INDIAN JOURNAL OF EDUCATIONAL TECHNOLOGY

Central Institute of Educational Technology
National Council of Educational Research & Training

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The Group of Twenty (G20) is the premier forum for international economic cooperation. It plays an important role in shaping and strengthening global architecture and governance on all major international economic issues.

India holds the Presidency of the G20 from 1 December 2022 to 30 November 2023. The theme of India's G20 Presidency - "Vasudhaiva Kutumbakam" or "One Earth · One Family · One Future" - is drawn from the ancient Sanskrit text of the Maha Upanishad. Essentially, the theme affirms the value of all life – human, animal, plant, and microorganisms – and their interconnectedness on the planet Earth and in the wider universe.

Indian Journal of Educational Technology

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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:

Email: ijet@ciet.nic.in

Editorial Team

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Editorial

After the approval of the National Education Policy (NEP 2020) on 29th July, 2020 by the Government of India, the first of the four National Curriculum Frameworks on the Foundational Stage was released on 20th October, 2022 at New Delhi. By all account, this stage, the foundational stage is indeed foundational in the life of a child as researches reveal that learning at this stage positively impacts learnings later in life. NEP (2020) recommends five years of an integrated Early Childhood Care and Education (ECCE) for children between ages 3 – 8in the 5+3+3+4 curricular and pedagogical structure of school education. The policy envisages that by 2030 all the children will be school-ready from Grade 1 onwards. AnganvadiCentres/Pre-School/ Bal Vatikas in the country will help in achieving this important milestone. Classes 1 and 2 will form the last 2 years of the Foundational Stage. NEP 2020 recommends play-based, activity-based and inquiry-based curricula.

This NCF for Foundational Stage builds on the NEP2020. It defines aims, curricular goals, competencies and learning outcomes at this stage. It also discusses approaches for learning language and numeracy. It recommends pedagogy to be adopted in classrooms, assessment plans to be used in order to achieve learning objectives and overall strategies to be followed to link up with the preparatory stage to strengthen the learning foundations of our young learners. The document ends with a few illustrative examples and researches from the country and world on ECCE.

In so far using technology at the foundational stage is concerned, this NCF says

i. "Enabling access to a diverse range of content and materials that is contextual for the child, age-appropriate and in a range of languages and materials." So, it says that all types of eContent (packaged in traditional media such as text, images, audio, video or new media such as interactive content and immersive content) in children's own languages can be made available to them.

ii. "Enabling access to content in diverse forms, spaces, and formats to ensure equitable access and to ensure inclusion of Divyang children." All existing technologies and platforms such as radio, TV, internet, computers, tablets, etc. may be used to reach out to children.

iii. "Ensuring that the key focus of the material would be to create an enjoyable experience for the learner and feed the child's innate curiosity and agency."

iv. "Supporting the capability development of Teachers, parents and the community."

It is important to note here that at this stage, NCF recommends providing a diverse range of engaging content across different platforms to the learners. Capacity building is restricted to teachers, parents and members of the community. It shows concerns about children spending time in using digital technology and its effect on their physical and mental well-being. However, it does not shy away from suggesting controlled and moderate use of digital technology by children. Perhaps to make them aware of the technology itself. It recommends digital infotainment for children. Further, the NCF for Foundational Stage recommends embedding the textbooks developed at this stage with appropriate audio/video/immersive eContent. The NCF at this stage lays emphasis on the digital rights of children and invokes the guidelines suggested by the UN Commission on the Rights of the

Child, which states that such a digital right is "non-discriminatory", gives primacy to "children's development", serves the "best interests of the child and respect children's views."

Recently, the Annual Status of Education Report (ASER) 2022 was released by Pratham Education Foundation. It throws some interesting insights into the state of education in the country, especially about the foundational stage. There has been a substantial increase in the enrollment rates of young children (ages 3-5 years) in some sort of ECCE centres including the Anganwadi centres. The increase is even more for children of age 4 or 5. Despite pandemic-induced closures of schools, the enrollment rate for the age group (6-14) has also increased marginally. Government schools too saw a rise in the enrollment rate in this age group. An encouraging sign is a decline in the proportion of girls (age 11-14) who are not currently enrolled. The decrease in the proportion of girls not enrolled in school is even sharper among older girls in the 15-16 age group, ASER, 2022 reports. Along with these encouraging signs in enrollment, the report also flags a few serious concerns such as the drop in the basic reading ability of children (true for both boys and girls and students of both government schools and private schools) to pre-2012 levels. Children's basic arithmetic levels have also declined to pre-2018 levels.

So, efforts to increase access to educational opportunities for all sections of students have yielded positive results; it's the quality of education that remains the central concern. Can technology be of any help in overcoming this crisis, this is a moot question.

This issue consists of twenty one manuscripts: seventeen research articles, one review article, two general articles and one book review. These articles are related to concepts like, online education, Augmented Reality, happiness curriculum and online learning, use of mobile games in education, cyber safety and security and multimedia learning. I thank all the authors and reviewers for contributing in taking out this issue of the journal. I hope the manuscripts will contribute in yet another episode of academic discourse.

(ABHAY KUMAR)
Editor

ICT Enhanced Instruction in Mathematics Sprucing Up Students' Achievement

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Abstract

Mathematics is treated as one of the most important subjects but along with it, it has the most dreadful effect on students. Students view Mathematics as complex, dull, boring, and stereotyped. The National Policy on Education 1986 alluded that "Mathematics should be visualized as the vehicle to train a child, to think, reason, analyze and to articulate logically. There is a shift in treating mathematics education as an instrument for National development as well as the development of a child's abilities." For attaining this objective, ICT is phenomenal. The research shows that ICT makes the learning environment vigorous and more captivating by engaging all the senses. The effectiveness of ICT-enhanced instruction can be perceived as a vigorous educational process for encouraging learners to think critically and creatively, analyze the acquired knowledge or skill, have insight into it, associate it with gained experience and apply it first-hand. After the initial reforms of ICT got well underway in other domains of education, it became quite evident for the researcher to see the impact of ICT on her subject and in her area. This research investigates the impact of ICT-enabled programmes created on Geometry content and comes out with a significant sprucing up of student's achievement.

Keywords: ICT Instruction, Mathematics Achievement, Effective Learning, Geometry Skills & Students

"Like the crest of a peacock, like a gem on the head of a snake, so is mathematics at the head of all knowledge." Vedanga Jyotisa (c. 500 B.C.) For promoting Maths in contemporary learners, ICT is proving itself by escalating student's achievement via manifold tools, equipment and applications by connecting them to symbolic mathematical concepts with dynamic visual representations.

Introduction

In the present era, Mathematics is taught as one of the important subjects in Indian schools, colleges, and universities. But, the majority of students feel that Mathematics is a complex, dull, boring, and stereotyped subject that leads to a lack of interest in mathematics. The paramount effort of every teacher is invariably to improve their student's ability and to equip them for the time ahead. The National Policy on Education 1986 alluded that "Mathematics should be visualized as the vehicle to train a child, to think, reason, analyze and to articulate logically. There is a shift in treating mathematics education as an instrument for the National development for the development of child's abilities." Capabilities are enhanced when qualitative instructions are used for teaching along with ICT. Students get benefitted from qualitative instructions by getting engaged in class with interest and gaining mastery of the content through it, which will help in measuring

student achievement in recommended time intervals. ICT has gained traction as an instructional strategy which helps in gaining qualitative instruction supporting student learning (Bloxham, 2005; Stuart, Mills & Remus, 2009) and enhancing student achievement (Kellar, Mackay, Zhang, Watters, Kaufman, & Borwein, 2003; Sosin, Blecha, Agawal, Bartlett, & Daniel, 2004; Coates & Humphreys, 2004).

The Pandemic has induced appalling agony in the whole world. The coronavirus outbreak has posed serious challenges and calls for evolution to resume and persist. Our immediate challenge is to educate children where they are, within the infrastructure and setting they are in. ICT has sprung up as a most prodigious tool for educating in tandem with the internet. It has overcome all sorts of setbacks of distantly learning. In this pandemic era, all schools are taking their classes online. It has come up with various online teaching learning tools and strategies that are able to enhance interaction, foster engagement, and provide immediate feedback. In this way, ICT resources provide many ways for ICT-based learning in all subjects and mathematics as well. It has paved the way for learning at its own pace and self-exploration. It succeeded in empowering students and teachers for making significant contributions in this pandemic era.

Miscellaneous researches elucidate the effectiveness of ICT integration as the practical aspect to enhance quality and bring forth productive results. It enables the teaching-learning process to strengthen its quality, improves access to content and resources, fosters learning, provides immediate feedback, supports a number of teaching strategies, promotes student engagement, boosts up skills and elevates the effectiveness of teaching-learning. Levin (2005) proclaimed ICT has transformed the ways of living, working and communicating. Forthcoming generations are supposed to have global awareness and understanding of multiculturalism. This generation has switched from being passive recipients to active participants in the information transfer model of learning. This revamps of curious learners has led to a reinforcement of bolsters in mathematics which is going to consolidate new skills of conceptions, reasoning and operations in mathematics. In this way, curriculum and methods of teaching also transposed from a behaviourist approach employing role play and tactics and strategies to an interactive problem-solving approach in a particular framework.

It is provided to be a more effective tool for students, teachers, and administrators in the school. ICT is used in different subjects like science, maths, and social science in various forms. It is an effective medium of teaching and learning. A Teacher uses technological devices such as power-point presentations, video, YouTube lectures, animation, audio, Graphing, and Geometrical tools to encourage interaction with students to share their knowledge and skills.

