger population (Yadav & Tomar, 2017).

An immersive experience is a key feature of this technology created by mixing computer graphics, interface devices, and visual screen displays (Pan, et al., 2006). Adding to the immersive experience of VR systems are interactivity and multimodal feedback. Immersion means being fully immersed in the environment. With immersion, you feel physically present in the stated reality. By moving one's body, interactivity allows one to control events in a simulation. This makes the experience more believable and engaging (raising a sense of presence), and reduces ambiguity and uncertainty. There are three basic forms of virtual reality technology: immersive, non-immersive, and semi-immersive (Verma et al., 2021). The user must be surrounded by GPS beacons or haptic devices to fully immerse them in virtual reality. A desktop or PC is required for non-immersive VR. The virtual world is controlled by a mouse, trackball, keyboard, or joystick. Widescreen projection is a typical framework in semi-immersive VR systems. Stereographic imaging is possible with particular shades of glasses and a broader field of view. It is emerging as a new educational tool for kids that have the ability to improve and alter student education (Pantelidis, 1993). As a result of its wide potential, virtual reality is being utilized to teach in fields as diverse as medical and education. Virtual reality is expected to help in many ways. One of its defining advantages is its ability to assist students to learn and visualize abstract scientific concepts (Youngbult, 1998). To participate in laboratory simulations or virtual trips that would be otherwise impractical or dangerous. It can simulate those dangerous science experiments. Using virtual reality in chemistry, for instance, allows users to experience completely immersive, interactive, and three-dimensional chemical procedure simulations (Georgiou et al., 2007). Previous educational research has shown the value of virtual reality technology in the teaching-learning process (Pantelidis, 2009). Virtual reality simulations, for example, have been shown to improve students' understanding of complex scientific concepts and increase their interest in science. Several advantages have been documented in research on the use of virtual reality for educational purposes, which are listed below (Table 1).

Table-1: Advantages of virtual reality in education

Advantages of VR	Researchers
Increases Achievement	Maloney (2005), Kim (2006), Parmar (2013), Dhamija and Kumari (2016), Aggarwal (2018)
Improves Retention	Moreno and Mayer (2002), Pérez-López and Contero (2013)
Enhances Interest and Motivation	Mei and Sheng (2011), Bowen (2018), Parong and Mayer (2018)
Develops scientific attitude	Kim (2006), Sarioglu and Girgin (2020)

Table-1 shows the benefits of virtual reality in science teaching. These advantages may allow virtual reality technology to be utilized to teach science. Future studies in education could use virtual reality studies as a paradigm. To explain the existing status and guide future research, a systematic

review is needed. Prior research can assist identify gaps, difficulties, and study design. Several comprehensive reviews have identified patterns in the usage of technology in education (Kucuk et al., 2013; Pardamean & Suparyanto, 2014; Crompton et al., 2016; Soni & Dubey, 2018; Unal, 2019 and Sabiri, 2019). But only a few rigorous reviews of virtual reality in education have been undertaken (Kavanagh et al., 2017; Kurniawan et al., 2019 and Pirker et al., 2020). There is a paucity of research on virtual reality in science teaching (Radianti et al., 2019 and Durukan et al., 2020). As a result, further research is needed to uncover patterns in virtual reality in science. Due to the lack of comprehensive reviews, this study examines all virtual reality studies found in chosen databases (ERIC and Web of sciences).

Review of Literature

Over the years, several learning techniques have been designed and effectively utilised in the classroom. Virtual reality technology, for example, has grown in popularity among educators, students, and researchers. Bernsten et al. conducted a comprehensive literature review to assess the commercial impact of virtual reality technology and the most prevalent subject of study (2016). The findings came from a careful review of several articles that questioned the commercial impact of virtual reality technology. There was a lot of research in the "presentation and entertainment department," which is concerned with the future of daily life being transformed and computerised. Similarly, Kavangh et al. (2017) reviewed virtual reality in education from 2010 to June 2017. Various databases were searched for relevant papers. The researchers studied 99 publications that employed virtual reality to create software. Higher education accounted

for 51 per cent of virtual reality software implementations. Research revealed that numerous publications had identified software usability concerns due to poor programme design and hardware usability issues due to lack of training. Cankaya, 2019 looked at 49 studies to see what trends emerged in the use of VR in education. The number of research articles published annually increased from 2014 to 2019. The findings show that quantitative methods were used in over half of the investigations. Pretest posttest and questionnaires were the most regularly utilised data collection tools, with undergraduates and adult students being the most common study participants. Kurniwan et al. reviewed a large amount of material (2019). 32 papers were found and assessed. This research sought to understand the purpose, equipment, and user experience of virtual reality in education. The majority of studies use virtual reality to enhance the user's learning experience by using a head-mounted display rather than a wide screen projector for all four objectives. Luo et al., on the other hand, evaluated scholarly literature on virtual reality in primary and secondary education over 20 years (2021). However, most of the VR treatments reviewed in this study were managed by computers or projectors, with low levels of immersion, engagement, and creativity.

Methodology

This systematic study examines articles published between 2015 and 2020 to determine trends in the usage of virtual reality in science education. The five steps provided by (Uman, 2011) are considered and adopted in this review study.

Defining the Research Questions

The researchers framed the research questions initially. These questions were framed using the PICO framework.

PICO acronym stands for "Participant-Intervention-Context-Outcomes". In this study, a participant is a population found through advanced database searches. This study's intervention is the researcher's preferred technology. Context refers to the study's shortcomings. The outcomes pertain to the review's objectives.

- P – The number of articles obtained after selecting the time frame and type of document.

- I – Virtual reality technology used in science education.

- C – Context is a science subject.

- O – Trends in terms of years of publication, country origin, research methodology used and data collection tools, etc.

Virtual reality in science education: Where are we now? This study intended to answer these and other related topics.

1. What numbers of studies are published each year?

2. In which countries the studies are most commonly carried out?

3. What research methods are most commonly employed in the studies?

4. What sample group is most commonly preferred in the studies?

5. What data collection tools are most commonly used in the studies?

6. Which science domain is most commonly selected for studies?

7. What variables do the studies most commonly investigate?

8. What type of hardware devices are used in the studies?

9. What findings do the studies report?

Searching the Database

After formulating the research questions, the researcher chose the databases to search for relevant publications. The search was limited to two databases, ERIC and Web of Science, to find relevant studies. The selection of these two databases was based on their availability of relevant and high-quality papers on the study topic. They also make full-text document retrieval simple. Moreover, past reviews of instructional technology use have used only two databases. For example, (Ünal, 2019) uses the Web of Science and ERIC. The topic-related keywords were found using Boolean operators (and, or) for a more precise and advanced search. A virtual reality and virtual learning environment in Biology, Physics, Chemistry, or Science was the keyword. Searches were limited to peer-reviewed full-text documents published since 2015. The researchers chose 2015-2020 because, according to the literature, most studies on virtual reality were published after 2015 (Durukan, Artun & Temur 2020). The steps followed in data collection are illustrated in Figure 1:

Figure-1: Data Collection Process
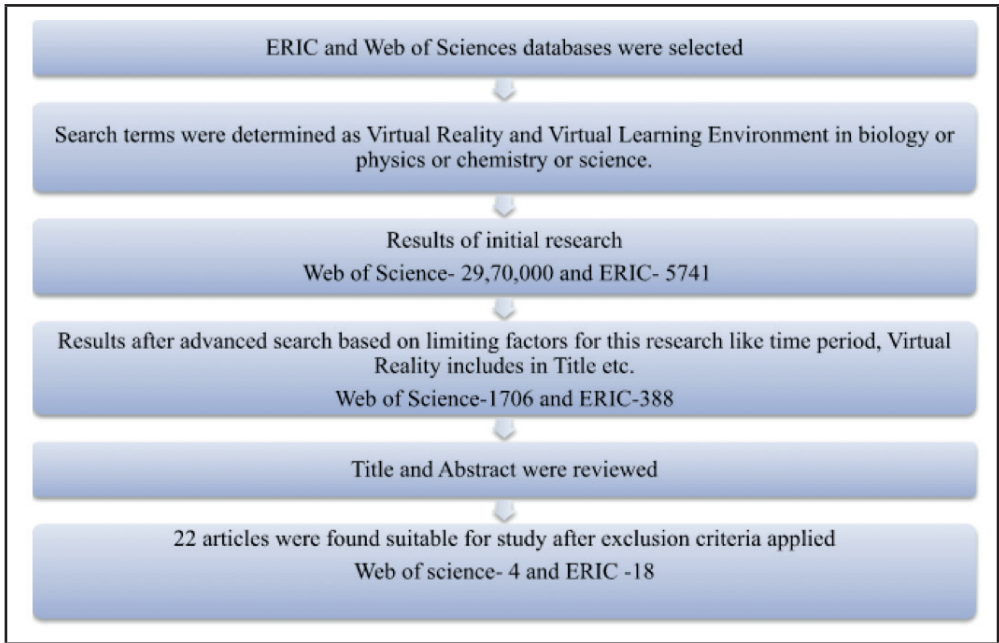
Selection of Articles

For the third step, the researchers selected the articles which were relevant to answering research questions. In this step, the researchers accept or reject the articles for literature review analysis based on inclusion-exclusion criteria (Table 2).

Table-2: Inclusion-Exclusion criteria

Inclusion	Exclusion
Articles that are peer-reviewed and with access to full-text were included in the study.	Conference papers, editorials, book chapters, reports, or articles with only abstract or summaries were excluded from the study.
Articles in which only Virtual reality technologies were used in science subjects with no other environment were included.	Articles which are using augmented reality or mixed reality along with virtual reality were excluded from the study.

Data Extraction

In this step, the researchers extracted the information from articles according to the research questions of the study. For examining the selected articles in detail the researchers developed an article review form. For the current study, the article review form developed by Unal (2019) was adapted and revised for its appropriateness according to the research questions of the present study. The data collection tool in this study was cross-examined by two experts in the educational field. Based on the expert's suggestions the final data collection tool was prepared which consists of 10 sections: Title of the study included for analysis, year of publication, country origin, sample, research domain,

research method, data collection tool, dependent variables investigated, and findings of the study. Each of the sections of the article review form and their corresponding categories are explained in Table 3:

Table-3: Data Collection Tool

Section	Category
Title of the study	Research Articles selected for analysis
Year of publication	2015-2020
Country origin	As per the authors affiliation and institution in which the study conducted
Sample	Primary school students Elementary school students Middle school students High school students Secondary school students Undergraduate students Teachers
Research domain	Natural Science Biology Physics Chemistry
Research Method	Experimental Survey Qualitative Mixed Research and Development
Data Collection Tools	Questionnaires Interviews Test (Achievement test, descriptive test, knowledge test, conceptual understanding test etc.) Scale (Attitude scale, Opinion scale etc.) Observation
Variable Investigated	Achievement Motivation Interest Other
Devices used	Desktop VR Mobile VR headsets Standalone VR headsets Handheld VR headsets
Findings of the study	Most commonly reported

The articles were then categorically analyzed and systematically examined based on the content analysis method for reducing information into more manageable data. Researchers sought two experts' views for the article review process to ensure the reliability of the data assessment. Finally, the result of the data was presented graphically.

Results

What numbers of studies are published each year?

The distribution of research publications published by year is depicted in Figure 2. From 2019 to 2020, there is a significant increase in the number of studies published. Two studies were published in 2015, one research was published in 2016, two studies were published in 2017, five studies were published in 2018, four studies in 2019, and eight studies were published in 2020. Between 2015 and 2020, the researcher discovered inconsistencies, such as an increase and decrease in the number of studies completed and published. Furthermore, more papers were published in 2020, with the least in 2016.

Figure-2: Number of articles by publication year.
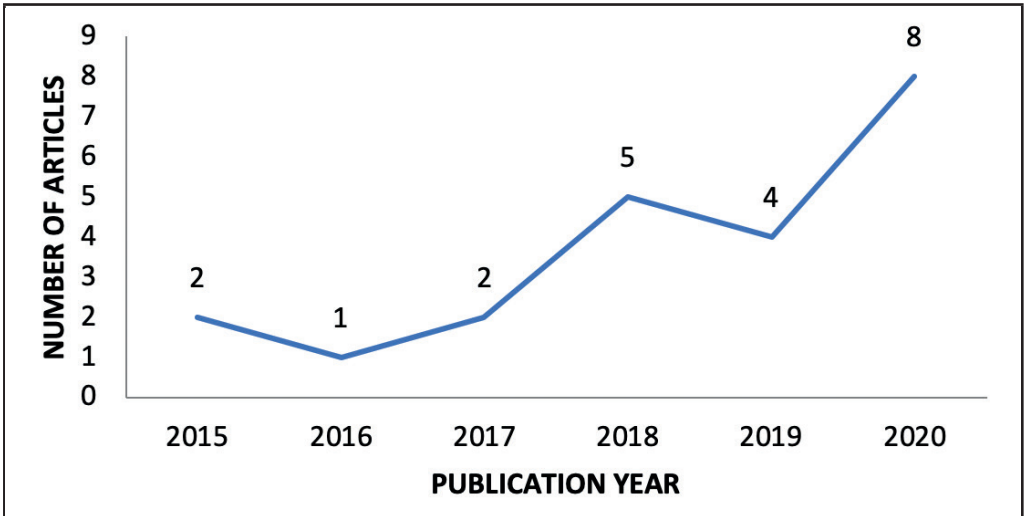
In which countries the studies are most commonly carried out?