Review of Literature

A thorough review of the research showed that ICT is widely used at all levels of education in this pandemic scenario. Many studies found that the availability of ICT resources and their use had positive effects on students' achievement. Ishaq (2020), José et.al. (2020), Bora Ashim et al. (2018), Mondal et.al (2012), Bature, B.(2016), Zakaria, N.A. & Khalid(2016), was conducted to see the effectiveness of ICT in mathematics learning. These researches were based on learning mathematics, Geogebra, Powerpoint, online–Lecture, Multimedia packages,

and computer-based instruction. The amalgamation of ICT in mathematics fabricated an emphatic environment among secondary school students in their learning. The findings of the above research depicted that the relationships between different types of ICT resources used with Mathematics achievement had shown a positive impact. Besides, self-confidence was developed among the students in conducting ICT-related activities. ICT with a focus on enhancing essential skills accomplish the teaching learning effectively by fostering student engagement. It has an optimistic consequence on engagement, autonomy, high-order thinking, motivation, mathematical concepts, results and grades. Henceforth, ICT is considered an efficient tool for its pursuit of mathematics achievement. The conclusion drawn from the review helped the investigation properly in the design of the study

Rationale of the Study

Over the past decade, technology has struggled in various ways to quantify its progress in education towards technology standards. In this information era, students must be able to voluntarily access information from a reservoir of resources, analyze, evaluate, work collaboratively, think enormously and constructively, integrate and reflect on the learning process. ICT has become such an influential tool that it has provided new roles for teachers and students during this pandemic. It succeeded in giving new directions in teaching mathematics and enhancing the understanding of students towards basic concepts. With the help of ICT, teachers are able to improve their skills and find enormous ways of presenting the content. Mastery of mathematical content, pedagogy with technology integration in tandem with knowledge about research outcomes culminates in teachers' tenacity to plump on the usage

of new technology in their classroom for enhancing their technology-integrated performance. Another possible explanation is that different analysis methods of ICT had been used in different mathematical concept research. Also, ICT has developed rapidly, the different tools and software for students learning. After the review of the literature, very few researches related to the usage of ICT were found by the investigator in the geometrical concept of mathematics. This area of research needs to be explained more. Hence, the current investigation aimed to see the effect of ICT on the geometrical concept of mathematics.

Objectives of the Study

1. To find out the impact of ICT-based teaching on the student's achievement in mathematics.

2. To compare the experimental group and control group based on achievement in mathematics (Post-test scores only).

Hypothesis of the Study

1. There exists no significant impact of ICT-based teaching on the student's achievement in mathematics.

2. There exists no significant difference of ICT-based teaching and traditional teaching on the student's achievement in mathematics

Methodology

A Quasi-Experimental design was adopted for the existing study. It is an attempt to see the effect of ICT-enabled programmes on the students' mathematics achievements related to the Geometry content of mathematics. The experimental group was taught through an ICT-enabled programme and the control group was taught through the traditional method.

Sample

The existent study was piloted on a sample of 80 students studying in Kanya Gurukul Senior Secondary School in Khanpur Kalan District Sonepat, Haryana. Out of 80 students, one group was formed as a control group, and the other group was formed as an experimental group.

Tool used: Various Tools chosen and used by the investigators are given below:

- Mathematics Achievement Test by Dr. Reena Rani &Dr. Anisha (2018)

- ICT-enabled Programme Developed by Investigators.

Description of the ICT-Enabled Programme

The ICT programme was based on nine units of Geometry for the class IX NCERT Mathematics textbook. For this Experimental Work, software was developed on MS PowerPoint by using text, pictures, animation, sound and bright colours for imitation and using the most commonly used software. Computer CD-ROM technology" as a medium for ICT used teaching technology. The CD-ROM, entitled, "Mathematics Geometry," was developed as a PowerPoint Programme, comprising the storyboard including text, instructional design and possible graphics, audio and video. To minimize the overload of children, concise information is used. PowerPoint features such as slides, background colour, text selection, fonts with appropriate size, graphics and proper animation were used to finalize the package, covering the total content in 40 lecture demonstrations. The slides can switch back and forth with a mouse click or such arrow keys on the keyboard and the developed package was enhanced in compact disc (CD). The Surface Areas and Volume of different solids like cubes, cuboids etc. can be shown in animated form with their day-to-day examples. Thus the animated diagrams with different pleasant colour combinations and full of extra allied information were made available to the students.

Execution of the Experiment & Data Collection

Execution of the experiment and data collection for the present research took forty days. Before the commencement of the experiment, the pre-test was administered to know the prerequisite knowledge of the ninth-grade students in geometry. In the next step, the experiment group was taught through the power point programme and the control group was taught through conventional methods. The teaching was conducted by the investigator herself. After the completion of the experiment, the post-test was administered to both groups and data was collected.

Results & Discussion

The finding of the research indicates that students who had learned Geometry content by using ICT-enabled programmes were significantly better in their Mathematics achievement as compared to students who underwent traditional learning.

Table-1: Findings of Use of ICT-enabled Programmes between students

Sr. No.	Class Interval	Mathematics Achievement Scores of Control Group		Mathematics Achievement Scores of Experimental Group	
		Frequency	Cumulative Frequency	Frequency	Cumulative Frequency
1.	0-5	2	2	0	0
2.	6-10	4	6	0	0
3.	11-15	17	23	1	1
4.	16-20	13	36	2	3
5.	21-25	4	40	6	9
6.	25-30	0	0	17	26
7.	31-35	0	0	12	38
8.	36-40	0	0	2	40

On the basis of scores, it is inferred that the Experimental teaching method proved useful. The findings showed that information and communication technology as a supplement to classroom instruction is more effective than traditional instruction.

Figure-1: Mathematics Achievement Score of Control Group
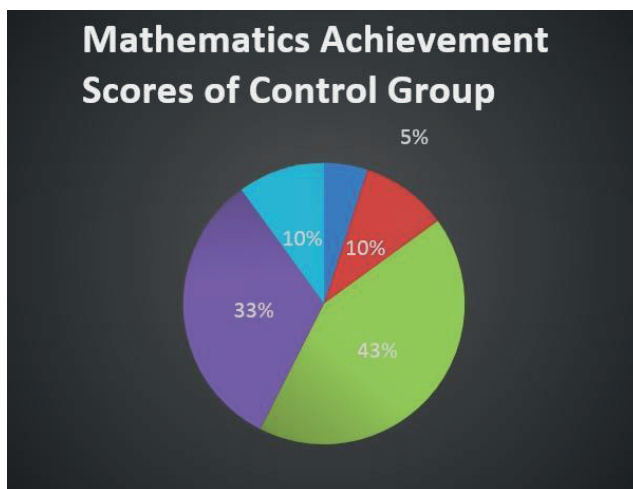
The pie chart on Mathematics scores of the control group shows that 43 percent of scores lie in 11-15 class interval, 33 percent scores lie in 16-20 class interval, 5 percent score lie in 0-5 class interval and 10 percent score lies in two class intervals 6-10 and 21-25, respectively. This pie-chart shows that the maximum distribution of score lies in the interval 11 to 15.

Figure-2: Mathematics Achievement Score of Experimental Group
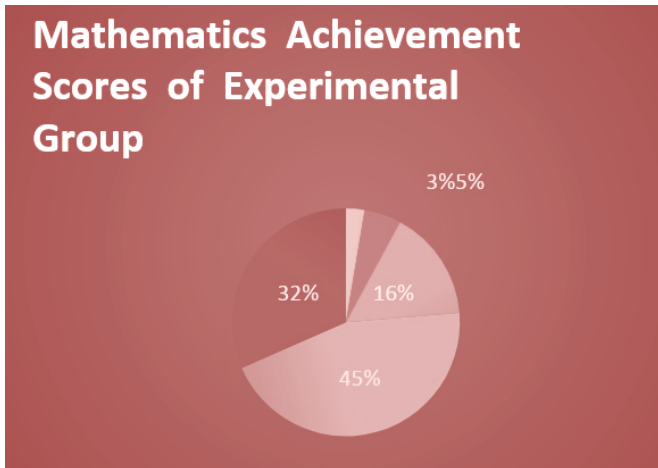
The pie chart on Mathematics scores of Experimental groups shows that 0 per cent scores lie in 0-5 and 6-10 class intervals, 3 per cent scores lie in 11-15 class interval, 5 percent scores lie in 16-20 class interval, 16 percent scores lie in 21-25, 45 percent scores lie in 25-30 class interval and 31 percent scores lie 35-40 class interval. This pie-chart shows that the maximum distribution of scores lies in the interval 25 to 30. This shows the huge effectiveness of the PowerPoint programme on experimental groups.

Table-2: Significance of Differences Between Mean, Standard Deviation and T-Value of Post- Mathematics Achievement Scores of Experimental Group and Control group

Groups	N	Mean	Std. Deviation	t-value
Control MATS	40	15.05	4.987	12.71
Experimental MATS	40	28.60	5.163	

Students of the experimental group showed a marvellous improvement in the post-test scores after the treatment. The calculated t- value was 12.71 which is more than the table value at 0.01 level of significance. It exhibits a significant difference between the mean post-test scores of the experimental and control groups. Findings of the study depicted that post-test mean scores are higher in the experimental group. Results indicated that the experimental group achieved higher mean gain scores (28.6) than the control group (15.05) in the post-test stage. Thus, the subjects exposed to ICT gained higher scores in comparison to that in traditional methods. In other words, ICT is found to be more effective in increasing the achievement expectation of IX class students. It means ICT lays positive impacts on a student's achievement. Researchers found that teaching with visuals strengthens students' cognitive skills. ICT encourages pupils' creativity and scientific thinking. It happens as a result of a deeper comprehension of the subject matter or the ability to complete more exercises in place of manually answering arithmetic problems. That suggests in some sense how learning performs differently under novel settings. Students recognized ICT as a tool for learning as well as one that can make a lesson more interesting. Students generally approve of it and

find it to be more useful. Additionally, it lessens individual variances and makes all students capable of succeeding. These results support other earlier findings with different populations and different subject areas.

This result is also supported by the views of Fuchs and Wosesman, 2004; Gunbas, 2015; Kanive, Nelson, Burns, &Ysseldyke, 2014; McLaren, Adams, Mayer, & Forlizzi, 2017 who reported a positive relationship between ICT use and mathematics achievement based on analysis of data. The study concluded that ICT had a positive impact on students' learning, critical thinking, and mathematics achievement. According to the various research, it is a dynamic approach and should be adopted for different types of students in schools. Whitaker, 2007 found that teaching math via online technology with video helps to improve students' academic performance. The adoption of technology facilitates new reforms in mathematics, which focuses on mathematical processes by offering quick and accurate computations as well as dynamic visuals as found in geometry and graphs. It makes the learning process enjoyable which improves students' performance apart from being fruitful by increasing the student's retention of information and methods. It helps in sparring more time for students and teachers to pursue the mathematical practices and operations in the classroom leading to fostering and imparting an immense understanding of mathematical concepts and enhancing capabilities and creativity to deal with more advanced mathematical content than in 'traditional' teaching environments.