The distribution of research by country of origin is depicted in Figure (3). The authors' institution at which the study is being done is taken into account when determining the origin of the study in a country. As shown in Figure 3, the USA ranked first with a total of eight studies (36 per cent) conducted, followed by Indonesia and Turkey, which ranked second in terms of number with four studies each (18 per cent) conducted, Nigeria with two studies (9 per cent), and Malaysia, China, the United Arab Emirates, and the Philippines with one study each (4 per cent).

Figure-3: Studies according to their countries' origin

Countries' Origin

- USA — 36%
- INDONESIA — 18%
- TURKEY — 18%
- Nigeria — 9%
- Malaysia — 4%
- UAE — 4%
- CHINA — 4%
- PHILIPPINES — 4%
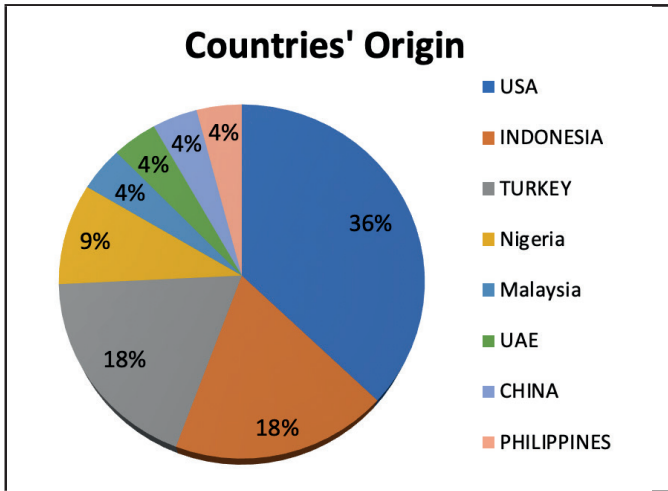
What research methods are most commonly employed in the studies?

According to Figure (4), the most commonly used research methods in studies of virtual reality technology in science were experimental, which accounted for 45 per cent, followed by R&D, which accounted for 18 per cent, mixed-method and qualitative methods, which each accounted for 13 per cent, and survey method, which accounted for only 9 percent. The experimental approach was used in the majority of the investigations.
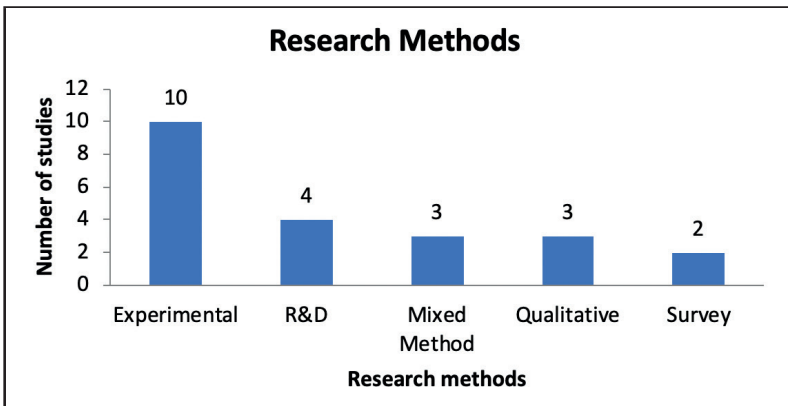
Figure-4: Research Methods used in Virtual Reality studies in Science

Research Methods

Research method	Number of studies
Experimental	10
R&D	4
Mixed Method	3
Qualitative	3
Survey	2

What sample groups are most commonly preferred in the studies?

The distribution of virtual reality studies based on sample size is shown in Figure (5). In general, it shows that undergraduate and high school students made up the majority of the study samples, accounting for 31 per cent. Middle school, high school, and elementary school children are each sampled in two studies (for a total of 9 per cent), while primary school students are only included in one study (for a total of 4 per cent). Primary school pupils were the least studied group, while undergraduate and high school students were the most studied.

Figure-5: Most preferred Sample group in Virtual Reality Studies
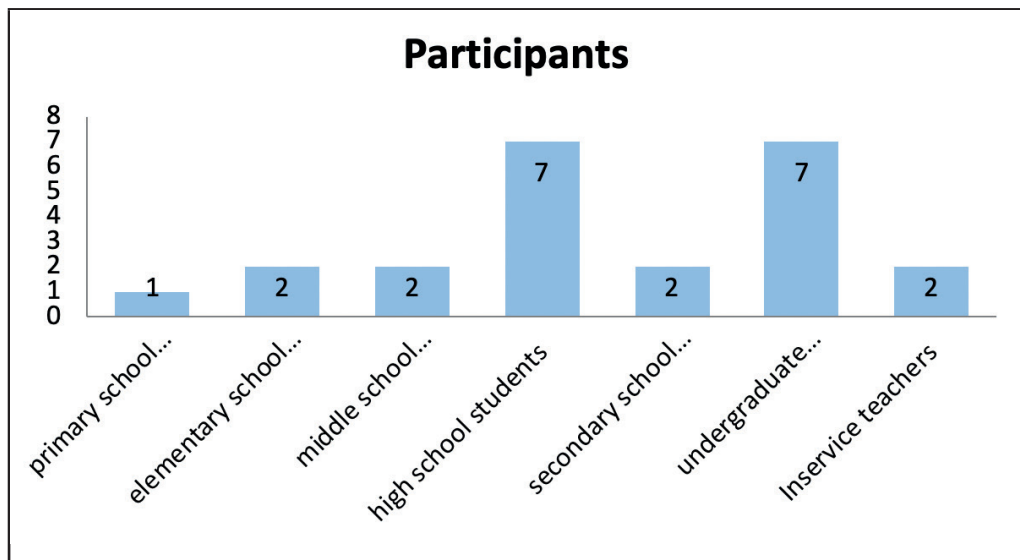
What data collection tools are most commonly used in the studies?

It was found that the most common data collection tools used in virtual reality studies in science were Questionnaires and Tests and the least commonly employed data collection tool was the observation method.

Figure-6: Most preferred Data Collection Tools
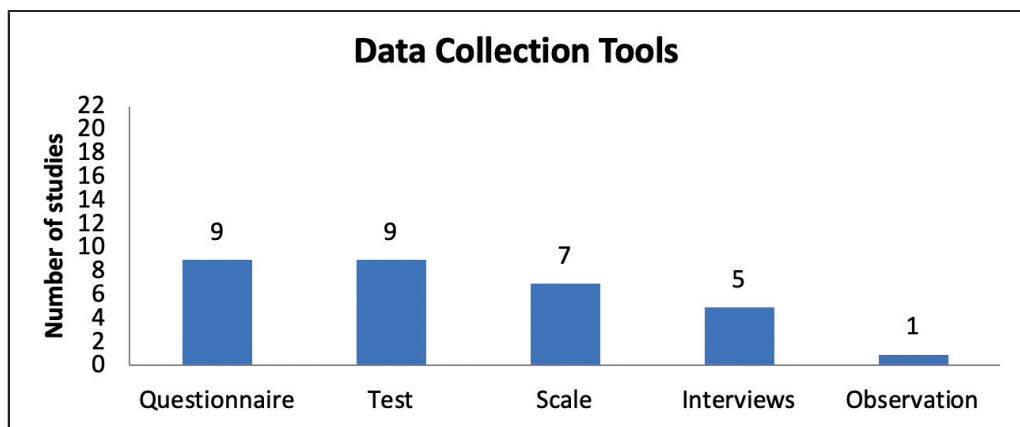
Which science domain is most commonly selected for the studies?

Figure (7) depicts the distribution of virtual reality studies across various science streams. It may be determined that physics has the highest number of studies (31 per cent) and followed by chemistry and biology (27 per cent). Natural science has the fewest studies, accounting for only 22 per cent of all studies.

Figure-7: Virtual Reality Studies by different domains of Science
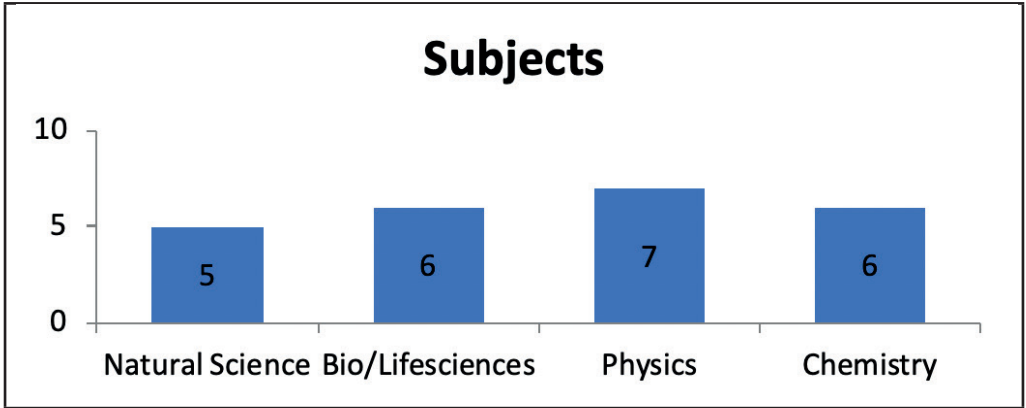
What variables do the studies most commonly investigate?

According to Figure (8), five studies looked into students' attitudes towards virtual reality in science, four looked into achievement, three looked into interest, learning outcomes and conceptual understanding and two looked into engagement, motivation, perceived ease of use, perceived usefulness and one looked into focus, intention, acceptance, performance, learning independence, teachers' perspective, opinion, and feedback. It has been observed that the most investigated variable is an attitude towards virtual reality.

Figure-8: Most commonly investigated variables.
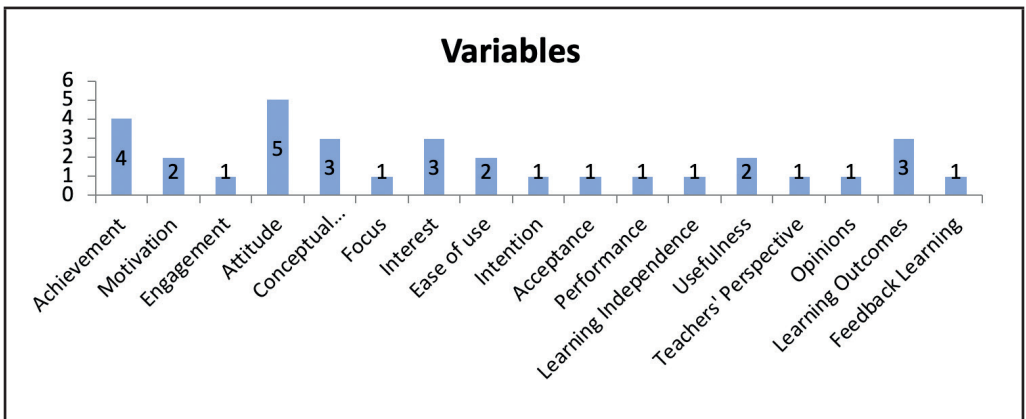
What type of hardware devices are used in the studies?

According to figure (9), it was observed that maximum studies used desktops for experiencing virtual environments i.e. 40 per cent. Mobile VR headsets were used in 3 studies and standalone VR headsets are also employed in 3 studies i.e. each contributes 13 per cent in the studies and only 1 study uses handheld VR headsets like Google Cardboard i.e. 4 per cent. The remaining 27 per cent of studies were found that have not clearly mentioned the kind of hardware devices used.

Figure-9: Hardware devices used in the studies
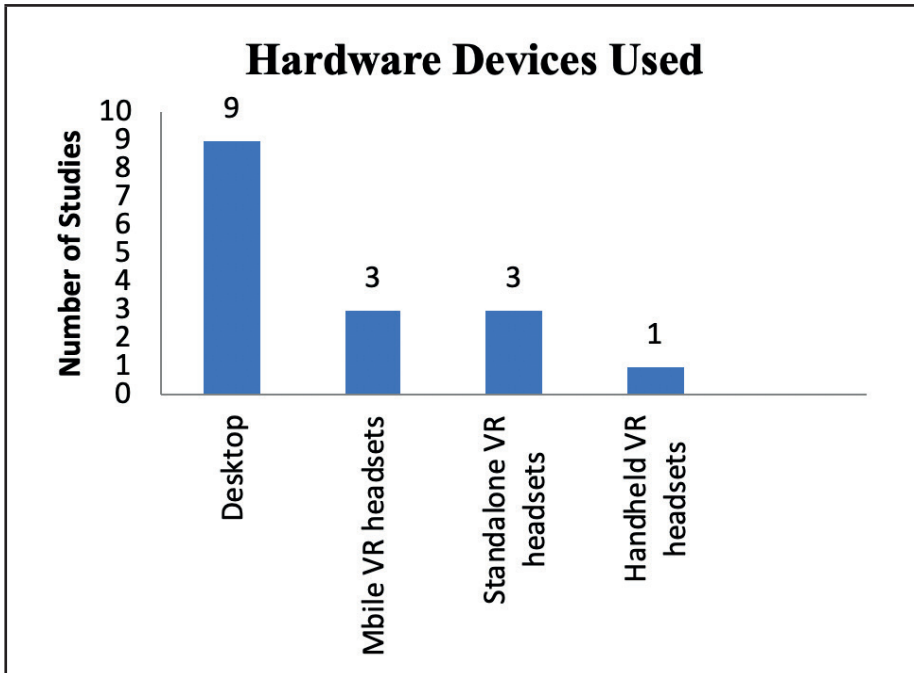
What findings do the studies report?

The findings of the reviewed articles revealed that the learning content developed by three-dimensional virtual reality technologies is viable and feasible to use in the teaching-learning process (Arista & Kuswanto, 2018; Bakar, Sugiyarto & Ikhsan, 2019 and Suleman, Sugiyarto & Ikhsan, 2019). There are plentiful studies that reported a significantly positive impact of a virtual environment on achievement (Haris & Osman, 2015; Goff, et al., 2017; Gambri, Kawu & Falode, 2018; Alneyadi, 2019 and Sarioglu & Girgin, 2020) and learning outcomes (Saputro & Setyawan, 2020 and Klash & Simmons, 2020). The studies also found that virtual reality allows the passive learner to actively participate (Bakar, Sugiyarto & Ikhsan, 2019) and engage in the learning process (Alneyadi, 2019 and Stone et al., 2020) for better enhancement of conceptual understanding in science (Arista & Kuswanto, 2018; Faour & Ayoubi, 2018 and Gabunilas et al., 2018).

Moreover, learning with virtual reality assists in development of scientific skills (Gambri, Kawu & Falode, 2018 and Klash & Simmons, 2020), enhancement of students' autonomous or independent learning ability (Arista & Kuswanto, 2018 and Wang, 2019). The studies conducted on pre-service and in-service science teachers as samples showed their positive attitude (Falode, 2018; Sarioglu & Girgin, 2020 and Mutlu & Acarsesen, 2020) towards the use of virtual reality technologies in the realm of educational settings. Teachers perceive virtual reality as an effective pedagogical tool for teaching science difficult concepts. However, only one study reported no significant difference in attitude towards virtual reality and conventional teaching method groups (Faour & Ayoubi, 2018). This can be attributed to the finding of previous research on virtual reality studies which found that this technology is as effective as the traditional approach (Tatli &Ayas, 2013; Smith, et al., 2016). There are myriad of studies that revealed various other

benefits of contemporary technology like increase in interest (Huynh, Hou & Wang, 2016; Wang, 2019 and Stone et al., 2020), motivation, and knowledge (Saritas, 2015; Alneyadi, 2019 and Stone et al., 2020) among learners and provides encouragement to opt science and engineering for learning and career purposes (Huynh, Hou & Wang, 2016). Despite numerous advantages, one study found that virtual reality has few barriers in the implementation of content in classrooms. These barriers may be related to the poorly designed virtual environment or lack of realism in learning material as promised by this contemporary pedagogical tool (Lamb, Lin & Firestone, 2020). Overall, virtual reality is found to be an effective instructional strategy for teaching science.

Discussion

An overview of important studies using virtual reality technology is provided in this systematic review. This study reviewed research publications published between 2015 to 2020, as this is the peak period for virtual reality studies. Similar results were found in earlier research when the researcher studied the literature. Durukan, Artun, and Temur (2020) observed that the majority of virtual reality studies were published after 2015. The researchers discovered anomalies in the number of studies performed and published between 2015 and 2020. However, this research found a significant increase in virtual reality studies in 2020, with a decrease in 2016 and 2019. Virtual reality has become an increasingly prevalent instructional technique for conveying scientific concepts. Virtual reality is becoming more affordable and accessible with smartphones, tablets, and video games (Gutierrez et al., 2017). The USA and Indonesia have the most research articles on the use of virtual reality technology in science, followed

by Turkey. Malaysia, Nigeria, UAE, China, and the Philippines also have few studies. The majority of scientific investigations on virtual reality are undertaken in the USA. Examining the literature revealed comparable findings in earlier educational technology research (Yildiz, Cengel &Alkan, 2020). China, UAE, and Philippines have the least.

Moreover, the results show that experimental research methodology is most usually used in publications released after 2015. A prior evaluation of virtual reality found that the most recommended research approach is experimental (Durukan et al., 2020 and Kalogiannakis et al., 2021). This study also revealed that qualitative research and surveys are the least usually used research approaches. Examining the literature revealed similar findings in earlier studies (Pellas, Mystakidis, & Kazanidis, 2021). The systematic review also found that the most common data-gathering technique employed is the questionnaire, as most studies used experimental approaches. Previous studies have found similar results (Egmir et al., 2017; Kalogiannakis et al., 2021 and Keser & Ozcan, 2011). Also, the target audience is undergraduate students. The literature review identified similar results from numerous educational technology researches, revealing that undergraduate students are the recommended sample (Kucck et al., 2013, Sirakaya & Sirakaya, 2018). These researches support our results that the least targeted participation level is lower grade school kids. The most popular subjects for using virtual reality technology were physics, followed by Chemistry and Biology, which relate to the participants' desired levels. Other characteristics addressed in virtual reality scientific investigations included attitude and achievement. The study undertaken by Pellas, Mystakidis, & Kazanidis, (2021) backed our findings.

Despite the availability of high-end VR devices on the market, the bulk of studies employed desktop VR technology. (Saritas, 2015; Haris & Osman, 2015; Huynh, Hou & Wang, 2016; Hite et al., 2017; Falode, 2018; Gambri, Kawu & Falode, 2018; Mutlu & Acarsesen, 2020; Saputro & Setyawan, 2020 and Klash & Simmons 2020). The researchers believe this is because most VR interventions are utilised for material delivery, requiring minimum involvement, immersion, and imagination. Luo et al., 2021 published a comprehensive review of virtual reality in K-12 and higher education from 2000 to 2019 with similar findings. Finally, the articles evaluated proved virtual reality's instructional potential. This systematic study also indicated that virtual reality can improve students' achievement, knowledge, comprehension, learning outcomes, interest, motivation, and abilities.

Limitations, Suggestions and Conclusion

This research is based on publications gathered from ERIC and Web of Science, two major databases. However, because the chosen databases contain high-quality publications from the relevant study activity, potential deviations are thought to be minor. For future research, it is advised that more datasets be reviewed so that a more comprehensive picture of the area may be formed. This evaluation discovered a dearth of comprehensive reviews on the use of virtual reality in science education, which can serve as a resource for future researchers, educators, and administrators. Because the majority of research has utilized quantitative approaches, it is critical to advise that more qualitative studies on lower grade sample groups are needed to fill the gap in the literature and investigate the educational potential of virtual reality technology in more depth. Furthermore, the concerns, obstacles, and potential solutions that arise when using virtual reality technology in science education settings are not addressed in this study. Future research should also include and explore the concerns, challenges, and potential solutions linked with virtual reality, according to the authors. The findings of this systematic review, which are significant and add to the relevance of this study in guiding emerging research in the relevant subject, are deemed to have addressed potential gaps in the literature.

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National Repository of Open Educational Resources —a digital repository of learning resources: SWOC analysis

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Abstract

After mass use of the internet open access has reached a new dimension in the forms of open access journals and open access digital repositories. So, a digital repository is a place where one can store, search and find digital content anytime anywhere in and around the globe. This paper aims to critically evaluate the open educational resources, e-books and courses available in the National Repository of Open Educational Resources (NROER). In this paper, the researcher retrieved 19,496 OERs including 440 e-books, and 14 e-courses from NROER while browsing the website concerned. The paper also tries to analyze the generic features of OERs including e-books and courses available in NROER. After surveying NROER, the content has been analyzed in respect of type, sources, subject, education level, target group, language, etc. After analysis OERs and e-books of multidisciplinary subjects, languages, and Secondary level e-documents have been observed. It is also observed that NCERT is the main source of OERs in NROER. To conclude, it may be opined that NROER will play a vital role in the development of the Digital Library.

Keywords: Repository, Open Access, National Repository of Open Educational Resources (NROER), e-books, Open Educational resources (OERs), Open education.

Introduction

The open access publishing movement started its journey in 2003 to provide access to resources to all without any cost. Later open access publishing has been divided into two types-Green Method i.e. self-archiving in repositories and Gold Method i.e. submission of open access papers in online journals. Here, the repository is a virtual place where something is stored for future access. In this regard, the National Repository of Open Educational Resources (NROER) is a digital platform for sharing open educational resources related to school and teacher education, developed by the Department of School Education and Literacy, Ministry of Human Resource Development, Government of India in 2013 in New Delhi and run by the Central Institute

of Educational Technology, National Council of Educational Research and Training, Homi Bhabha Centre for Science Education, Mumbai manage this NROER on the Meta Studio platform having registered users of 20,957 at the time of data collection.

As per data available on the repository, total of 19,496 OERs including 440 e-books in many subjects, languages and formats are available in NROER for the purpose of Primary, Secondary, and Senior Secondary education under Creative Commons CC BY-SA 3.0 License. So, Open educational resources popularly known as OERs can be accessed freely under an open license and used for teaching and research purposes. OERs include e-books, text, audio-visual materials and any other documents used for teaching-learning

and research purpose. Here, CC license means creative commons license in which the author gives rights to anyone to use, share, attribute and remix his/her OERs with different types. It is also noteworthy that 14 online and blended e-courses are available in NROER. In NROER, these open educational resources have no technical and price burden except a few copyrights and licensing restrictions for users. The users not only use these resources, but also they can reuse them with proper attribution.

Literature Review

The following related studies have been found after consultation with both foreign and Indian literature:

Upneja in his paper discussed Indian OER initiatives and their usage by information professionals. In it, he showed that among information professionals, the National Digital Library of India (NDLI) has gained the highest popularity as per the highest usage frequency (17.59 per cent) followed by Study Webs of Active–Learning for Young Aspiring Minds (SWAYAM) (15.60 per cent) and then followed by ePathshala (14.04 per cent) (Upneja, 2020). Chakrabarti in his paper related to institutional repositories studied 75 websites of institutional repositories through content analysis with respect to their generic features and revealed that many multidisciplinary subject-oriented repositories are available. It is also observed by him that a huge number of open educational resources have been found in these repositories (Chakrabarti, 2017). Thakran and Sharma in 2016 investigated the role of OERs in Indian higher education amidst lacking trained faculty and geographical variation regarding accessing education. Both the authors gave a brief overview of initiatives of OER in India to overcome the barriers of educational challenges faced in higher education (Thakran &

Sharma, 2016). Dutta in 2016 threw light on the possibilities and challenges in connection with OER in Indian higher education. In this respect, the author enumerated some initiatives of the Government of India like NROER, SHAKSHAT, NKN, EKLAVYA, NMEICT, NPTEL, OSCAR, E-grid, etc. (Dutta, 2016). Khan, in his paper, discussed about NROER and its various activities in the field of School Education. He tries to investigate the OERs of NROER with special emphasis on Physics in pre-primary and secondary levels of education (Khan, 2015). Das in 2014, in his paper, defined the term OER and international policy related to OER. He then emphasized Indian initiatives of the OER through the support of National Mission on Education through ICT (NME-ICT) (Das, 2014).

Objective of the study

The main objectives of the study are stated below:

- To identify the existing OERs and to analyze the generic features of OERs including e-books available in NROER in terms of type, sources, subject, education level, target group and language.

- To present SWOC analysis of NROER

Methodology

The data relating to NROER in terms of type, sources, subject, education level, target group, language have been collected from the website concerned and the relevant information as per the objectives mentioned above has been extracted, summarized, tabulated, and analyzed using MS Excel. For analysis of data, content analysis of the website of NROER and case study method have been acquired. For the quantitative analysis of the data the percentage is worked out. Qualitative analysis was

done after browsing the repository concerned and also after consulting the review of related studies. The period of data collection was from 16.06.2021 to 20.06.2021.

Analysis and Interpretation of Results

According to the objective stated above, the following tables and figures have been prepared below for minute analysis. These figures and tables are stated below-

Table-1: Type of OERs available in NROER

Type	Number of OERs	Percentage
Documents	5934	30
Interactives	1453	08
Audios	2956	15
Images	2582	13
Videos	6571	34
All Files/Total	19496	100

(Source: NROER, 2021)

Figure-1: Type of OERs available in NROER
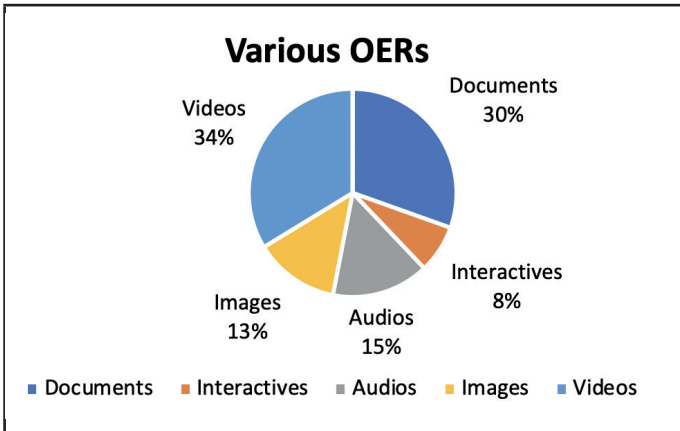
(Source: NROER, 2021)

Table 1 and figure 1 present 19,496 homogeneous collections of open educational resources in NROER. The total collection includes 5,934 documents, 1,453 interactives, 2,956 audios, 2,582 images and 6,571 videos. The above table clearly shows that 33.71 per cent videos are available in the repository immediately followed by 30.44 per cent of documents.