Conclusion

Achievement is a behavioural change that occurs due to multifarious learning experiences. Analysis and interpretation of the results discussed above have revealed that ICT-enabled programmes prepared by the researcher show an immense impact on better learning of Mathematics. The Mathematics achievement of students can be increased by using these types of programmes. Students were motivated and interestingly participated in ICT-enabled programmes. Mathematics students were active during experiment work due to the uniqueness of the programme. The learning material of the Programme was more interesting, creative, valid, and effective rather than the traditional method of teaching. It included animation, text, graph, audio, figure, and video. It brought a new kind of experience for the students. It was expected that the outcomes can aid the students, teachers, school administrators, Government etc. and can act as a guide in the implications of the ICT enabled Programme in the different schools. The main goal of education can only be achieved by paying serious attention and addressing challenges related to ICT appropriately.

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Understanding Student Engagement and Online Learning Post Covid-19 Using Multiple Perspectives

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Abstract

Corona pandemic besides claiming countless fatalities has affected the overall structure of social institutions at large. The suspension of offline learning and implementation of remote learning in the times of Covid-19 appeared to be the biggest challenge it posed to the education sector in particular and to the nation in general. Specifically talking about the state of Jammu and Kashmir, it has been witnessing the repeated and frequent closure of educational institutions for the last three years but the shift to online mode was completely a new thing as it was for other states of the country. The crisis which emerged with an abrogation of the Article 370 (special status granted to Jammu & Kashmir) in the year 2019, left educational institutions shut for six months and it was only in February 2020 the schools were reopened. Unfortunately due to the outbreak of Covid-19, they were again closed in March of the same year and remained shut again for almost eight months. It was only in March 2021, they were reopened but, due to the surging covid-19 cases, were closed back in April of the same year. This repeated school closure and the recurring shift to online mode during the times of covid-19 disturbed the whole teaching-learning process. In such a chaotic environment of teaching and learning, we are interested to know and understand the student engagement of 1st and 2nd grade students (aged 6-8). Also to know the challenges or opportunities their parents and teachers experienced during the whole school closure period. Parent and teacher perspective was specifically used to realise these objectives. Semi-structured interviews were used to collect the data. Later, thematic analysis was used to generate the themes.

Key words: Student engagement, covid-19, virtual learning, primary students, parent perspective, teacher perspective.

Background

Coronavirus, originally reported from Wuhan city in China in late 2019, spread widely and quickly around the world, leading to the closure of educational institutions. This abrupt closure of educational institutions as a protective measure against the corona infection and the shifting of education from in-class learning to remote learning posed significant challenges to students, parents and teachers. Because the shift was not gradual, it happened overnight to resist the severity of the Corona infection (Dhawan, 2020). Early studies reveal clear challenges for students in general, and for educationally disadvantaged students in particular in terms of learning continuity and school engagement (Devitt et al. 2020; Green 2020). Previous research provides a good insight that school closure increases the chances of inequality of opportunities for those who belong to educationally backward families (Calarco, 2020). Initially, much of the discussion focused on the 'digital divide,' which suggests that low student engagement for some students is caused by lack of access to devices and

the internet (Devitt et al. 2020; Darmody, Smyth, and Russell 2020). Students who had access to internet-enabled classes were found to have higher levels of engagement. Additionally, exposure to a wider variety of academic and socio-emotional learning opportunities is associated with higher levels of engagement. Additionally, students were more inclined to participate online if their families maintained social ties with the families of other students. (Domina et al, 2021). The dissimilarity in the implementation and quality of off-campus education increases the possibility of undesired consequences of remote learning for the development of youth (Morgan, 2015; Sorensen 2012). Physical absence from school environments, besides posing learning challenges, would have consequences for the physical and mental well-being of children (American Academy of Pediatrics, 2020).

This paper examines student engagement in primary students post Covid- 19, using the teacher and parent perspective. Moreover, it attempts to know the online learning problems or opportunities perceived by teachers, parents and students. Since the population is 1st and 2nd grade students, the qualitative approach was found most appropriate. Therefore, a qualitative research design was adopted to get a deeper understanding of their engagement and response to online classes.

Contextual Background

The participants in the current study are all the residents of the village Padgampora, Tehsil Awantipora, located 14 km East of District headquarters Pulwama and 25 km from UT summer capital Srinagar, Jammu & Kashmir, India. To make contextual background clear the researcher wants to make mention of timing and circumstances together. The data collection process for this study actually started in the month of September. At that time, private schools located in towns of the district were closed. However, the government primary schools and private schools in the locality had actually resumed providing community classes to these children in school under strict adherence to Covid-19 SOP.

Research Objectives

- Understanding student engagement post Covid-19 from the perspective of parents and teachers.

- Understanding the challenges or opportunities of online learning perceived by the parents and teachers.

Student Engagement

Student engagement, a multidimensional construct with behavioural, affective and cognitive components (Fredricks et al., 2004) refers to the active participation, interest and psychological investment of the student in the learning goals. The behavioural dimension may include student's attendance, completion of school activities, active participation in classes, and participation in extracurricular activities (Wang, Willett and Eccles, 2011), emotional engagement involves feelings, interests, and attitudes toward learning and school (Skinner & Belmont, 1993) and the cognitive component involves the quality of cognitive processes and learning approaches used by students on school assignments and homework (Walker, Greene & Mansell, 2006).

It is hard to get positive learning outcomes without positive engagement or involvement of students in their learning. The existing student engagement literature has demonstrated a positive relationship between student engagement & quality learning outcomes & learning

achievement (Carini, Kuh & Klein 2006; Coates 2005). It is associated with improved learning, performance, retention, persistence, experience, and achievement (Appleton et al., 2006; Carini, Kuh & Klein 2006; Fredricks, Blumenfeld, & Paris, 2004).

Online Education

Education received through the internet without stepping out of home is referred to as online education. It involves the use of the internet in the teaching-learning process which allows flexibility of time. Online learning is more student-centred, advanced, and flexible to use (Singh & Thurman, 2019). It happens either through synchronous or asynchronous settings. Synchronous learning is where students engage in active learning. There is real-time interaction between teachers and students, and instant feedback is possible. On the other hand in asynchronous learning, learning content is not directly associated with the type of instruction. It is available in a wide range of learning systems and forums and instant feedback and direct response are not possible (Littlefield, 2018).

Methodological Framework

Sampling is a critical component of qualitative research design (Mason, 2002). A sample selection criteria, i.e., inclusion or exclusion of participants, must be specified for the study in order to demarcate a sample universe (Luborsky & Rubinstein, 1995; Patton, 1990). The sample participants consisted of 70 parents, 20 primary-level students and 10 primary school teachers working in different government and private schools of the respective district and were recruited using a purposive sampling technique. The rationale behind using a purposive sampling strategy was to ensure the inclusion of the participants in the sample the researcher believed had

a unique and different perspective on the phenomenon under study (Mason, 2002; Trost, 1986). Participant observation of children and the interview of parents and teachers were used for data generation. Data was collected in the form of recording by conducting a face-to-face semi-structured interview (interview with 5-7 topics about which the respondent is urged to speak (Wilkinson et al., 2004) to parents and teachers. Parents were asked how engaged the children are with their learning activities at present and what kind of difference they feel in their engagement during this period where no offline education is provided. The parents were also asked to tell the challenges they themselves and their children face in the online education system. Also to what extent do online modes engage students with learning goals? Interviews with teachers began with similar questions followed by the ideas/points they were revealing to the researcher at the moment.

Participant observation of children happened simultaneously during this period as the researcher was already giving tuition to these children at home. But during the analysis process, the researcher de-familiarised her to only reflect upon the perspective of teachers and parents but this observation definitely helped to get insight into what the parents and teachers were revealing. Since the data was collected in the form of recording, Thematic Analysis Technique was found most appropriate to be used with this data set. Therefore Braun & Clarke's (2006) six-phase framework was used to do the analysis of collected data pertaining to the current study.

During the sample selection process, the researcher ensured the research ethics are followed properly. Therefore, proper consent was sought from all the participants before commencing the

interview process. Since the content sought from them was not sensitive, they freely explained what they had gone through and how engaged they saw their children with studies. Moreover, they acknowledged the study objectives.

Analysis

Analysis constitutes the major part of any research study. In qualitative research, it refers to the process of systematically searching and arranging the data (interview transcripts, observation notes, or other non-textual materials) that the researcher accumulates to increase the understanding of the phenomenon. The data for the current study, using face-to-face semi-structured interviews, was collected in the form of recording, therefore, Thematic Analysis Technique was found most appropriate to be used with this data set. It is the process of identifying patterns or themes within qualitative data (Braun & Clarke 2006) and then use these themes to address the research or say something about the issue.

Braun & Clarke's (2006) six-phase framework was used for doing a thematic analysis of the collected data pertaining to the current study. The steps involve: Becoming familiar with the data, Generating initial codes, Searching for themes, Reviewing themes, Defining themes and Write-up. It is essential to mention here that this thematic analysis is a recursive process; the movement is back and forth as required throughout the phases. Since, the data was collected in the form of recording, it was essential to listen to the audio recording of the interview several times before transcribing the same. The familiarity was gained by listening to the audio recording and transcribing the recordings which helped in producing initial codes, separating chunks of text and labelling them as belonging to specific categories. Similarly, these

categories were reviewed and later sorted into potential themes. In this way six major themes emerged as follows:

Online education: an opportunity

Online education, introduced with a constructive approach to prevent disengagement and ensure engagement (ensure online classes are covering the syllabus) during Covid-19 crisis, although, creating chaos initially, helped in engaging back children with learning activities. It made classes possible during the times of pandemic for a large number of students. The deteriorating condition of the education sector faced before and after the immediate suspension of offline teaching-learning process as a result of the Corona pandemic outbreak has been improved to some extent with the commencement of online mode. One-third of parents appreciated the initiative saying that it prevented learning loss, made classes accessible during the Covid-19 crisis and helped children get an education without getting infected by the Corona infection. Because the time it was introduced everything was paralyzed and no moment was seen anywhere in the world. In such a chaotic situation it seemed the desired initiative, serving the purpose of educating students during the Covid-19 crisis. Waqar Ahmad, a parent while talking to him said "With the suspension of offline schooling, student engagement started to decrease at a speedy pace. Since covid-19 put everyone's life at risk so health was the first priority and nobody was paying attention towards education of children which added to the deteriorating condition of student engagement initially. But with the commencement of online classes it started improving. In such a situation it seemed the desired initiative, serving the purpose of educating students during covid-19 crisis. Also teachers working in private schools appreciated

this immediate move. A teacher namely Mubashir Wani said "Shift to online mode during the Covid-19 crisis was the only option to prevent learning loss one could think of. If it would not have been done the situation would be worse, it at least prevented complete disengagement". This means that it has somehow helped the students to remain in touch with their studies. Comparing the situation education has faced in the valley during the crisis in 2019, virtual mode at least did not let children completely disengage from studies.