Table-2: Sources of OER in NROER

Sources of OERs	Number of OERs
CIET,NCERT	6771
NCERT	12701
Explosive	181
VIDYA'S ONLINE	20
Arvind Gupta	1726
Vigyan Prasar	383
CCRT	449
UNICEF	282

(Source: NROER, 2021)

Table 2 states that NCERT is the highest contributor of OERs followed by CIET, NCERT. There are other partners like Azim Premji University, Gandhi Smriti Darshan Samiti, Society for All Round Development, Vidya Online, etc. who/which contributed OERs to NROER. Some noteworthy contributions have been observed viz. 181 images of Explosive, 1,726 videos of Arvind Gupta-author of Science Books for Children, 383 videos of Vigyan Prasar-autonomous organization under Department of Science and Technology, 443 images of CCRT out of 449 images, 223 audio files of UNICEF out of 282, etc. The total number of resources presented in the above table exceeds the total number of OERs (19,496 OERs) because some OERs may be the sources of more than one institution e.g. NCERT and CIET.

Table-3: Subject-wise distribution of OERs in NROER

Subject	Number of OERs	Percentage
Accountancy	159	00.82
Art	573	02.94
Biology	487	02.50
Chemistry	265	01.36
Economics	386	01.98
Education	968	04.97
Environmental Studies	503	02.58
Geography	458	02.35
History	2288	11.74
Language	2967	15.22
Mathematics	1716	08.80
Physics	227	01.16
Political Science	240	01.22
Psychology	183	00.94
Science	4100	21.03

Social Science	1409	07.23
Sociology	200	01.03
Others	2367	12.14
Total	19496	100

(Source: NROER, 2021)

Figure-2: Number of OERs available in NROER
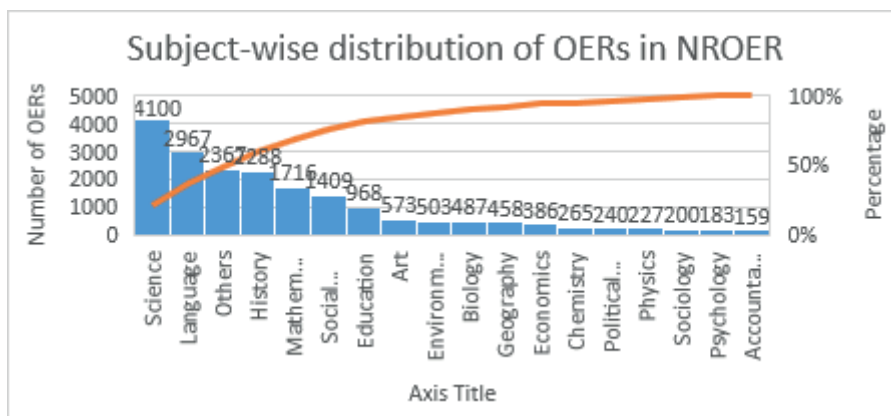
(Source: NROER, 2021)

Table-3 and clustered bar chart (figure-2) show that most of the OERs belong to Science (4,100 OERs i.e. 21.03 per cent) compared to Language (2,967 OERs i.e. 15.22 per cent) and Social Science (1,409 OERs i.e. 07.23 per cent). There are other notable subjects like Mathematics (1,716 OERs i.e. 08.80 per cent) and History (2,288 OERs i.e. 11.74 per cent) which can be specially mentioned. In NROER, 1,823 audio files out of 2,967 in language, 2,100 video files out of 4,100 in Science and 457 videos out of 968 OERs in education have been also observed.

Table-4: Education Level-wise distribution of OERs in NROER

Level of Education	Number of OERs
Primary Level	7479
Upper Primary Level	5943
Secondary	9034
Senior Secondary	5907
Not Mentioned	1091

(Source: NROER, 2021)

In NROER, Secondary level OERs are available in large numbers (9,034 OERs) followed by Primary Level (7,479 OERs) and then followed by Upper Primary Level (5,943 OERs). The notable attribute of the study is that total of 1,091 OERs do not belong to any specific level of education. The total number of open educational resources presented in the above table exceeds the total number

of OERs (19,496 OERs) because some OERs belong to more than one level of education. Here, the Secondary level denotes Class IX and Class X, Upper Primary Level denotes Class VI to Class VIII and **Primary Level** denotes Class I to Class V.

Table-5: Target Groups–wise distribution of OERs in NROER

Target Groups	Number of OERs
Teachers	17428
Students	18068
Teacher Educators	4245

(Source: NROER, 2021)

Table 5 states that most of the OERs available in NROER for students (18,068 OERs) are followed by Teachers (17,428 OERs) and then followed by Teacher educators (4,245 OERs). The total number of resources presented in the above table exceeds the total number of OERs (19,496 OERs) because the target users of some OERs are both teachers and students. Here, the Teacher Educator indicates those teachers who give training to pre-service teachers and help them to teach effectively.

Table-6: Language-wise distribution of OERs in NROER

Language	Number of OERs	Percentage
Assamese	52	00.27
English	13102	67.20
Gujarati	03	00.02
Hindi	4011	20.57
Manipuri	30	00.15
Marathi	400	02.05
Others	1898	09.74
Total	19496	100

(Source: NROER, 2021)

Table 6 indicates the availability of language-wise OERs in NROER. OERs in the English language are available in large numbers (13,102 OERs i.e. 67.20 per cent) followed by Hindi (4011 OERs i.e.20.57 per cent). The OERs in other languages like Manipuri, Gujarati, Marathi, Assamese, etc. are also available in NROER. The main attribute of the study here is that 52 videos are available in Assamese and 400 videos are available in Marathi. In this respect, it may be remembered that the almost same result has been observed by Chakrabarti and Maharana in 2019 in their paper related to Library and Information science. They observed that 95 Open Access Repositories in Open DOAR are available in English. So, English is the main source of OERs not in education discipline, but also in other subjects (Chakrabarti & Maharana, 2019).

Table-7: Distribution of e-books according to Subject in NROER

Subject	Number of e-books	Percentage	Rank
Language	20	04.55	xx
Mathematics	51	11.59	**3**
Environmental Studies	09	02.05	xx
Science	98	22.27	**1**
Social Science	59	13.41	**2**
Art	01	00.23	xx
Accountancy	21	04.77	**5**
Psychology	09	02.05	xx
Sociology	18	04.09	xx
Economics	12	02.72	xx
Political Science	18	04.09	xx
Geography	27	06.14	**4**
History	19	04.32	xx
Biology	10	02.27	xx
Physics	19	04.32	xx
Chemistry	19	04.32	xx
Business Studies	12	02.72	xx
Others	18	04.09	xx
Total	440	100	xx

(Source: NROER, 2021)

Figure-3: Number of e-books available in NROER
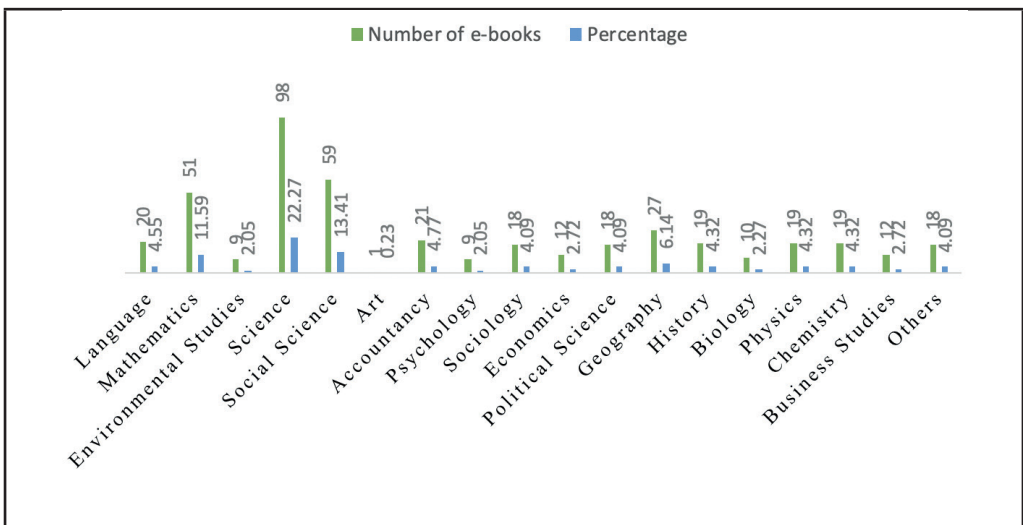
(Source: NROER, 2021)

Table 7 and clustered column bar (figure-3) represent the subject-wise distribution of e-books i.e. 'Device independent digital books' i.e. a book available in such a format to read it on an electronic device and shows 440 e-books in NROER which can be read by scanning QR codes. QR- coded e-books can be downloaded through QR Code Readers available in a large number. It also shows that most of the e-books belong to Science (98 e-books i.e. 22.27 per cent) compared to Social Science (59 e-books i.e. 13.41 per cent). There are other notable subjects like Mathematics (51 e-books i.e. 11.59 per cent) and Language (20 e-books i.e. 04.55 per cent) which is noteworthy.

Table-8: Distribution of e-books according to the Level of education in NROER

Level of education	Number of e-books	Percentage
Primary Level	028	06.36
Upper Primary Level	018	04.09
Secondary	110	25.00
Senior Secondary	093	21.14
Not Mentioned	191	43.41
Total	440	100

(Source: NROER, 2021)

In NROER, Secondary level e-books are available in large numbers (110 e-books i.e. 25 per cent) followed by Senior Secondary Level (93 e-books i.e. 21.14 per cent) then followed by Primary Level (28 e-books i.e. 06.36 per cent). It is also observed that 191 e-books have not been assigned to a particular level of Education. These e-books may be assigned to either a primary or upper primary level or the Secondary or Senior secondary level.

Table-9: Distribution of e-books according to Target Groups in NROER

Target Groups	Number of e-books
Teacher	423
Students	440
Teacher Educators	000

(Source: NROER, 2021)

Table-9 gives an overall picture of e-books according to Target Groups in NROER and finds that 423 e-books are best suited for Teachers and 440 e-books are best suited for Students. On the other hand, no e-books have been found suited for Teacher Educators. Some e-books may be considered for both teachers and students.

Table-10: Distribution of e-books according to the Language in NROER

Language	Number of e-books	Percentage
English	183	41.59
Hindi	138	31.36
Others	119	27.05
Total	440	100

(Source: NROER, 2021)

Table 10 presents the distribution of e-books according to Language in NROER. e-books in the English language are available in large numbers (183 e-books i.e. 41.59 per cent) followed by Hindi (138 e-books i.e. 31.36 per cent). The 119 e-books in other languages like Assamese, Marathi, Gujarati, Manipuri, etc. have been found at the time of searching in NROER.

Table-11: Distribution of e-Courses according to the Subject in NROER

Subject	Number of e-Courses	Percentage
Mathematics	04	28.57
Science	5	35.71
English	2	14.29
Values	1	07.14
Research	2	14.29
Total	14	100

(Source: NROER, 2021)

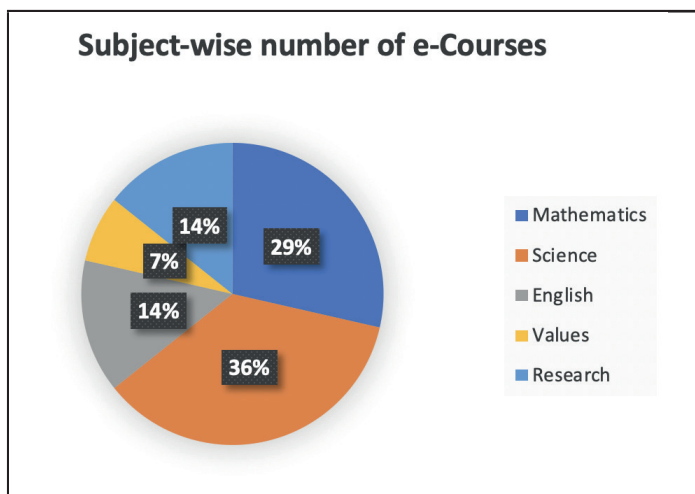**Figure-4: Number of e-courses available in NROER**

Table-11 and figure-4 show the distribution of e-Courses according to Subject in NROER. These e-courses are blended i.e. type of continuing education programme aimed to provide students with instructions through classroom and online delivery. From the above table, it is clear that 35.71 per cent of e-courses belong to Science subject followed by 28.57 per cent of e-courses belong to Mathematics then followed by 14.29 per cent of e-courses belong to English. The main attribute of the study is that 13 e-courses belong to Grade 8 and Grade 9 except one Mathematics e-course for secondary level.