Online education: an alternative not a substitute

Although online mode helps in engaging children back with studies, it is not free from limitations. The prolonged school closure and repetitive shifting to online mode disturbed the whole process. The way children learn and get engaged with learning in offline mode can never be expected in an online teaching-learning environment. No matter how much effort a teacher puts in to make the connection strong and make sure the material/content is learned by children, children only do what they want to. He fails to ensure their maximum participation and positive involvement which results in partial student engagement. Sameer Ahmad, a primary school teacher said, "Student engagement has definitely dropped due to the prevalent circumstances as we see a partial interest among children towards learning. He further added, it is hard to ensure their complete positive participation in an online class (because of physical distance) that directly affects their performance and hence can never replace physical school". It can only be an option during an emergency and can never be a substitute. Almost one-half of parents had the same opinion. They believe online learning has affected the health and mental well-

being of their children (psychological pressure, boredom). Giving the reason that prolonged school closure and continuous exposure to the online world is distracting them from the right track.

Learning problems & Student Engagement

Online learning is completely based on virtual interaction, one needs to be mature enough to make the right use of it. Considering the immaturity and flexible nature of primary-level children it could not make a satisfactory contribution. The reasons may involve their flexible nature, physical distance, inappropriate teaching strategy, less concerned parents and many more. "In online education, an appropriate teaching strategy is difficult to adopt. Primary children learn more by play way method, they are group lovers, they like to learn along with the group rather learning individually, which is not possible to provide in an online class" revealed a primary school teacher, she further added They need help from elders, in case they are not available, or parents are uneducated, engagement and results are unsatisfactory". In addition to this, in an online learning environment usually, one-way traffic is working, children are supposed to listen to the lecture which is completely a theoretical part. In such a situation, they lose motivation and interest which further makes the intended outcome hard to achieve and eventually results in the failure of the intended purpose of the class. Mostly the students from uneducated and poor households were seen to be facing severe consequences because they lack family guidance. "We are afraid that our children will refuse to enter schools again. Their involvement is terribly low; they have forgotten what they had learned earlier in school. The corona pandemic has caused great damage to children's education

interests. Online classes are of no use in our case neither do we have those devices nor do we have knowledge of how to handle them and run an online class. We are unable to support them anyway" said Sabzar Ah. a parent. Thus, online classes fail to serve the purpose in their case.

Online learning: a challenge

The sudden transition to online learning created chaos and disturbance among the people as nobody had thought of such a drastic change before. To embrace this change was really a challenging task for a large number of people. It posed challenges in terms of demanding knowledge about ICT and running technological devices for uneducated parents, children and some teachers as well. "Initially it was so challenging because the shifting to virtual mode was so sudden. We faced challenges in terms of low or weak student response. As we are talking about primary children who are difficult to handle even in offline classes. To ensure their presence in the online class during the initial phase was very much challenging. However, with consistent efforts they started to learn the process. They became familiar and started showing the signs of engagement. But at the same time, they learned things they were not supposed to learn such as playing online games and accessing YouTube" Said a primary school teacher. Teachers got a weak response from students which has been causing difficulty to ensure positive student engagement in an online class. Indiscipline and improper conduct from students in online class was the biggest challenge teachers faced in the initial phase. As of now, the situation is not that critical but the teachers are still not able to ensure maximum student participation and are completely unable to ensure students do their home assignments honestly and on time.

Besides this, making the devices available to children in poor households was the biggest challenge. The uneducated parents, especially those working in fields all day to make the two ends meet failed to assist their kids in any way due to poverty, illiteracy and unawareness-of how to run an online class. Monitoring the activities of children while using the phone appeared another challenge for parents because the process is all internet-connected, chances are inappropriate or sensitive or irrelevant content is accessed that can put parents in trouble. In addition to this, making them join the class and sustain attention was another big responsibility. "The biggest challenge during the whole period was to motivate children to take online classes and ensure they are joining the class on time and ensure their involvement. Since online education runs through an internet connection, most of the time it was snapped for days, posing challenges to bring children back to learning after a break" said Shabir Ahmad, a parent.

Parent negligence vs. low engagement

Some uneducated parents (who have either never gone to school or have studied up to 5th class) completely deny the significance of education in general and online mode in particular. While interviewing them it was felt they do not value education due to their narrow perception about it. Their perception that education lacks a utility factor, especially provided in government schools, is not job oriented and indirectly affects their children's engagement and performance. Because no attempt is being made to make classes accessible to children. While interviewing one parent of such a category regarding the online mode this is what he said "We do not understand this online education system. This is not going to help our kids. What are they going to get in such classes where they actually get

the opportunity to play with the device rather than use it for learning purposes" said Bashir Ahmad, a parent. Therefore no attempt is being made to make online classes accessible to children by the parents which eventually results in their disengagement.

Boredom vs. entertainment

Besides learning about teacher and parent experiences, some students were also asked about the current teaching-learning environment. Although their description is generally considered less important, the researcher believes they possess a transparent nature and say only what they feel, therefore their view was also given space. The children presented a feeling of boredom to the researcher and wished for the resumption of a face-to-face teaching-learning environment. In contrast, government school children are enjoying being at home.

"I really feel bad not because education is provided online but because face-to-face interaction is missing. In school we were happily learning every lesson and were progressing together along with other classmates, the teacher used to teach us different teaching strategies like activity and demonstration methods. It was really wonderful. Online teaching-learning is boring and we do not enjoy the process. We want to go to school to get the same learning environment" Toiba Jan, class 2nd, a private school student.

"I am happy being outside the school and I do not want to go to school now. I play with my friend all day at home and nobody is there to restrict us but in school, we are kept in the class for hours and are taught the lessons" Zeeshan, class 2nd a government school student.

It can be established from the above-presented description that firstly this online education could not reach the total student population. Secondly, it caused (prolonged school closure and online mode together) boredom among children who have access to it.

Digital addiction

Digital addiction was the most serious concern revealed by both parents and teachers. Since the learning happens either through smartphone or computer, it makes children learn to operate the devices themselves. Being all day free at home, they feel boredom and to get over this feeling the children try to find enjoyment in accessing online material and playing video games online. This is a clear indication that phone addiction among children may prove adverse in consequent stages of their future as it is causing distraction, also exposing them to things which are inappropriate for their tender age.

Results and discussion

A study is a useless endeavor if it has no practical value or contribution. It is necessary to enquire if the findings are helpful in expanding theoretical knowledge or knowledge of the pertinent issue under consideration. (Yardley, 2000; Silverman, 1993). The present study has a multitude of insights. The first and foremost finding clearly showed a significant negative relationship between the prevailing situation, (created by the corona pandemic) and student engagement. No doubt the data in the present investigation clearly highlighted that virtual learning prevented the complete disengagement of children to these classes but still a significant drop can be seen in the engagement of primary students. The causes are many as discussed in the previous section. The children from government schools especially from poor households and uneducated families could not take any advantage of virtual platforms which apparently increases the risk of their

complete disengagement. They are the vulnerable group to the severe negative effects of school closures and online mode. The majority of children studying in government schools completely were left unattended during the entire online learning period.

The challenges it posed to parents, teachers and students are significant. All three groups felt difficulty in adapting to abrupt changes brought about by the corona pandemic, particularly by the online mode of education. A higher level of adaptability is significantly related to increased positive student engagement (Martin et al., 2013). The challenges faced by the teachers were essentially in terms of weak response most appropriately weak participation and lack of discipline in the online class. Similarly, parents face problems in terms of motivating children to take online classes and making them do their work without delay. Besides this difficulty, uneducated parents faced different other serious challenges due to the lack of academic proficiency or ICT skills. Since, distance learning completely relies on the use of technology, especially the use of the internet, social media, smartphones, and laptops confused the illiterate or less knowledgeable parents which they revealed was a great challenge.

The success of online education mode is determined by a lot of factors. Unlike access to the Internet and devices, the difference in the skill of teachers and lack of ICT skills, less concerned parents, unfavourable family environment, flexible nature of children, poverty, were identified as the stumbling blocks to the success of remote learning initiatives in this particular village.

Parental support plays a significant role in children's good or bad performance. Help from elders or adults is necessary not only for positive academic outcomes but for overall development. The teachers identified the lack of parent support, parent guidance and lack of interest as key barriers to student engagement. Student engagement can be enhanced by a mutual teacher-parent endeavour. The teaching in online learning needs to be supportive in terms of assisting children in attending classes and doing assignments. Also, a good teacher student relationship can do a great help in ensuring engagement of children in online class. Student engagement in virtual learning is likely to increase when the connection between teacher and student is meaningful. Also, the use of innovative teaching-learning strategies by the teacher and encouraging the development of student key skills enhances engagement (Bray, A. et al, 2021).

Given the substantial amount of evidence, covid-19 pandemic has had a significant negative impact on education. It can be established that student engagement throughout the school closure period could not rise to a satisfactory level. There might be other implicit underlying contextual factors behind i.e., the period of school closure before the Covid-19 pandemic outbreak, which resulted from the abrogation of Articles 370 and 35a. Thus, the loss of interest or partial engagement that is visible is somehow related to the past crisis. However, online education during the Corona crisis ensured engagement at least partially and has comparatively contributed to re-engaging children with studies. At the time it was implemented, as mentioned in the previous section everything seemed paralysed, no movement of people was seen anywhere in the world. In such a stagnant environment, it was thought the only option to avoid any serious damage to education. At this point of time, the issue was not whether online teaching and learning methods can provide high-quality education, but rather how academic institutions can

provide solutions by embracing online learning on a large scale (Carey, 2020).

Though online education served the purpose of making education accessible to students during the covid-19 crisis and prevented complete disengagement, it is not free from flaws as discussed earlier. Perets, E. A et al, (2020) stated, the immediate transition to virtual learning influenced student engagement negatively. Online teaching less engaged students after this transition happened. However, course activities helped first-year undergraduate students retain their engagement. Since online mode demands expertise in ICT skills-operating devices such as laptops, smartphones, computers and accessing the internet created a lot of disturbance, the biggest reason seemed unpreparedness of teachers and parents to embrace the change. The move posed challenges not only to students but to teachers also. Most teachers who have never taken relevant training or taught online are less likely to provide effective online education (Chiu, 2017; Ingvarson et al., 2005).

The findings of the present paper that overall student engagement declined during the closure of educational institutions are consistent with the research of Doyle, 2020. The current investigation highlighted the role of parental support in children's education as a must. This finding is consistent with previous research that higher parental involvement predicts higher engagement (Smyth, 2017, Bray et al, 2021).

However, research is an ongoing process that starts and ends with a problem which is actually what makes it interesting. The present investigation has been carried out with a relatively small number of participants and is delimited to one single village which may reduce the transferability of the findings. Therefore, future research

can be conducted with a larger group. It has worked purely with a qualitative approach which if used along with a quantitative approach can increase the generalization of results. Also, more in-depth studies using participant observations, case study and triangulation is suggested for future research.

Conclusion

Given the evidence, online education during Covid Pandemic played a complex role in the engagement of children with learning. This role can be classified into main three categories i.e., challenge, opportunity and negligence or deprivation. Online education in its initial stage despite causing chaos proved beneficial as mentioned earlier in terms of engaging children back with learning, encouraged engagement that was completely dropped in a short span after the corona outbreak and school closure happened and also protected children from contracting the deadly virus. So the immediate shift was appreciated by both the parents and teachers. Secondly, the paper provided insight into the experiences of the journey during the entire school closure period of both teachers and parents and children. Thirdly, the paper widened our vision about how underprivileged groups who could not even access it due to one or the other reason got into a vulnerable state to experience the ineffectiveness of online education. Particularly the 1st and 2nd Grade students from poor households and children enrolled in Government schools did not get any online classes for the whole period.

Another serious limitation revealed by the participants was digital addiction. It was asserted that children who had access to these classes got affected in another way. Initially lacking the knowledge of running the device connected to the internet was a big

challenge for children but now the same is considered the best source of entertainment, it is now like a game for children to operate the devices and access different sites online. This thing distracted them from the actual purpose. The result is partial student engagement.

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Effect of Augmented Reality-Based Science Content on Learning Achievement among Secondary Level Students

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Abstract

Today teachers are dealing with generation alpha, the most technology-supplied generation ever. Generation Alpha is a cohort born entirely in the 21st century and therefore a confident group of digital natives. This means for dealing with them teachers must be prepared for learning how to adopt new technologies and blend them into teaching as these students prefer digital resources and the gamification of education. Using digital resources play an important role in dissolving the boundaries of classrooms and providing an opportunity for students to have experiential learning and promoting problem-solving. In the present paper ePathshala AR (Augmented Reality) Mobile Application has been used to teach AR-based science content to students of class ninth of Dholpur District, Rajasthan to study its effectiveness upon achievement in science. This mobile application is an initiative of NCERT under the aegis of the Ministry of Education, with the caption making Education Experimental. The method employed for the study was experimental with two groups of randomised matched subject pre-test and post-test design. The study was done on 74 ninth-grade students. Results of the study indicated that students in the experimental group not only showed their interest in learning with this application but also a significant effect has been found in their achievement in science as compared to the control group. Considering these findings, the investigator supports the use of ePathshala AR mobile application for a better understanding of scientific concepts among students.

Keywords: Augmented Reality, generation Alpha, learning achievement, ePathshala AR Application, Mobile Application

Introduction

Learning by doing is considered one of the best methods of knowledge construction and gaining insights into abstract concepts in science. When students read science textbooks they encounter several two-dimensional figures and illustrations of different scientific concepts, processes etc. which require imagination to visualize the concept, as some complex concepts require the third dimension to gain a better understanding. Technological advancements in recent years have modified and broadened learning and teaching methods.

Augmented Reality (AR) technology digitally enhances the content of the book by superimposing three-dimensional simulated models over existing figures of the textbook and making it interactive which naturally catches the attention and interest of learners. With this technology students not just read or memorise content in a book but also interact and learn concepts by directly experimenting. The present study used NCERT's ePathshala AR mobile application to teach AR-based science content to ninth-grade students.

Generation Alpha students have a

natural inclination towards digital gadgets and technology-embedded learning models (Prensky, 2001) so, with them using AR based textbooks is an additional advantage for holding their interest and attention in class. In the present study the investigator attempts to use an experiential, student-centric and interactive approach to teaching science via ePathshala AR (Augmented Reality) Mobile Application. This mobile application has selective AR content for class ninth and tenth only. Class ninth has been selected by randomly drawing a lottery for the present study. From class ninth science textbook content from five chapters has been incorporated in this mobile application, out of which three chapters one each from biology, physics and chemistry have been included in the study. Since this ePathshala app uses AR technology with an English medium science textbook of class ninth, so present study was delimited to ninth class students of English medium schools of Dholpur District. During teaching the concept the students of the experimental group were demonstrated how to use AR application via mobile over different figures provided in the textbook that showed the data linked to these figures from the AR database uploaded on the application and enabled them to gain better visualisation and digital experience of the concept. This study intended to determine how science content designed with AR-based applications affected students' learning achievement before and after treatment.

Review of Literature

A number of studies have revealed that AR-based applications affected teaching learning in various disciplines ranging from mathematics which require abstract visualization of concepts, promoting reading and comprehension skills and to science courses including several simulated activities and experiments (Munoz et al, 2015; Chao and Chang, 2018; Abas & Zaman, 2011; Billinghurst & Dunser, 2012, Chen & Wang, 2015). AR technology is more effective as compared to traditional book-based learning (Sin et al, 2010). Lindgren et al (2011) in their study found that AR-based content when compared with computer-based teaching also showed positive results towards the effectiveness of AR technology in education. Chang et al (2011) concluded that the learning process holds more attention for students after using AR technology. Chiang et al (2014) supported the use of AR based mobile learning systems for science content with students in grade fourth in Taiwan. When employed with primary-level students AR-based applications have been found to increase the academic achievement of learners (Contero & Lopez, 2013; Petrov & Atanasova,2020). Muhammad et al (2021) investigated the effectiveness of AR-based learning materials for primary school children in terms of learning performance, motivation, attitude and behaviour towards different methods of learning, the findings favoured AR-based learning techniques enhanced students' learning motivation and performance compared to the non-AR learning methods. Khan et al, 2019 analyzed the impact of an AR Application on the learning motivation of undergraduate health science students and established that using an AR mobile application increased the learning motivation of students.

AR based applications also establish a positive attitude towards learning (Karagozlu et al, 2019; Sahin and Yilmaz, 2020). Cetin & Turkan (2021) investigated the effect of AR-based applications on achievement and attitude towards science courses in distance education and found a significant increase in both. Eldokhny & Drwish (2021) tried to study the effectiveness of AR in

Online Distance Learning at the time of Covid-19 Pandemic and reported that AR was more effective in promoting academic achievement as well as skill acquisition in virtual classrooms as compared to virtual classrooms that did not use AR in online distance learning.

Objectives of Study

The present study purports to fulfill the following objectives –

- To study the effect of AR-based science content on the learning achievement of ninth-class students.

- To study the effect of AR-based science content on different cognitive areas of learning achievement of ninth-class students.

Hypothesis of Study

The following null hypotheses have been stated

- There is no significant difference between the mean scores of science learning achievement of students of control and experimental groups.

- There is no significant difference between the mean scores of different cognitive areas of science learning achievement of students of control and experimental groups.

Material and Methods

The present study employed an experimental method with two groups of randomized matched subjects, pretest–posttest design to test the effect of the AR-based science content using AR ePathshala app on the science learning achievement of students. Pre-test was administered to both control and experimental groups to find out the homogeneity between the groups. The experimental group was exposed to treatment with AR-based science content via AR ePathshala mobile app while the control group was treated with a traditional book-based method of teaching. Post-test was applied to determine the effectiveness of the treatment. Experimental design patterns followed in the study and variables included in the study have been depicted in table 1 and 2.

Table-1: Experimental design of the Study

Randomly Assigned Groups after Matching	Pre-Test	Independent Variable	Post Test
Experimental	Self-Made Achievement Test of Science	Teaching AR-based science content via AR ePathshala mobile app	Self-Made Achievement Test of Science
Control	Self-Made Achievement Test of Science	Teaching through traditional method	Self-Made Achievement Test of Science

Table-2: Variables of the study

Independent Variable	Dependent Variable	Intervening Variable	
		Controlled	**Moderate**
Exposure to AR-based Science Content	*Traditional Teaching*	• *Grade* • *Age* • *Intelligence* • *Socio-economic status* • *Duration of Instruction* • *Teacher* • *Content*	*Gender*

Data Gathering Tools

The following standardized tools have been used in study:

- Socio-Economic Status Scale (RL Bhardwaj, 2006): This scale envisages to determine nine types of statuses namely social status (ascribed), social status (achieved), social status (as a whole) consisting 7 items (areas) like family, social, education, professional, property, monthly income and caste perspective. The reliability of the test has been calculated by the test and re-rests method. The scale was administered on a sample of 200 students and was re-administered on the same sample. The correlation between the two scores was calculated by the Spearman Brown formula and was found to be 0.76.

- Culture Fair Test of Intelligence (Scale 2, Form A) prepared by RN Singh and SD Kapoor (1999) (Indian Adaptation of Cattell's Culture Fair Intelligence Test): This is a nonverbal test of intelligence where the subject has to perceive relationships in shapes and figures. It has four sub-tests, consisting of incomplete progressive series, classification, matrices and conditions. The reliability of the test is 0.76, calculated using the split-half method. The validity is calculated by calculating direct correlations with other tests of general intelligence and is found to be 0.81.

- Self-Made Achievement Test of Science: For measuring learning achievement in Science a self-made achievement Test in Science has been used. The test has been prepared by the investigator in line with the opinions of subject experts. The final test consisted of 40 items after preliminary tryouts and item analysis. The blueprint of the test is given in table 3.