Table-12: Distribution of e-Courses according to Unit specified

Unit	Number of e-Courses
1	08
2	03
3	01
4	02
Total	14

(Source: NROER, 2021)

Table 12 indicates the distribution of e-courses according to the Unit specified. From the above table, it is found that most of the e-courses have one unit i.e. 8 e-courses out of 14 e-courses and 3 e-courses have two units. It is also noted that 2 courses have four units and 1 course has three units. It is observed that 1-unit e-course is mostly because 13 e-courses belong to Grade 8 and Grade 9.

SWOC analysis of the findings

SWOC (S-Strength, W-Weakness, O-Opportunity and C-Challenge) analysis of NROER may be enumerated based on the findings from the above tables and figures to find out the real picture.

Strength

i.   In NROER, OERs including e-books are of several types like Video, Image, Audio, etc.

ii. These OERs may be used as teaching and learning aids.

iii. OERs of Science stream have been found in large number in respect to Social science and Language.

iv. All OERs including e-books are available here under the CC-BY-SA license i.e. anyone can edit and remix the e-books, even for commercial purposes without changing the original license and with full credit to the creator.

v.   The books of NCERT are in the format of Flipbook i.e. e-book looks like a real book having a page-turning facility and flipping sound.

vi. Vigyan Prasar, Gujarat Institute of Educational Technology (GIET), SIE, SCERT, SIERT, CCERT, SIET and other stakeholders shared their resources in the NROER platform,

vii. OERs on Themes and topics in different subjects like Economics, History, Biology, Political Science, Physics, Chemistry, Geography, Language and Mathematics which are mapped to the National Curriculum Framework, 2005 are available on a separate webpage for easy access of documents.

viii. Total of 14 online and blended e-courses are available in NROER where teachers and students can participate.

Weakness

i. The textbooks of NCERT are openly licensed to download and also can be shared non-commercially without changing with proper attribution. It encourages creation and sharing of duplicate OERs.

ii. Some of the OERs in NROER have not been accessed at the time of data collection.

iii. The stakeholders are unaware of NROER, support from management, insufficient fund and lack of ICT infrastructure have been observed.

iv. No search facility for multilingual OERs has been found.

Opportunity

i. Anyone knowing the internet may use the OERs and access e-courses in NROER.

ii. Academicians may contribute OERs according to the prescribed format of NROER.

iii. OERs are available in Indian languages like Manipuri, Gujrati, Assamese, Marathi, etc. besides English and Hindi which are beneficial for students of all provinces of India.

iv. This platform is very helpful for sharing OERs easily. These OERs help to build a National Digital Library.

Challenge

- A lack of skilled personnel and lack of preservation policies have been observed while browsing the website concerned and collecting data.

- Lack of policy for checking plagiarism of OERs has been observed.

- Anyone may use these OERs for commercial purposes violating open licensing as these E-books are easily available to download.

The Way Forward

It is a matter of great joy that India is not far behind in hosting National Repository in the arena of School education. In this repository, a large number of open educational resources are available to students and academicians at any time anywhere. From the above-mentioned SWOC analysis, it may be pointed out that the organization concerned should have to minimize the weakness and threat and maximize the strength and opportunity to develop NROER and increase awareness regarding NROER. It is also observed from the related literature reviews that the academicians and students are not all fully aware of the use of e-books available in NROER. The awareness programs and workshops regarding use of e-books and their deposit by the academic community should be organized from time-to-time. The organizations concerned with NROER should approach various institutions to submit their intellectual output to NROER. Most of the institutions in India do not have sufficient infrastructure regarding the creation of e-books for school education. So, NROER in India should provide adequate infrastructure and other support for the creation and maintenance of e-books. For future sustainability, the content collection and functional development of NROER should be done to create a digital society.

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Blended Learning in National Educational Policy 2020: Towards ending privileges to Higher Education

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Abstract

The National Education Policy 2020 of the Government of India is an exemplary milestone in the history of education in the country. It has proposed radical transformations in the education system in various dimensions, be it educational levels, pedagogy, infrastructure, training, and adoption of technology. Two revolutions have impacted deeply all our walks of life: the 4th industrial revolution where the artificial intelligence-enabled technologies are transforming the way almost all functions and the 4th educational revolution (as proposed by Sir Anthony Seldon in his famous book pondering 'Will Artificial Intelligence liberate or infantilise humanity?'). National Education Policy 2020 in clause 24.3 highlights the significance of blended learning for its impact on "social, affective, and psychomotor dimensions of learning". This paper discusses the transition to and the pedagogy of blended learning in the context of National Education Policy 2020 towards closing the digital divide in higher education in India.

Keywords: National Education Policy 2020, Higher Education, Blended Learning, massive open online courses, Covid-19, Technology, e-learning, open educational resources

Introduction

According to Fortune Business Insights (2021), the higher education technology market worldwide in 2021 was USD 85.43 billion. The estimates project that there would be a Compound Annual Growth Rate (CAGR) of 10.3 per cent and thus by the year 2028 this would grow upto USD 169.72 billion. One of the reasons for this increased use of technology is the adoption of online teaching by educational institutions, availability of better Internet bandwidth, increased Internet penetration, particularly in third world countries, increased use of personal computing machinery and digital learning initiatives by various governments. In India, the Ministry of HRD (now Ministry of Education) made digital initiatives/platforms for students and teachers like DIKSHA (Digital Infrastructure for School Education)

portal for e-learning content in the form of video lessons, QR-coded textbooks, assessments, and worksheets based on the curriculum of Central Board of Secondary Education (CBSE) and National Council of Educational Research and Training (NCERT), an e-Learning app ePathshala developed by NCERT for students of classes from 1 to 12, a National Repository of Open Educational Resources (NROER), SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds) as the national on-line education platform for undergraduate and post graduate courses and SWAYAM PRABHA as a bouquet of 32 DTH (Direct-To-Home) Television channels running 24x7 and covering school as well as higher education (Govt. of India, 2020) programmes.

With an average age of 29 years in 2020, the Indian workforce comprised

relatively young people. While the median age of the population in India in 1970 was 19.3 years, it may increase to 38.1 years by the year 2050 (O'Neill, 2021). (The workforce in China, Japan and other leading economies has an average age of 44 years or more, as of now.) And to reap the benefits of this demographic dividend in a stratified society like ours for national advantage, higher education is the most trusted vehicle, provided it is innovatively democratized. Higher education can act as a building block for empowering suppressed voices of the marginalised people and nurturing an inclusive talent pool. That is, highly educated, well-rounded, competitive, productive and efficient human capital rooted in cultural values and endowed with capabilities to create new knowledge can drive the world economy. This nevertheless is quite challenging, particularly post-Covid-19. The successive waves of the pandemic have caused unprecedented social anxiety due to huge loss of human lives and enormous economic crisis. In these unprecedented times, Covid-19 has completely reshaped the education system and newer pedagogies/ methodologies are being put to use for maximising gains in studies/student support.

Educational development in India

In India, the route of Five Year Plans had been followed from 1951 to 2014 to implement all important decisions with national dimensions and financial provisions were made in annual budgets, which were approved by the Parliament. As far as education is concerned, high-powered Commissions were appointed from time to time (GoI, 1950, 1966, 1986, 2009, 2020) to suggest ways to move forward so that people could share the front line of academic power. The recommendations of every Commission submitted to the Ministry of Education/MHRD, Govt. of India were

placed in the Parliament for approval. In this perspective, the National Education Policy (NEP) accepted by the Cabinet in July 2020 provided the road map and strategies to prepare Indian youth as value-loving individuals. NEP-2020 lays great emphasis on the use of technology for quality education and places a lot of confidence in the creativity of teachers and student entrepreneurs to integrate technological developments with education for a multiplier effect. In paragraph 23.2, NEP visualizes that "...new technologies involving artificial intelligence, machine learning, blockchains, smart boards, handheld computing devices, adaptive computer testing for student development and other forms of educational software and hardware will bring about drastic changes in what and how students learn in the classroom and beyond...". It also acknowledges in paragraph 23.8 that the NEP is being formulated when disruptive innovation of Artificial Intelligence (AI) has emerged with huge capabilities and applications in education at all levels. However, the most important point emphasized in NEP is that technology should be used to reach the underprivileged to the last mile for inclusive education and bridge the digital divide.

Is it a coincidence that teachers abruptly shifted to the use of technology--online education---around the time NEP was accepted by the Govt. of India in July 2020? No, it was not so. The shift to online mode was done in April 2019 to stem transmission of the highly infectious super spreader COVID-19 virus as well as to avoid loss of the academic year. Millions of students were forced to stay away from their educational institutions and break the chain of infections caused by Coronavirus. Moreover, it was not possible to continue with traditional methods of teaching-learning and it can be said with some confidence that technology came to the rescue when

COVID-19 had completely reshaped the education ecosystem. Since the virus in its mutated forms is likely to remain in vogue for some more time in future, education planners, administrators, and leading intellectuals have together reassessed the suitability of face-to-face (F2F) teaching-learning. (Internationally, leading universities like Cambridge and Stanford as well as prestigious Indian institutions like Indian Institute of Technology-Bombay had declared to conduct academic sessions in online mode for the entire academic year 2021-22.)

It is said that the problems of today can be best tackled by tools of tomorrow, not yesterday. Recognising this, the National Education Policy 2020 document has provided dedicated space in section 24 on "Online and Digital Education: Ensuring Equitable Use of Technology", which rightly identifies that new realities need new initiatives and thus recognises the advantages of technology, especially the role of online/digital education. While acknowledging the potential of online/ digital education, the policy however takes a cautionary note of the perils of the digital divide. The policy lays stress on the professional development and effective training of online educators. Emphasising the value of blended learning, the policy states in para 24.4 (i)

"Blended models of learning: While promoting digital learning and education, the importance of face-to-face in-person learning is fully recognized. Accordingly, different effective models of blended learning will be identified for appropriate replication for different subjects." (p.60)

Blended learning

On a continuum of a scale with face-to-face teaching at one end, which denotes in-person presence of teacher and students in the classroom, to the online teaching-learning at the other end which denotes teaching and learning in a fully online environment, blended learning is a combination of these pedagogies and thus occupies a middle position. The term blended learning was first used in 1999 in a document by the Experiential, Project-based Interdisciplinary Curriculum (EPIC) learning at Georgia State University, Atlanta (Friesen, 2012). Friesen noted some ambiguities in the usage of the term and pointed out:

"Blended learning, in other words, is almost any combination of technologies, pedagogies and even job tasks. It includes some of the oldest mechanical media (e.g., film) and theories of learning (e.g., behaviourism), as well as the newest" (Friesen, 2012, p.2).

Blended learning has also been explained as "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (Garrison and Kanuka, 2004, p. 96). Similarly, Graham considered blended learning as an approach to "combine face-to-face instruction with computer-mediated instruction" (Graham, 2006, p.41). Onguko (2014) put blended learning as a "deliberate combination of the self-directed study of offline content deployed on tablets, with occasional face-to-face meetings, moderated through instructor-led sessions" (p.78). Nakayama, Mutsuura and Yamamoto (2016) hold that "blended learning consists of face-to-face sessions and learning materials that are supported by information communication technologies (ICT)" (p.43).

There are many advantages of blended learning as it combines the benefits of face-to-face and online teaching-learning. Nazar, Omer, Nazar, & Husband (2019) in their study on the "impact of a blended learning teaching approach to teaching pharmacy law" reported that the pharmacy law teaching was transformed from

merely didactic to interactive learning. Basogain, Olabe, Olabe, and Rico (2018) in their study "Computational Thinking in pre-university Blended Learning classrooms" reported blended learning adds value for teachers and students and found it to be an innovative pedagogical strategy. Dendir (2018) examined the difference between performance (exam and homework assignments) of face-to-face (F2F) and online students for four semesters and found that the performance of the online students was better than that of F2F students in term-end exams. However, for higher levels of learning, online students had lower achievement as compared to F2F students. Cutri & Whiting (2018) observed a faculty development programme related to the blended learning course and examined how technology could be integrated on a long-term basis rather than as a one-time project. They reported that technology integration facilitated the teacher educators' authentic engagement as a self-study methodology. Factors such as the cognitive presence and social experiences gained through the synchronous and asynchronous discussions with peers or teachers using a blended approach were found to be an advantage (Donnelly, 2006; Ndlovu & Mostert; 2017).

Review of studies on the effectiveness of blended learning strategy

This section reviews the studies on blended learning for its impact on teaching and learning. Tambunan, Silitonga & Sidabutar (2021) studied the impact of blended learning in teaching technical teacher students having different learning styles by using a 3x3 design in which three blended learning composition groups were created. The first group had 25 per cent face-to-face (F2F) and 75 per cent online delivery; the second group had an equal of F2F and online delivery,

while the third group was provided 75 per cent F2F and 25 per cent online content. These students were grouped based on their learning styles as being assimilator, accommodator, converger and diverger. The study reported a significant change in the competence outcomes of students.