Table-3: Blue Print of Self-Made Achievement in Science

Objectives	Knowledge		Understanding				Application						Total	
Type of Question	Objective		Short Ans	Objective			Short Answer			Objective			Marks	Questions
Content	E	A	A	E	A	D	E	A	D	E	A	D	Marks	Questions
Building Blocks of Living Organism									2(1)			1(1)	3	2
Prokaryotic cell											1(1)	1(1)	2	2
Animal cell and its organelles										1(1)	1(3)	1(1)	5	5
Plant Cell and its organelles					1(1)					2(1)		1(1)	4	3
Colloidal Sol^n & Tyndall Effect				1(1)			2(1)						3	2
Separation of Components of Mixture	1(1)				1(2)				2(1)				5	4
Evaporation, Sublimation				2(1)									2	1
Distillation, Chromatography					2(1)			2(1)					4	2
Separation of Components of Air	1(1)		2(1)									2(1)	5	3
Water Works water purification system				1(1)									1	1
Production & Propagation of sound	1(1)												1	1
Sound needs a medium to travel	1(1)								2(1)				3	2
Sound waves are longitudinal				1(1)	1(1)								2	2
Characteristics of sound wave				1(2)	1(1)								3	3
Reflection of sound						1(1)							1	1
Applications of Ultrasound	1(2)	1(1)			1(1)								4	4
Sonar	1(2)												2	2
TOTAL (MARKS)	1(8)	1(1)	2(1)	1(5) 2(1)	1(6) 2(1)	1(1)	2(1)	2(1)	2(3)	2(1) 1(1)	1(4)	1(4) 2(1)	50	40
TOTAL QUESTIONS	9		1	14			5			11				

E = Easy Item (difficulty index 0.61 to 0.75) A = Average Item (Difficulty Index 0.4 to 0.60) D = Difficult Item (Difficulty Index 0.25 to 0.39)

- Reliability and Validity of Test: Split-half reliability of test is calculated, which was found to be 0.712 showing fairly good reliability of the test. The face and content validity of the test was assured while preparing the test. Adequate weightage is given to content, learning objectives and difficulty level (Table 4). The opinion of subject experts was taken into consideration while preparing the test and necessary modifications were made accordingly.

Table-4: Weightage given to different areas in Self-made test of Science Achievement

S.N.	AREA OF WEIGHTAGE		Total Number of Items	Percentage
1	CONTENT	Biology (The fundamental Unit of Life)	12	30.0
		Chemistry (Is matter around us pure?)	13	32.5
		Physics (Sound)	15	37.5
2	COGNITIVE AREA	Knowledge	09	22.2
		Understanding	15	37.5
		Application	16	40.0
3	DIFFICULTY LEVEL	Easy	17	42.5
		Average	14	35.0
		Difficult	09	22.5

Data Collection

A total of 74 students from the CBSE board-affiliated English medium school of Dholpur district of Rajasthan constituted the sample of the present study. Table 5 provides details of the sample. For conducting the experiment prior permissions were sought from the school authorities. Firstly, students were randomly assigned to an experimental and control group after matching for intelligence and socio-economic status. According to the time schedule, a two-month programme was given to the experimental and control group. 32 students were assigned in both experimental and control groups. In the experimental group 21 boys and 11 girls were there while the number of girls and boys in the control group was 20 and 12, respectively. Investigator has provided training and necessary guidance to subject teachers to use AR ePathshala mobile application to teach different AR-based science concepts involved in the study. The teacher demonstrated the experimental group about application usage by presenting demos on a projector screen. Students were motivated to practice the science content with this application. The control group performed learning by conventional book-based method, with the guidance of the same teacher. Prior to and after the experiment the Self-made Test of Achievement was administered and the data was collected for further investigations.

Table-5: Sample of the study

Name of School	Students in Experiment Group		Students in Control Group	
	Boys	Girls	Boys	Girls
AVM Convent School	21	11	20	12
	32		32	
Total	74			

Analysis and Interpretation of Data

To test the significance of the stated hypothesis the mean, standard deviation, t-value and significance were calculated (Table 6). From the table, it can be noticed that the calculated t-value of 7.75 is higher than the tabular value of 2.66 (p<0.01) at 72 degrees of freedom. This rejected the null hypothesis of no difference between the learning achievement of the control and experimental group. Thus, we can say that the experimental group performed better in the posttest of achievement test of science after being exposed to AR-based science content.

Table-6: Details of t-test conducted for science achievement in different groups

S.N.	Mean Scores of Groups Compared	N	Mean difference	Df	SD	t value
1	Pretest Control	37	2.01	72	3.12	1.06
	Pretest Experimental	37			2.96	
2	Pretest Experimental	37	13.38	72	2.96	7.11**
	Posttest Experimental	37			3.33	
3	Posttest Control	37	14.57	72	2.79	7.75**
	Posttest Experimental	37			3.33	
4	Pretest Control	37	0.81	72	3.12	0.43
	Posttest Control	37			2.79	

*** Values significant at 0.01 level of significance*

Table 7 provides the analyses for the effect of AR-based science content on different cognitive areas of learning. The t values for knowledge t (72) = 4.14, p<0.01), understanding t (72) = 3,5, p<0.01) and application t (72) = 3.79, p<0.01) areas of learning is found to be significant when the mean scores for control and experimental group was compared. It can be concluded that learning with AR-based science content affected knowledge, understanding and application areas of the cognitive domain of learning.

Table-7: t Values for different cognitive areas of learning for the experimental and control group

Cognitive Area of Learning	Group	N	Mean	SD	SE$_D$	t Value
KNOWLEDGE	Control	37	4.28	2.06	0.871	4.14**
	Experiment	37	7.89	1.75		
UNDERSTANDING	Control	37	8.03	1.45	1.40	3.5**
	Experiment	37	12.93	3.12		
APPLICATION	Control	37	5.62	2.97	2.30	3.79**
	Experiment	37	14.34	3.24		

Conclusion and Discussion

Literature studies revealed that the scope of exploring the effectiveness of mobile AR on students' learning is very vast as the area is insufficiently worked out (Lin et al., 2013 and Ibanez et al., 2014). This study tried to investigate whether AR-based science content has an effect on learning achievement in science of secondary-level students. For studying this science content via AR ePathshala has been presented to experimental group students. From the analyses of data gathered it has been found that AR-based science content affected students' scores positively in science achievement in knowledge, understanding and application areas of the cognitive domain of learning. The results of the study are consistent with previous studies which also found that AR-based instructional approach proved effective in concretizing the abstract concepts of science. (Walczak et al., 2006; Sayed et al., 2011; Özdemir, 2017; Tulgar, 2019) besides affecting achievement the instructions based on the AR approach also kept high motivation levels among students (Singhal et al., 2012; Chiang et al., 2014; Huang & Liaw, 2014; Ibanez et al., 2014; Torregrosa et al., 2015; Solak & Çakır, 2016; Khan et al., 2019). The effectiveness of AR ePathshala in this study can be attributed to the reason that the students involved in the study were digital natives when they were exposed to treatment with AR-based science content via the mobile application, they showed interest in knowing the concept and the interactivity allowed by this type of content motivated students to concretize the concept by interacting with it. AR-based content provides a high sense of reality to the content so this technology helps in concretizing the concept (Ozdemir, 2017).

In this study, students of the experimental group got the opportunity to see an interactive three-dimensional model of different content which held their interest and prepared them ready to learn. This study strongly supports using AR ePathshala app for teaching different content to students. This concept of augmented reality and its usage in education is still not very popular so there is a need to popularize these types of mobile applications that can be easily used by pre-service and in-service teachers to teach abstract concepts to the alpha generation.

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Perception and Attitude of Matriculation School Teachers towards Online Classes

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Abstract

The COVID-19 pandemic situation upended the education sector with the closing of schools, colleges, and universities everywhere in India. Considering the alternative of no school closure, the virtual classroom has been an important tool to sustain educational objectives. The researcher analyzed challenges and perceptions of matriculation school teachers (those who are taking classes between IX standard to XII standard) towards online teaching in the Virudhunagar district by adopting a simple random sampling method. The important challenge associated with online teaching is boredom and monotony induced by increased exposure to the screen as well as the modus operandi of sitting at one particular place for prolonged hours and it also leads to some health problems. This article highlights the challenges, problems, and attitudes of matriculation school teachers towards online classes.

Keywords: Online Class, Perception, Attitude, COVID-19, Technology

Introduction

Education in any society does not depend so much on anyone else as on the teacher. The importance and the key position of the teacher in an educational system are recognized by everyone. The teacher is the most important factor for improvement in school education. Today teachers are greatly responsible for the student's future. Therefore the teacher should be physically and mentally strong so that they can achieve their objectives successfully. The Covid-19 pandemic situation upended the education sector with the closing of schools, colleges, and universities everywhere in India. Approximately, 1.72 billion learners worldwide and around 32 crore students in India have been affected due to the closure of educational institutions during the Covid-19 lockdown. It results in high socio-economic costs for education stakeholders. The uncertainty caused by the pandemic seems to discourage not only the parents but also the educators as well from being hopeful that the quality of the education process will be guaranteed. From March 2020 onwards students cannot physically attend classes but have to attend classes virtually. It leads to new types of problems for all the stakeholders, whichever faced before during the traditional classes. In this situation,

the teacher's role is more challenging and requires more involvement. The success of online education always depends on the teacher. Therefore the teacher should take extra effort for the successful implementation of virtual classes.

Statement of the Problem

The sudden epidemic of a deadly disease namely Covid-19 shook the entire world. This situation vastly affected and challenged education institutions across the world and compels educators to shift to a virtual mode of teaching. Many academic institutions that were earlier reluctant to change their traditional pedagogical approach had no option but to shift entirely to virtual teaching-learning. There was an overnight shift of normal classrooms into e-classrooms, that is, educators have shifted their entire pedagogical approach to tackle new market conditions and adapt to the changing situations. Now teachers are teaching students with the help of internet access by sitting at their home place. But it is not an easy one. It requires more preparation and innovative ways of teaching to attract the students as well as actively engage the class than the traditional classes. So there is a need to analyze the perceptions and challenges faced by teachers during online classes.

Scope of the Study

The teacher is the most important factor for improvement in school education. The quality of education always depends on the teachers and their quality. During the coronavirus pandemic situation, almost all higher education were forced to pivot their instructions online to allow teaching and learning to continue. Virudhunagar district is one of the famous districts as well as an industrial centre in Tamilnadu state. In the Virudhunagar district, many parents give more importance to their children's education. So they admit their children to matriculation school. They also expect quality education during the COVID-19 lockdown with innovative presentations. Considering the alternative of no school closure, the virtual classroom has been an important tool to sustain educational objectives. In online teaching, teachers need serious preparation to use online tools and platforms. But most of the teachers are not all ready for the new situation, which further opens the issues with our overall education. So there is a vast scope for the researcher to analyze challenges and perceptions of matriculation school teachers (those who are taking classes between IX standard to XII standard) towards online teaching in Virudhunagar district.

Review of Literature

Mohamed Hassan (2020) highlighted that the sudden changes to online classes lead to many challenges for the stakeholders of educational institutions. The main challenge is that some countries suffer infrastructure problems like internet availability and speed. Similarly, teaching members do not have updated study material suitable for online teaching and the problem relating to online examination and its reliability.

Shivangi Dhawan (2020) narrated that natural disasters can stimulate our motivation for the adoption of highly innovative communication technology and e-learning tools. To make e-learning effective in such difficult times, we need to focus on the use of technology more efficiently, that is, the usage of that technology that has minimum procurement and maintenance costs but can effectively facilitate educational processes.

Shabnam Gurung (2021) pinpointed that, some teachers conducting online classes is itself a great challenge because they are habitual of conducting

classroom teaching for many years. The most important challenge faced by teachers in online teaching is to reach/teach students of remote areas because there is the unavailability of strong internet access Even after facing all the challenges in online teaching teachers are motivated to learn the new technology and make the best possible use of all resources for effective teaching.

Objectives of the Study

The main objectives of this study are:

1. To understand the demographic profile of the respondents

2. To analyze the problems faced by the respondents during online teaching.

3. To identify the expectation of teachers in online teaching.

4. To analyze the health-related problems faced by the teacher due to online teaching.

5. To give suggestions for implementing online classes efficiently and effectively.

Methodology

To fulfil the objectives of the study, the researcher has collected both primary and secondary data. Primary data has been collected from the respondents through a pre-tested interview schedule. The interview schedule (designed in Google Forms) has been modified in light of the experience gained through the pre-testing. Secondary data has been collected from various studies, books, magazines, journals, the internet, newspapers, etc to supplement the present study.

The sampling design was formulated by the researcher to collect the data from the matriculation school teachers. The researcher selected 30 reputed matriculation schools in the Virudhunagar district by adopting a simple random sampling method. After that, 10 teachers from each school were selected by adopting the lottery method.

Analysis and Interpretation

Demographic Profile

Demographic factors lead to differences in attitudes and beliefs (Cianni & Romberger 1995, Mor Barak, Cherin & Berkman 1998) among the respondents. Demographics include such factors as gender, age, salary levels, and marital status. The researcher normally includes those factors which are assumed to have explanatory value in the research. The demographic profiles of the respondents are portrayed in the following table 1.

Table-1: Demographic Profile

Demographic Factors	Number of Respondents	Percentage
Gender wise Classification		
Male	123	41.00
Female	177	59.00
Marital Status		
Married	184	61.33
Unmarried	116	38.67

Experience		
Less than 5 Years	58	19.33
5 to 10 Years	93	31.00
10 to 15 Years	84	28.00
More than 15 Years	65	21.67
Monthly Income		
Less than Rs.15,000	108	36.00
Rs.15,000 to 20,000	84	28.00
Rs.20,000 to 25,000	67	22.33
More than Rs.25,000	41	13.67

Source: Primary Data

Table 1 reveals that out of 300 respondents interviewed, 59 per cent of them are female, 61.33 per cent of the informants are married, 31 per cent of the teachers possess 5 to 10 years of experience and only 13.67 per cent of the teachers are earning more than Rs.25,000 per month.

Reasons for Choosing the Teaching Profession

Choosing a carrier is one of the important decisions in one's life. The teaching profession is always an interesting, challenging, and service-oriented profession. The reasons for selecting teaching differ from one person to another person. The interviewer gathered the information about the reasons for choosing the teaching profession and displayed it in table 2.

Table-2: Reasons for Choosing Teaching Profession

S. No	Reasons	Number of Respondents	Percentage
1	Passion	52	17.33
2	Like Teaching Profession	94	31.33
3	Social Respect & Honorable work	58	19.33
4	Chances for Continuous Learning	29	9.67
5	Limited Work than other jobs	36	12.00
6	More Holidays and limited working time	31	10.34
	Total	125	100.00

Source: Primary Data

It is lucid fact from the above table 2 that, 17.33 per cent of the respondents selected the teaching profession because they feel teaching profession as passion, 31.33 per cent of the respondents are like teaching profession than any other so they choose this profession, 19.33 per cent of the informants are attracted by the social respects, 9.67 per cent of the informants given importance to the chance for continuous learning, 12.00 per cent of the respondents consider the working hours and the remaining 10.34 per cent of the respondents are attracted by the leave facilities.

Professional Problems

A teacher is a kingpin in the entire system of education. Almost all cultures of the civilized world have considered their teachers in very high esteem. The success of the education and students' future always depends upon the quality of the teacher. The teacher discharges their duties effectively only when they feel safe, having adequate freedom, and for career development. So the interviewer collected the information about the professional problems faced by the teacher and these details are set out in table 3.

Table-3: Professional Problems

S.No	Professional Problems	Number of Respondents	Percentage
1	Lack of Job Security	73	24.33
2	Low Salaries	69	23.00
3	Little Opportunity for Career Development	36	12.00
4	Inadequate Annual Increment	64	21.33
5	Job Mobility	36	12.00
6	Lack of Incentives	22	7.34
	Total	300	100

Source: Primary Data

It is inferred from the above table 3 that, out of 300 respondents, 24.33 per cent of them have confronted with the problem of lack of job securities, 23 per cent of them are not satisfied with their salary level, 12 per cent of them have cited the problem of lack of career development, 21.33 per cent of them are facing the problem of the incremental policy of the management, 12 per cent of the informants pointed out the problem of lack of job mobility in the teaching profession and the remaining 7.34 per cent of them have indicated the problems in lack of attractive incentives schemes.

Online Teaching Profile

The covid-19 pandemic situation affected the working system of the Indian education sector. The classroom teaching techniques were changed. Now the teachers are taking classes in virtual mode. The researcher gathered the basic information relating to online teaching techniques and presented it in the following table.

Table-4: Online Teaching Profile

Online Teaching Profile	Number of Respondents	Percentage
Platform Used		
Google Meet	83	27.67
Zoom	97	32.33
Cisco Webex Meet	61	20.33
Whatsapp	26	8.67
Google Classroom	24	8.00
Others	9	3.00
Teaching Tools Used		
Whiteboard	101	33.67
Powerpoint and other Microsoft Products	134	44.67
Pre-recorded videos	39	13.00
YouTube and other videos	22	7.33
Others	4	1.33
Number of Hours per Day		
Less than 3 hours	8	2.67
3 Hours	98	32.67
4 Hours	164	54.66
More than 4 Hours	30	10.00
Place		
At Home	64	21.33
At School	236	78.67

Source: Primary Data

It is obvious from the above table 4 that, out of 300 respondents 32.33 per cent of the respondents are using the Zoom app and 27.67 per cent of the teachers are taking online classes through the Google meet platform.

Out of 300 teachers, the majority of the respondents (44.67 per cent) are using PowerPoint and other Microsoft products for their presentations while taking online classes and one-third of the respondents are using whiteboard at the time of taking online classes.

Out of 300 informants, 54.66 per cent of the teachers are teaching 4 hours per day, and more than three-fourths of teachers were taking online classes at their school.

Occupational Problems Relating to Online Classes

The primary role and responsibility of a teacher are multitasked in the present-day school system. Due to the coronavirus pandemic, educational institutes were compelled to pivot their instruction online to allow teaching and

learning to continue. Online teaching poses a different set of challenges for teachers. To ascertain the problems faced by the teacher, a study was made and the responses are analyzed by adopting the Ranking method and its results have been given in table 5.

Table-5: Occupational Problem

S. No.	Work-Related Problems	I	II	III	IV	V	VI	VII	VIII	IX	X	Total
1	Lack of Classroom Atmospheres	35	34	36	34	31	31	27	25	24	23	300
2	Lack of Network and Power Problem	25	34	32	43	46	33	31	24	17	15	300
3	Inability to focus on Screen	49	47	41	36	32	26	22	18	15	14	300
4	Unable to Monitor Students Behavior	46	42	44	41	34	27	21	19	16	10	300
5	Not familiar with Online Teaching Applications	47	42	41	39	41	34	26	15	9	6	300
6	Not possible to Interact with Students	41	45	49	41	36	31	23	12	12	10	300
7	Unwanted Interruption by Students	21	23	14	21	32	42	41	39	33	34	300
8	Homework and Attendance Verification	21	15	17	16	19	36	42	47	51	36	300
9	Difficult in preparing Presentations	12	13	18	19	16	28	36	44	52	62	300
10	Distributions from the Family Members	3	5	8	10	13	12	31	57	71	90	300
	Total	300	300	300	300	300	300	300	300	300	300	

Source: Primary Data

The orders of merit given by the respondents were converted into ranks by using the following formula.

Percentage position= [100 (Rij-0.5)/Nij]

The percentage position of each rank thus obtained is converted into scores by referring to the table given by Henry Garret Ranking Technique. Then for each factor, the scores of individual

respondents are added together and divided by the total number of respondents for whom the scores were added and presented in table 6.

Table-6: Weighted Average Points

S.No.	Problems	Garrett mean Score	Weighted Average Points	Rank
1	Lack of Classroom Atmospheres	15783	52.61	6
2	Lack of Network and Power Problem	15886	52.95	5
3	Inability to focus on Screen	17183	57.28	3
4	Unable to Monitor Students Behavior	17171	57.24	4
5	Not familiar with Online Teaching Applications	17428	58.09	1
6	Not possible to Interact with Students	17287	57.62	2
7	Unwanted Interruption by Students	13879	46.26	7
8	Homework and Attendance Verification	13168	43.89	8
9	Difficult in preparing Presentations	12122	40.41	9
10	Distributions from the Family Members	10093	33.64	10

Source: Primary Data

The above-ranking analysis pointed out that the shift to online learning is not an easy one. It requires restructuring course components using new pedagogical approaches, learning activities, and tech tools. It was new to many teachers. So many teachers are facing many problems to deliver their lectures through online mode in an attractive manner and it got the first rank. Interaction among the students is one of the most important elements for a successful education, but it is more difficult in online education and it has scored as 2nd rank.