Fenech, Baguant, & Abdelwahed (2021) analyzed the attitudes of undergraduate students about blended learning and reported that they had a better attitude towards blended learning after they underwent a full course using this approach. Hijazi and AlNatour (2020) studied how the blended learning approach may impact the achievement of students and their motivation of learning. The results of their work statistically indicated better results in their achievement and motivation to learn their subject.

Lankapalli & Rao (2020) examined the technology and pedagogy aspects of implementing blended language learning. The delivery modes, task style, materials, the familiarity of teachers and students with technology and planning for formative and summative assessments are important elements. The authors recommended that blended learning was more suitable for those persons who wished to upgrade their skills through face-to-face learning and supported with online and offline learning activities. It is however important to decide the proportion of face-to-face and online delivery components for a course. The content could be delivered using emails, virtual learning environments or web conferencing systems. In addition, customization of the content or use it from the Internet needs to be considered. This is in accordance with Núñez Pardo and Téllez (2009, p. 172) that "the teaching method is significant within the exploration for developing materials that satisfy students' learning objectives and designs, preferences,

and expectations."

Zhang and Zhu (2020) compared blended learning with F2F and online learning as a good practice in teaching English as a second language learning (ESL). The students were found to have a positive change in their perceptions and the blended learning had high effectiveness as compared with F2F learning.

The blended mode of instructions were carried out for less proficient students in Malaysia who had a learning difficulty, were not sufficiently motivated and hesitated in using technology applications (Yusoff, Yusoff and Md Noh, 2017). The authors created a motivating blended learning system after identifying learning styles and cognitive levels. Motivation is an important element for the students who have low confidence in online teaching-learning as it does not have F2F interaction (Muirhead and Salmon, 2002).

Aguilar-Rodríguez, et al. (2019) made an assessment of the effectiveness of the blended mode of learning in the light of students' professional ethics and their attitudes, knowledge, and opinion. The study reported an improvement in the attitudes and gain of knowledge towards understanding professional ethics.

Transition to Blended Learning

Student behaviour and the modalities of learning have been found to have changed due to the increased use of technology (Okaz, 2015). Martins and Kellermanns (2004) also proved increased student participation (in the form of discussions using communication and technological skills) through the use of an online course management system (CMS). Recently, based on the recommendations of its expert group, which seems to have been

guided by the recommendations of NEP-2020, the national regulator University Grants Commission (UGC) has issued guidelines to Universities for adopting the blended mode of teaching-learning using a mix of online technology and face to face (F2F) teacher instructions. It has been suggested that up to 40 per cent of course curriculum could be transacted through online mode and 60 per cent through face-to-face (F2F) mode. By doing so, it should be possible to not only retain interactivity but also provide learners much-needed opportunities to develop as autonomous learners and emerge as confident individuals. In part, this recommendation has its genesis in the consideration of achieving a 50 per cent Gross Enrolment Ration (GER) by 2030 as envisaged in NEP-2020 (Govt of India, 2020). UGC has argued, and rightly so, that blended learning is pragmatic and should prepare the learners for the technology-driven world of tomorrow. However, blended learning involves a serious shift in pedagogy from the traditional mode of knowledge transaction.

It is pertinent to note here that the practices and models of blended learning are refining in keeping with the rapidly changing global perspective, which demands radical changes in teaching-learning pedagogy. Moreover, the blended learning processes are expected to be more engaging, interesting, impactful, and challenging for the learners. Fisher, Perényi, and Birdthistle (2021) carried out a study related to the students' satisfaction, engagement, and performance using the flipped and the blended mode of learning. Their findings reported a positive impact on the perception of engagement, performance and satisfaction, and they thus recommended a financial investment, individual involvement and cultural support by the educational institutions for promoting flipped learning

pedagogies. Worldwide, India is the second largest telecommunication market (Sun, 2021a). There were 1.15 billion mobile wireless subscriptions in India in 2020 (Sun, 2021b). Owing to the increasing mobile telephony, many students use their smartphones for their online learning activities like accessing the course material, learning management systems, interaction with teachers and peers and completing their assignments (Clinefelter, Aslanian, & Magda, 2019; Eom, 2021).

In India, the experience shows that there are several constraints in implementing even conventional technology-supported education (NKC, 2009; Garg and Sharma, 2021) and it would be really difficult to democratize education and include the underprivileged talent without providing the necessary support and augmentation of ground realities. Moreover, field research findings reveal that the majority of higher education institutions in India do not have access to relevant technologies, software, expertise and other necessary wherewithal. Cabauatan, Uy, Manalo, and Castro, (2021) looked into the factors which affect the intentions to adopt a blended learning approach at the tertiary level, and the preparedness of teachers to use blended learning for transacting learning activities. This study recommended strengthening institutional support for the teachers in getting opportunities for using technology.

A recent study reported that in India, online education was not being practised in its strict sense because the majority of teachers were not trained in designing curricula suited to or delivering education commensurate with online learning experiences (Garg, 2020). This view was supported by Rao (2020) who suggested that to shift to blended learning, Open Universities should integrate technology in all forms of student support services. Rao

(2020) advocated the creation of digital self-learning materials in the form of e-tutorials/e-books with links to audio and video resources, supplemented with OERs, interactive web links, discussion/chat boards, online quiz/educational games and animation, among others. These suggestions are applicable to all HEIs practising online education.

As such, developing learning materials is one of the prime challenges towards implementing blended learning essentially because it is a specialised task. Moreover, overcoming a lack of expertise in principles of instructional design is another serious challenge. While designing course/programme curriculum, teachers would also have to appreciate that in blended learning, structured learning activities are moved from classroom to online platform. Education technology and online learning have to be used to complement learning objectives. Only when teachers can effectively implement these aspects, the quality of academic transactions can be ensured. Therefore, training teachers in the blended learning pedagogy and equipping them with the necessary skills and expertise would be mandatory rather than an option. Alternatively, acknowledged experts could be associated with them for digital teaching-learning support. It may be pertinent to note here that without this element; this educational innovation will be stifled.

In a populous country like India, the number of universities, colleges and students is very large. To implement the suggestion to go the technology way and support universities academically as well as technologically, the architects of NEP-2020 have suggested the creation of a Technology Fund with initial seed money of IRs 150 thousand million. These funds would be used to increase access to relevant quality education in emerging areas and end educational privilege to a few. However, College

and University teacher associations led by progressive thinkers have advised the UGC against the blended learning initiative because of the non-availability of the Internet, Laptops and other facilities to the learners at large. As such these elements are integral to technology-assisted education. In a way, this is a realistic evaluation of ground reality where about 70 per cent of people depend on Government dole for free ration.

It is well known that ever since the British occupied India, it was robbed mercilessly. When the country became free and the process of reinvigoration began, a new breed of indigenous looters emerged. But the nation's desire to be in the front row of global academic leaders did not dampen. The policies laid down by the forefathers of Indian democracy helped increase literacy levels; now it has gone beyond 70 per cent from about 10 per cent in 1947. However, it is a matter of grave concern that the Gross Enrolment Ratio (GER) continues to be below 30 per cent. Though India has a rich tradition of higher education and scholarship, there are many and varied reasons for the malaise affecting the system (Garg, 2015). It has been criticized, even ridiculed, by various stakeholders. This is despite the realization that only higher education can take society out of darkness and empower the people. There is a dire need to increase equitable access to educational opportunities for all. (It is another matter that increased emphasis on access has masked the efforts towards quality and Indian education continues to operate in the quality deficit paradigm.)

Pedagogy of Blended Learning

Blended learning is essentially a delivery and design method wherein activities like online tests, quizzes, video content and even interactive learning materials ought to be completed online in combination with face-to-face support (Arbaugh, 2014; Hollyhead, Edwards, & Holt, 2012; Whitaker, New, & Ireland, 2016). Therefore, every teacher would be required to clearly identify the topics in each course that could be covered in online mode and elements that have to be completed F2F in the classroom situation, so that technology seamlessly partners with teachers. (It would be desirable to get such recommendations approved by the Academic Council of the University.) Though UGC has stipulated 40 per cent to be covered online, it would be desirable to keep it flexible. As such, uniformity, though desirable, is necessarily not a virtue and provision to allow some variation in it due to nuisances of a course/programme should be acceptable. For instance, for a professional programme such as Bachelor in Nursing, Physiotherapy and Pharmacy, some adjustment would be necessary because of enhanced practical work and it will do good to the learners as well as the institution. Moreover, due weightage should be given to the concerns of the faculty, as the national regulator has not issued guidelines.

To practice blended learning effectively, it is important to pool together all materials to be learnt/discussed online and the same should be made available to students prior to the F2F class so that they could add their inputs and put their knowledge/experience into practice. Fegely, Hagan, and Warriner (2020) proposed a "blended learning virtual reality inquiry framework" which combines modalities like blended learning, experiential learning and inquiry-based learning. Experience shows that no single institution in the country has the capacity and capability to do it on its own. Even the Indira Gandhi National University, an A+ institution, pooled academic expertise from all over the country while developing self-instructional packages suited to the

needs of distance learners. It would therefore be advisable/desirable that HEIs work in collaboration, preferably through a consortium. Alternatively, the Ministries of Education in the states or at the centre could coordinate this task, as was done while creating digital repositories like SWAYAM PRABHA. Apart from saving time and resources, such a partnership should help maintain quality.

Conclusion

To sum up, technology in collaboration with teachers would help create a system where more students could learn faster and more efficiently. However, there will be a paradigm shift in the role of teachers and delivery of education; the teachers will be facilitators and help learners for successfully navigating through a programme. Also, it is important to realize that technology cannot replace/eliminate the teacher in the teaching-learning process, though their role in blended learning would undergo substantial change. Moreover, the prerequisites for the success of this initiative include the availability of technological wherewithal with every educational institution, pro-activeness to change and putting faculty development mechanisms in place.

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MOOCs in India and SWAYAM: An overview

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Abstract

Education plays a vital role in every possible way of shaping the future of any nation. One of the major responsibilities of the Government is to enable the citizens of the country to skill themselves through quality education. Massive Open Online Courses (MOOCs) through the SWAYAM portal is one of the major initiatives by the Govt. of India to promote learning among its citizens. Although the concept of MOOC is now more than a decade old, in India it started in 2014 through MooKIT. Later in 2017 Govt. of India launched the SWAYAM portal. It aims at providing learning opportunities through MOOCs which provide online free education to all and have the capacity to bridge the digital gap. Through these courses, quality education can be made available at the doorstep of every learner without any cost. These courses are curriculum-based having interactive content material on different topics across all disciplines. The materials are developed by the best teachers from various top-level educational institutions across the country from secondary to post-graduation levels. The MHRD now the Ministry of Education has identified nine national coordinators to ensure the production and delivery of high-quality content material. It is meant for anyone, anytime, anywhere with the facility of credit transfer for up to 40 per cent of the courses in a programme. It follows a four-quadrant approach. In this paper, the focus is on a) Development of MOOCs in India b) Emergence of SWAYAM c) A brief review of SWAYAM course content and its activities d) Critical review of the accessibility of MOOC courses on SWAYAM.

Keywords- MOOCs, SWAYAM, Online Learning, ICT, Distance learning, Remote Learning

Introduction

Education is a very important aspect of the human race to grow and excel in life. Human beings are inquisitive and since the time they came into existence, they used this inquisitiveness as a weapon to achieve their goals in life. The knowledge that is attained through education provides several opportunities for better prospects in career growth. Individuals put efforts to gain knowledge across the globe which plays a significant role in opening up their minds and preparing them for the future. For ages, people used to travel from one place to another to meet their quest for knowledge and attain wisdom. They started sharing their learning and educating other people and also preserved their piece of knowledge in scripted form. This continued and education gradually transformed into a structured form which then got passed on to the next generation.

*Facts stated and opinions expressed in this paper are entirely of the authors and not of ICSSR.

Schooling up to grade twelfth and higher education at a university level follows a structured learning process, but people search for new and better learning

avenues once they start working after attaining a level of formal education (Sharma, 2018). Open and distance education has been available for quite some time and now it has witnessed a paradigm shift due to technological advancements and interventions. One such intervention is that of MOOCs which are online learning materials. MOOCs are a kind of revolution that can change the formal system of education. During the covid-19 pandemic when the education sector was one of the worst-hit areas and was not prepared for lockdowns across the globe, online learning proved itself as a rescuer. MOOCs which are extensions of online learning are the courses which have the capacity of anytime unlimited access to quality study materials at a very affordable rate with the option of free and open registration. According to Technavio's research MOOC market across the globe will reach $17.70 bn during 2020-2024 with 36 per cent growth from the Asia Pacific. This data supports the fact that it is the future of our education system which will encourage the universal access to quality education.

Literature Review

A review of related literature is very important to find the gap in existing available knowledge in a particular area and the researcher has gone through various literatures in this field which helped her to narrow down the actual research problem and also provided a strong base for the facts related to the article. Some of them are as follows:

Mohapatra, S. and Mohanty R. (2017) through their paper Adopting MOOCs for affordable quality education have studied the various parameters that influence the adoption of MOOCs by Indian learners. The data was collected from various stakeholders like learners from the undergraduate college, students pursuing master's

degrees, corporate employees looking for career accelerator courses, parents and educators. It was found that the learner's skill, usability and availability and affordability are the main factors affecting the learner's perception of MOOC adoption.

Kaypak, E.et.al. (2017) In the article entitled Mobile learning and MOOCs have provided a general overview of the emergence of MOOCs, the different types of MOOCs, the dimensions of these MOOC types, their topologies and integration of mobile learning in MOOCs. Authors have highlighted a few concerns like big class size, dropout, quality concerns and non-accreditation still finds a great scope in shaping the future of distance education.

Majumdar, C. (2019) in his paper SWAYAM: The dream initiative of India and its uses in education has discussed the various aspects of SWAYAM, its advantages and challenges associated with its implementation and delivery. Although the author sees a great future for the learning environment through SWAYAM, the fact that the economic condition of the people can affect this programme cannot be denied.

Singh, N. (2019) in a study named SWAYAM-Indian MOOCs: An insider's perspective has tried to find out the experiences of course coordinators, especially the challenges faced by them while operating the platform for running their courses. She found that course coordinators are quite satisfied with the platform.

Though research has been done in India and abroad on the topic, still there is a need to do further research to get more feedback for strengthening the system. Hence the study is undertaken.

Objective of the study

- To have a brief look at the growth and development of MOOCs globally and in India.

- To critically analyze the factors that pose challenges in accessing SWAYAM.

Research questions

1. How have MOOCs evolved around the world and in India?

2. How does SWAYAM work and serves the purpose for which it has been started?

3. What are the hurdles that can impact the implantation of SWAYAM**?**

Material and Methods

Researchers mainly used secondary data to show the development of MOOCs and SWAYAM in India. Facts related to MOOCs and SWAYAM have been collected from various research articles and related websites. For data used in the section where the researcher's experience is shared, the course coordinator was contacted through email.

Global Perspective

MOOCs have changed the perspective in what way education is perceived in this 21st century across the globe because of large-scale technological developments. The need for skilled labour force with advanced specialisation due to globalization is the biggest contributor to such courses because; in today's world any skill becomes outdated after a few years. It has evolved as a medium of learning for learners with flexibility in all terms i.e., access, time and eligibility. Technically MOOC is an extension of distance education that has led to a massive shift from traditional methods to technology-enabled methods which have revolutionised the way of delivery of courses. In these fast-moving times, people are trying their best to acquaint themselves with the available skills and knowledge in their field of expertise and during this transition phase distance

learning especially MOOCs have evolved as an important player in the education sector. Delivery through post then radio and television and now internet, distance delivery system in distance education has changed drastically and these high-tech advancements have every time ensured better learning in all possible ways. The idea of education for all is also a big contributor to the creation of MOOCs in the present society.

The growth of MOOCs from 2012-2021 shows a large-scale increase in the number of courses (to more than sixteen thousand) which points out to the potential of MOOCs in the coming times (Class Central).

If we look into the history of the evolution of MOOC, it started with Nikolai Frederik Severin Grundtvig of Denmark who first provided the theoretical framework for it which later became famous as the folk high school (Rollins, 2018). The main purpose of this school was to teach anyone interested, without any restrictions in terms of age, social background or financial means. This movement of self-learning continued to be popular throughout the 20th Century in Europe. With the arrival of the internet, other movements also emerged that changed the way education was imparted. The first online courses were technically not very complicated instead they were simple and basic in terms of delivery of content. Earlier the postal system was used to send the study materials. Later, email with a list of documents to download and read replaced the postal system. With more advanced internet quality videos were included to demonstrate the concept for better understanding. Initially, lectures delivered in classes were simply recorded and were made available as it is without any ratification. In this journey, the world witnessed the Open Education Resource movement which started in the United States

in early 2000 and this movement initiated the first-ever MOOCs which further was sparked by the MIT open courseware project. In 2006, Wikiversity started and in 2007 first open course was organized on the platform. The term MOOC was used for the open course "Connectivism and Connective Knowledge" (CCK08) by Dave Cormier and was introduced at the University of Manitoba in Canada by Stephen Downs and George Siemens. Alongwith 25 students who attended this course in a class of 2,300 more learners joined this online. In 2011 Stanford University started three of its online courses; the first on artificial intelligence (CS221) in July and the second and third in August on database and machine learning. The connectivism theory for knowledge creation and generation was the main idea for the very first generation of MOOCs which became popular as cMOOCs and later extended MOOCs also known as xMOOCs emerged which allowed free access with some closed licenses (Wikipedia).

Declared by New York Times as the year of the MOOC in 2012 (Wikipedia), several well-financed providers like Coursera, Udacity and EdX associated with top universities emerged and revolutionized the education system with more diverse courses through this new online medium. Table-1 summarises the growth of MOOCs in terms of the number of learners, a number of participating universities and demand of new courses globally.

Table-1: Growth of MOOCs in terms of the number of learners, number of participant universities and demand of new courses

Year	Enrolments	University	Courses
2011	300K	1	3
2012	2M	40	250
2013	10M	200+	1.2K
2014	16-18M	400+	2.4K
2015	35M	500+	4.2K
2016	58M	700+	6.85K
2017	81M	800+	9.4K
2018	101M	900+	11.4K
2019	120M	900+	13.5K
2020	180M	950+	16.3K

Source- Class central (do not include data from China in 2019 and 2020)

MOOCs in Indian contexts

India is one of the leading countries in terms of enrolments in MOOCs which are provided globally through various platforms. The MOOC history began with NPTEL in a different format which was started in 2003 as an educational content repository similar to MIT open courseware. It was started by seven IITs and IISc to put its recorded lectures delivered by its member institutes online open access. Today it is the largest online repository in the world of courses in engineering, basic sciences and selected humanities and social sciences subjects. It is also the most accessed library of peer-reviewed educational content in the world. Later MooKIT an indigenously built platform,

which was developed by IIT Kanpur in 2012 launched two MOOCs named Architecting Software for the cloud and MOOC on MOOCs which witnessed 2,300 participants (Jagannathan, Sugandhan and Kumar, 2018). It is a lightweight MOOC management system and is completely based on open-source technology which enables the creation of content in such a manner that is freely available for the public to view, edit and re-distribute. The MEAN stack application that uses javascript-based technology enabled it to work on low bandwidth which was common with other available MOOC platforms (Chauhan 2017). An indicator was provided like mobile bars to show the current bandwidth and in case of bad connectivity, the learners had the choice to switch to other content delivery options. Overall, it used user-friendly features. MooKIT has delivered close to 30 courses to about 2,00,000 users, in over 100 countries.

In 2014-15, IIT Bombay came up with the customization of the open-source EdX for attracting a global audience. It was funded by the National Mission on Education through Information and Communication Technology (NME-ICT), the then Ministry of Human Resource Development (MHRD), Government of India. IIT BombayX was introduced on the EdX platform as the basic version of the blended learning MOOC. Blended learning is a combination of both electronic and online media as well as traditional face-to-face teaching. After IIT Bombay some other institutions also offered MOOCs on EdX and Coursera in 2015. Later in 2017 by the recommendation of the then Ministry of Human Resources and Development (MHRD) now Ministry of Education, SWAYAM, a MOOC delivery Platform by the Government of India was finally launched. There are few more lesser-known providers available in other fields. Table-2 enlists some of them.

Table-2: Lesser-known MOOCs providers

| Provider	Founded in Year	Type	Industry	Head-quarter	Website
V skills	2009	Educational Institution	**Education Management**	New Delhi	www.vskills.in
U18	2009	Privately held	**Education management**	Gurgaon	www.u18.edu.in
Digi-talVidya	2009	Privately held	**Higher Education**	New Delhi	www.digitalvidya.com
Edukart	2011	Privately held	**Education management**	Jaipur	www.eduKart.com
Apna Course	2013	Privately held	**E Learning**	Bengaluru	www.apnacourse.com
UpGrad	2015	Privately held	**E Learning**	Mumbai	www.upgrad.cm
Learn-vern	2020	Privately held	**E Learning**	Ahmed-abad	www.learnvern.com

(Source: LinkedIn)

Development of SWAYAM

To cater to the diverse needs of the learner, the Govt. of India launched the SWAYAM Platform on 9 July 2017 for providing MOOCs. It is a very good move which enables eminent scholars an opportunity to share their knowledge with all including the most disadvantaged in the society. It is an initiative to provide quality education which can be accessed by anyone, anywhere to bring equity to society. It specially targets those students who could not be benefitted from the digital revolution and are not able to participate in the mainstream formal education system. Making quality education available to all is a priority of the Government but due to limited resources and a huge population, physical enrolment in top-level institutes like IITs and IIMs are very tough. The highly competitive entrance tests make entry almost impossible for students who are not at par with their level. Through SWAYAM MOOCs, learners can join courses by leading faculty of these institutes even if the student could not get admission there. The SWAYAM project is fully funded by the government and the cost for everything like content creation, technical infrastructure, maintenance and human resources are borne by them. Nine national coordinators AICTE, NPTEL, UGC, CEC, NCERT, NIOS, IGNOU, IIMB, NITTTR have been entrusted to ensure the production and delivery of quality content to all the sections of learners from school to higher as well as vocational education. For learning SWAYAM, courses are free but certification requires registration and attendance in final exams conducted online through NTA and a fee is charged for that. The emergence of SWAYAM among big players in the field can be understood by figure-1 which depicts how it evolved as a major MOOC provider within two years of its launch and surpassed Future Learn the very next year.

Fig.-1: Number of learners on major MOOC providers
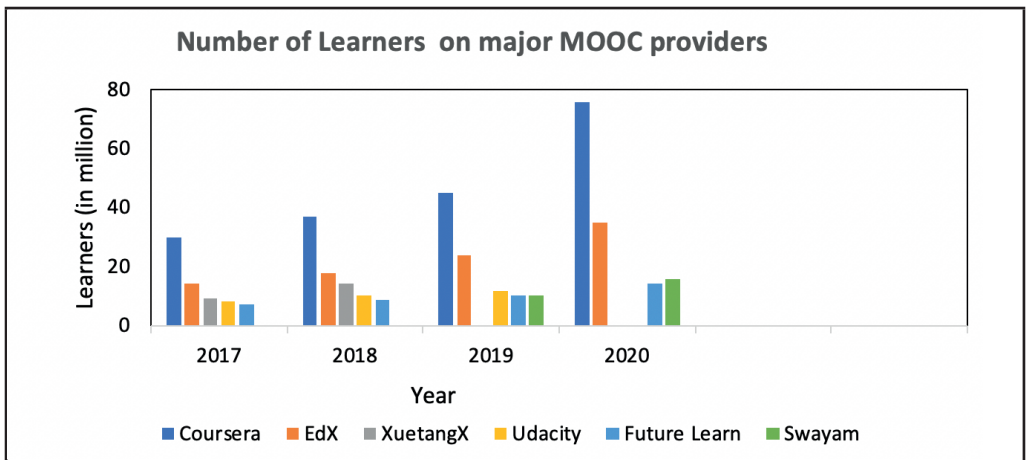
(Data source: Class Central)

The course credits obtained from a SWAYAM course can be considered by the institutions for credit transfer and UGC had already issued a framework on 20 July 2016 way before its launch. This permits credit transfer on to the academic records for courses done on SWAYAM. Earlier 20 per cent of course credits were allowed to transfer from the MOOCs offered on SWAYAM but

according to new UGC guidelines during the pandemic where online education is the only medium to provide education universities can offer 40 per cent of courses on SWAYAM. Recently UGC has decided to allow universities to teach up to 40 per cent of the syllabus of each course through online mode (other than SWAYAM courses) and the remaining 60 per cent in offline mode (UGC, 2021, D.O.No.1-9/2020). Examination for both online and offline portions can be conducted offline and this provision can be created over and above up to 40 per cent of online education permissible for SWAYAM courses for which mode of examination would be online as per the rules. The Government, therefore, is also promoting online education with up to 80 per cent portion in the online mode which indicates a great future for SWAYAM.

SWAYAM Course Content and Activities

SWAYAM, an indigenously developed portal of MHRD, can host 2,000 courses and 80,000 hours of learning at a time. It covers the courses from school education to PG level in multiple streams and different industry skill sets. SWAYAM gives liberty to its learners in choosing the courses as per their requirements, interest or profile. The interested learner can access and join courses online by registering on the SWAYAM portal at swayam.gov.in. It gives them a choice to register themselves by filling in the required details manually on the SWAYAM portal or through Facebook, Google and Microsoft. The courses available on SWAYAM are categorised into ten categories that are: AICTE- NITTT courses, ARPIT courses, Architecture and Planning, Education, Engineering and Technology, Humanities and Arts, Law Management and Commerce, Maths and sciences and School. Different filters are also available for convenience on the portal to choose the desired course for the learners. The learner can select the course either by national coordinators or course duration. They can choose the course which fits the best in their busy schedule according to the exam date. It also gives the choice of choosing a course with and without credit. The courses hosted on SWAYAM follow the four-quadrant instructional design.

i. **Teaching content:** The first is teaching content which includes teaching videos, PowerPoint presentations, animations and e-text which is self-explanatory text material covering the subject matter.

ii. **eContent:** The second is e-content which includes self-instructional material, which are available online such as e-Books, Open-source Content Videos, Case Studies, research papers & journals with related links.

iii. **Assessment**: Third is Assessment which contains weekly quizzes in the form of Multiple-choice Questions, Fill in the blanks, Matching Questions, Short Answer Questions, Long Answer Questions, Assignments and term papers.

iv. **Discussion Forum:** The fourth is a discussion forum which allows learners to interact with each other and also ask questions and their doubts are clarified by the course coordinator and their team.

SWAYAM course contents are divided into modules which are released weekly and clearly list the topics to be covered in that particular week. In order to promote the goal of the SWAYAM Project along with National coordinators who are responsible for the production and delivery of quality content, local chapters are also created. They are higher educational academic institution (College/University) that

helps in better adoption of MOOC integration into the curriculum. Local Chapters serve as a local link between SWAYAM and students/faculty in the institution. SWAYAM coordinators (or Single Point of Contact) within the institution as a representative of the local chapter are provided with sufficient features by the portal which allows them to monitor the progress of learners enrolled in the course. This enables these institutes as SWAYAM Local chapters to better facilitate MOOC adoption among learners. In addition to this, each National Coordinator uses their strategies to effectively partner with the Local Chapters for increasing the effectiveness of the course enrolments. Local chapters put up publicity posters within the college at places that students frequently visit, conduct awareness workshops on NPTEL Certification courses inside the campus to all students and faculty members, motivate students to join courses and register for exams and give feedback on the courses that were offered, provide suggestions on what they would like to see, nominate faculty as Mentors who can extend help to students, make arrangements within the college for either lab facilities for students to access the material online or download the content and let the students know about it, explore the avenues of adopting the courses for credit and implement the same through the Board of studies/Academic Councils.

Researcher's experience as a MOOC learner on SWAYAM

To understand better and get a feel of how MOOCs are actually developed and delivered on various platforms, the researcher enrolled herself on some courses on SWAYAM, Futurelearn, Coursera and CoL portals. Here the MOOC which is included to highlight the researcher's experience on a MOOC course which she completed on SWAYAM with certification in Academic Writing. It was very much relevant for research knowledge and was joined by the researcher in its first run for the session from July 2019 to October 2019. The researcher personally contacted the course coordinator through email for the related data about courses in different cycles. The researcher's observations are categorised into three groups named learner focussed, teaching focussed and MOOC focussed. A testimonial from learners which is available on the SWAYAM page also supports the researcher's experience with the course.

Table-3: Learners' testimonial

Learner focussed	Learner's characteristics	Undergraduates, postgraduates, research scholars, and academicians of beginning stage with and without prior knowledge of academic writing
	Lerner's expectations	Met to a satisfactory level could have been better if few topics would have covered in more details like the use of literature management tools and plagiarism
	Learner's engagement	Good, although the course was joined late by the researcher but, found earlier contents interesting which was enough to arouse curiosity for further learning and was able to complete the course with certification.
	Learner's satisfaction	Satisfactory
	Peer interaction	Satisfactory
	Learning outcome	More than 96% result in the final proctored exam.
	Knowledge retention and application	Yes, as a learner, researchers learned so many things about academic writing and are using them in current PhD research.
Teaching focussed	Knowledge transfer	The course design was good and the content covered weekly was clear and relevant to the topic
	Instructor's clarity	Impressive and balanced as the experience of video lectures were like face-to-face classroom
	Skills taught in terms of objective stated	Yes, to a greater extent all related topics were attempted to be included but as a beginner she found few topics were covered very briefly where more elaboration was required.
	Response on the discussion forum	The instructor's response was quick and good in terms of clarification of doubts.
	Assessment and feedback	Satisfactory as weekly progress and feedback were available on the portal. Need for more activity-based assignments for better engagement of learners on every topic.

MOOC focussed	Comparison with other MOOCs	If we compare it with other MOOCs from different platforms, still a lot can be improved for learners' support. Reminders can be sent through mails to complete weekly tasks by enabling some monitoring features with the platform.
	Technical functionalities	Improvement in this particular MOOC course was needed as it had certain technical issues in releasing the weekly module and assignments in the later part of the course, i.e., in weeks 13,14 and 15
	Completion rate	In the first three cycles for which data are available out of 28723 enrolled, 2769 registered for the exam which is 9.64% of total enrolment. It got maximum exam registration among all UG/PG SWAYAM MOOCs in the first two cycles and results were more than 96%
	Return on investment	The enrolments in all four cycles of this particular MOOC were 12532+7546+8645+6647=35370 and exam registration was 1472+723+574+ not opened. Overall got maximum exam registration among all UG/PG SWAYAM MOOCs in the first two cycles and in the third cycle ranked #2 in India. The result was more than 96% and this data about exam registration against enrolment indicates a good return on investment.

Critical review of the accessibility of MOOC courses on SWAYAM

Making education available to all is a priority of the government. SWAYAM has a great potential to make far-reaching changes in the educational processes, especially in these times of the Covid19 pandemic and can extend its reach to remote corners of the country. But, developing countries like India, with limited resources are the most affected in this tough time. The availability of limited resources and the "backwardness" of certain communities are the major reasons for this inequality. Due to a shortage of qualified faculty and sufficient funds for setting up physical infrastructure, reaching out to the learners at a mass scale is a big challenge. Although MOOCs seem to be an alternative for achieving this goal there are various practical problems associated with their implementation and delivery. The purpose of the SWAYAM project is to achieve the three main tenets of education, namely, access equity and quality. Also, we see a large disparity in the literacy rate of women and marginalised communities which would certainly affect the target of achievement of equity in education but the major problem is associated with access. Adequate technical means which are prerequisites for course delivery are the first and major hurdles in overcoming the digital gap in India. Again, the availability of proper hardware setup does not guarantee

access especially because of the absence of smooth uninterrupted internet connection in India. Forget better internet services, a large number of populations are deprived of digital resources like smartphones due to large economic disparities. About 220 million Indians are forced to sustain an expenditure level of less than Rs 32/- (the poverty line for rural India in 2013) and this figure was revealed by World economic forum, post analysing a study which was conducted in 2020. For such people, having a computer and paying internet connection bills is not a priority. In this scenario, access to computers in publicly funded schools will give a large number of school children a chance to learn computer skills, but most of these schools are not equipped with such facilities. In a survey by ASER conducted in 2018, it was found that in 596 government schools of 619 districts overall 21.3 per cent of the students had access to computers in schools. Along with the resource constraints, the digital literacy rate in India is also not very good. A large number of individuals do not know the basics of computers and thus cannot use these online materials to enhance their knowledge and skills. Again, SWAYAM courses are available online and for that, a stable internet connection is essentially important but the condition of quality of internet speed is not very good. If we look at the global scenario, India ranks second in terms of internet users but according to the October 2019 speed test global index, published by speedtest.net, India ranked 70th out of 176 countries by average fixed broadband speed and 128th out of 141 countries by average mobile speed. This was not a good indication because this could probably interfere with the anytime anywhere access concept of the MOOC learning on SWAYAM. Another prominent issue with the SWAYAM courses is its content language. Most of the MOOCs available on SWAYAM are either in English or Hindi and it is a huge hurdle for learners belonging to vernacular linguistics. One more aspect which needs to be discussed about courses on SWAYAM is related to its learner's support system. Like Coursera, SWAYAM does not have any active monitoring system which can track the actual time spent on learning by the learners. If the SWAYAM portal can adopt a feature which can track the weekly progress of the learner after the release of a new module like active days, completed items and actual learning time, it will help them to access their real progress and accordingly, they can cover up the pending tasks which need to be done for the completion of the course. Weekly reminders can be sent through emails which will motivate the learner to complete the work on time.

Conclusion

Within a period of five years, SWAYAM has been able to provide a platform for online learning which is gradually growing in terms of enrolments. These courses by expert educators can be seen as effective mediums for self-learning. Through these courses, quality education is brought to the doorstep of every learner at virtually no cost. It has the potential to change the way education is perceived. Although it is facing certain issues in terms of its acceptance at a mass scale, it can definitely be redressed to shape the future of the education sector.

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Tech-aways of pirouetting like a pirate

Miller, Matt. *Tech Like a PIRATE: Using Classroom Technology to Create an Experience and Make Learning Memorable*. San Diego, David Burgess Consulting Inc., 2020
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"Joke exchanges are carried on in deadly earnest, like a verbal duel – mouth-to-mouth combat. Bang, bang: you're (linguistically) dead." – David Crystal (*Language Play,* 1998)

Matt Miller misses out on one aspect – jokes – in his entertaining, inspired handbook-of-sorts, *Tech Like a PIRATE.* He draws on methods of emulation (of students' interests); simulation (of the fantasy worlds and games students build); collaboration, but doesn't harp on how jokes are loved by all folks and blokes and can be integrated into various emulation-simulation-collaboration models that are there. Fletcher Maynard of Chapel Hill told me once, sitting down at a café, that the best stand-up comedians are the wittiest people; therefore the most serious people; thereby the most serious and entertaining educators of the society. That may be Mr. Maynard just fletching his cerebral arrow, but he's in the narrow zone of pinpointing the matter – of boredom.

Boredom is the point of departure that Miller also takes in his book – that educators need to break free from the shackle of conventional boredom of the classroom. He takes his cue from Dave Burgess's book *Teach Like a PIRATE* (2012) and works the "Teach" to the matter of "Tech." PIRATE in both the books is an acronym for Passion, Immersion, Rapport, Ask-Analyze, Transformation and Enthusiasm. That is regular acronymization of a seed word (that India also has become so efficient at) – with a bunch of abstract nouns thrown in, each of which is rough synonyms of each other. This acronymization is an old bane, masquerading as a boon, in self-help books that have boomed since massive industrialization in the USA in the 1950s. They have spread to the world with the spread of industrial and industrious loneliness. The other usuals of self-help literature also exist in this book – changing "impossible" to "I'm possible"; transforming "I'll never do that again" to "I'll never do it that way again" (p15) et cetera.

That rider aside, Miller's attempt is at a decent compendium of technology tools that can be integrated into the classroom space in a fun way. The premise of Miller is – "don't teach, create an experience" – which any interesting and interested teacher of course understands – but a reinforcement of positive clichés can be a constructive force. Miller encourages educators to be risk-takers, to push against the limits of existing methods – which again is the hallmark of any positive systemic transformation.

The book is divided into various tech compartments. In terms of using applications (apps henceforth), Miller points out that there would be metonymic displacements – that is the platforms and the trending apps would keep changing. However, that doesn't make the book dated, for the author is hankering after recreating the experience of using an app in the classroom rather than using a particular

app. The "buzz app" could be used as a springboard; what hooks students to it is what the teacher needs to figure out, and work with the tools available to them. For example, using Google slides instead of Instagram stories; phone videos instead of Vine videos (Vine is already outdated) – in short, mimicking social media, to generate interest in students. Miller advocates tools like seesaw.me, classdojo.com, Google classroom instead of Snapchat and TikTok. Twitter's brevity could be a springboard to teach precise writing.

Miller spends a considerable amount of space exploring the space of videos – which is so pertinent in the post-pandemic scene. He mentions a 2017 study which predicted that by 2021, 82 per cent of all consumed internet content would be videos. He also mentions the psychosomatic effect of videos. This of course is a major area of concern with so much audio-visual content at fingertips – the research that is needed to evaluate the psychosomatic effect on posterity, and how to navigate this matter with responsibility. Miller advocates making videos and podcasts in classroom, and role play with roles like news anchoring, game shows etc while integrating subject content. An interesting interactive audio tool is gosynth.com, to use in the classrooms to create the podcast experience. Miller rightly points out the power of social media in terms of youngsters voicing their concerns on a global platform – be it Malala Yousafzai blogging about the Taliban's oppression in 2009; or students in Florida raising their concerns about gun laws after a mass shooting in 2017.

The section on games is interesting; it's an area that educators are struggling to co-opt from the zone of addiction to education. Jane McGonigal, who suffered a concussion, started playing games, got better; and built gaming platforms for healing people with problems similar to hers – her website is superbetter.com. Miller quotes Zomorodi who contends that games can fight depression. That of course can go the exact another way too, and would require more qualification – but the optimism is interesting, and a step forward to understand the intrinsic human nature to like games. Miller advocates "stealing like an artist" – that is picking up the features of games available on the market. This is his consistent idea, as we have seen with the matter of apps as well – that classrooms work best with innovation and copyleft rather than copyright. There are games for repetition (Kahoot, Quizlet); games that interact with data; games for problem-solving etc.

The eight sections of the book are high on both egging on and pegging – a provocation to try new methods, and then suggesting methods. It's generally Google tools that Miller expositions; but as he says – the matter is about creating an experience and innovating with whatever tools are in currency in a time and space. Overall, this is a useful compendium for classroom teachers transitioning to a tech experience, both in terms of motivation and information.

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