Positive Attitude towards Online Teaching

The rise of the CoronaVirus lockdown has compelled education systems worldwide to find alternatives to the traditional classroom environment. Considering the alternative to traditional face-to-face classrooms, virtual schooling becomes an important technique to sustain skills development during school closures. This is not only new to the students but also to the staff members. The online teaching method increases the tech knowledge among the teachers. The study about the positive attitudes of teachers towards the online teacher and the result is presented in table 7.

Table-7: Positive Perception Towards online teaching

S. No.	Factors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total Points
1	Increase ICT Knowledge	153 (765)	116 (464)	28 (84)	3 (6)	0 (0)	1319
2	Learn the innovative teaching tools	108 (540)	95 (380)	83 (249)	12 (24)	2 (2)	1195
3	Access new study material	46 (230)	60 (240)	74 (222)	61 (122)	59 (59)	873
4	Improve professional competency	51 (255)	64 (256)	81 (243)	76 (152)	28 (28)	934
5	Develop creative thinking	21 (105)	36 (144)	48 (144)	103 (206)	92 (92)	691
6	Feel comfort in taking a class at home	16 (80)	22 (88)	35 (105)	98 (196)	129 (129)	598

Source: Primary Data

It is obvious from table 1.6 that teachers strongly feel that the compulsion of online classes increases their tech knowledge, followed by that they understand and use the innovative teaching aids in their teaching paradigm. More overdue to online class the professional competency of the teachers is also increased.

HYPOTHESIS: 1

Ho: There is no significant association between the experience and positive attitude of the respondents towards online teaching.

H1: There is a significant association between the experience and positive attitude of the respondents towards online teaching.

To test the above Hypothesis, the researcher used the Chi-Square Test. The result has been displayed in table 8.

Table-8: Experience and attitude towards online teaching

Factors	Chi-Square Value	Significant	Accept/ Reject Ho
Increase ICT Knowledge	21.582	.042	Rejected
Learn the innovative teaching tools	21.570	.043	Rejected
Access new study material	31.833	.001	Rejected
Improve professional competency	6.542	.886	Accepted

Develop creative thinking	30.130	.000	Rejected
Feel comfort in taking a class at home	20.708	.014	Rejected

Source: Computed Data

Among the above six factors of positive attitude of respondents towards online education except "Improve professional competency", for the remaining factors P-value is less than 0.05. Therefore, the null hypothesis is rejected at a 5% level of significance. So, the researcher concludes that there is a significant association between the experience and positive attitude of the respondents towards online teaching.

Staff Expectation

In the past, a large proportion of online courses were simple transfers of classroom materials and methods into an online environment. However, it is not possible for regular school education, especially matriculation school. Online education should be learner-centric. To fulfill the goals of online education the education institution must fulfill the staff's expectations. The researcher gathered information about the teachers' expectations to carry out online teaching effectively and efficiently. This piece of information is presented in Table 9.

Table-9: Professional Problems

S.No	Professional Problems	Number of Respondents	Percentage
1	ICT enabled Training Programme	69	23.00
2	Support from the parents	47	15.67
3	Developing adequate and updated technology in Schools	96	32.00
4	Assistance from colleagues and office staff	53	17.67
5	Reducing Workload	35	11.67
	Total	300	100

Source: Primary Data

The study reveals that, among 300 respondents, 23.00 percent of the teachers expect ICT enabled training programme to increase their tech knowledge, followed by 15.67 percent of the respondents expects proper cooperation from the parents, 32.00 percent of the informants required adequate and updated technologies in their school to carryout online teaching in an effective manner, 17.67 percent of the respondents are pointed out that, the proper support and necessary assistance from their colleagues and office staff help them to take the classes effectively and the remaining 11.67 percent of the informants expected that the workload should be reduced.

HYPOTHESIS: 2

Ho: There is no significant difference between the teaching experience and their expectations.

H1: There is a significant difference between the teaching experience and their expectations.

To test the above Hypothesis, the researcher used the Kruskal Wallis Test. The result has been displayed in table 10.

Table-10: Experience and their expectations

Age	Size	Mean Rank	Chi-Square Value	Significant	Accept/ Reject Ho
Less than 5 Years	58	78.53			
5 to 10 Years	93	69.39	12.017	.017	Rejected
10 to 15 Years	84	69.88			
More than 15 Years	65	74.50			

Source: Computed Data

Since the P-value is less than 0.05, the null hypothesis is rejected at a 5% level of significance. Hence, the researcher concludes that there is a significant difference between the teaching experience and their expectations

Health Problems due to Online Classes

Matriculation school teachers are engaging themselves to take online classes atleast 3 hours a day. During this time, they must sit in front of the system or mobile and continuously monitor the screen. It affects the health of the teachers. So, the researcher collected information about the health problems faced by the respondents. These details are set out in table 11.

Table-11: Health Problems

Health Problems	Some Time		Mild		Always		Sever		Very Severe		Mean
	N	%	N	%	N	%	N	%	N	%	
Eyesight	43	14.3	48	16.0	65	21.7	80	26.7	64	21.3	3.25
Headache	60	20.0	63	21.0	65	21.7	55	18.3	57	19.0	2.96
Backbone	78	26.0	55	18.3	101	33.7	49	16.3	17	5.7	2.58
Body pain	114	38.0	69	23.0	53	17.7	29	9.7	35	11.7	2.34
Sleeping problem	92	30.7	113	37.7	55	18.3	31	10.3	9	3.0	2.17

Source: Primary Data

During online teaching, the teacher must observe the screen to take online classes and monitor the students. Continuous screening affects the eye power of the teachers. Out of 300 respondents, 14.3 per cent of the respondents are affected by eyesight problem sometimes, another 16.0 per cent of the respondents mildly has an eyesight problem, 21.7 per cent of the respondents are always having eyesight problem, 26.7 per cent of the

respondents are severely affected by eyesight problem and the remaining 21.3 per cent of the respondents are very severely affected by eyesight problem.

Among 300 respondents, 20 per cent of the respondents are sometimes facing headache problem, 21.0 per cent of the respondents are mildly affected by the headache problem, 21.7 per cent of the respondents are always having headache problems, 18.3 per cent of the respondents are severely affected by headache problems and the remaining 19.0 per cent of the respondents are very severely affected by the headache problems.

Because of backbone problems, 26 per cent of the respondents are affected by the backbone problem sometime only, 18.3 per cent of the respondents are mildly having backbone problems followed by 33.7 per cent of the respondents are always having backbone problems 16.3 per cent of the respondents are severely affected by the backbone problem and the remaining 5.7 per cent of the respondents are very severely affected by backbone problem.

Out of 300 respondents, 11.7 per cent of the respondents are very severely affected by body pain and only 3 per cent of the respondents are very severely affected by sleeping problems.

To recap the health problems, "EyeSight" problems were given the highest importance with a mean score of 3.25.

HYPOTHESIS: 3

Ho: There is no significant association between age and health-related issues due to online teaching.

H1: There is a significant association between age and health-related issues due to excessive travelling

To test the above Hypothesis, the researcher used the McNemar-Bowker Test. The result has been displayed in table 12.

Table-12: Age and health Problems

Health issues	Chi-Square Value	Significant	Accept/ Reject Ho
Association between age and Eyesight	49.147	.000	Rejected
Association between age and headache	20.708	.014	Rejected
Association between age and backbone problem	34.128	.000	Rejected
Association between age and body Pain	39.286	.000	Rejected
Association between age and sleeping problem	31.161	.001	Rejected

Source: Computed Data

Since the P-value of the association between age and health problems is less than 0.05, the null hypothesis is rejected at a 5% level of significance. Hence, it is concluded that there is a significant association between age and health problems due to online classes.

Recommendation

From the study, the following suggestions are made

1. The sudden move to online teaching was new to many teaching faculties. To make them familiar with online teaching the management must organize an e-tech-oriented training program for their staff members for increasing ICT knowledge.

2. The management should arrange the necessary infrastructure facilities in their school campus to carry out the online class effectively.

3. To monitor the students, assess and evaluate the students' performance the office staff and colleagues should help the teaching faculties. It reduces the excessive workload of the teaching faculties.

4. The management should reduce the workload of the teaching faculties and also provide adequate incentives to their staff members to induce them.

5. Sitting in front of the system or mobile and continuously monitoring the screen will lead to health issues among the teachers. To avoid these issues the teachers should relax while taking online classes continuously.

6. The teachers should also learn the innovative and recent teaching tools to handle online teaching attractively.

7. Interaction among students is one of the important concepts for successful online education. Therefore the teacher should prepare the study material seriously and should develop interactive online classes as well as share the class materials.

Conclusion

Learning is a continuous and life-long process in an individual's life. Learning helps the individual to acquire the necessary skills and knowledge in order to achieve his or her desired goals in their life. Due to the COVID-19 pandemic situation, every country in the world faced many challenges not only on the health and economic but also on the education scale. The rise of the CoronaVirus lockdown has compelled education systems worldwide to find alternatives to the traditional classroom environment. Considering the alternative of traditional face-to-face classrooms, virtual schooling becomes an important technique to sustain skills development during school closures. The sudden move to online teaching was a drastic step because not only the students were not ready for such a move, but the faculty and institutions as well. Compared with the other stakeholders of education, teachers face many difficulties to accomplish the objective of teaching and learning. In online teaching, many of the teachers mostly are facing problems like lack of technological knowledge, technological changes/up-gradation, lack of IT support, unoptimized software for mobile devices followed by security issues. Similarly, another biggest challenge faced by the matriculation school teacher is assessing students' progress. Even though matriculation school teachers frequently organize online tests, the success of the test is always questionable. Another issue relating to assessment is if the students upload their answer sheets online and the concerned teachers across different sections for the different subjects should download the answer sheet and verify the same by viewing the screen. It is not an easy one and it increases the stress among the teaching staff. Another important challenge associated with online teaching is

boredom and monotony induced by increased exposure to the screen as well as the modus operandi of sitting at one particular place for prolonged hours and it also leads to some health problems. In order to solve the issues, the management of the school should arrange ICT-enabled training programmes for their staff members to handle e-tech-related issues and develop adequate infrastructure facilities in the schools to carry out the online teaching effectively. The management also reduces the excessive workload and also provides adequate incentives to their staff members. It attracts staff members to take online classes effectively and efficiently. To conduct an online exam effectively the student's involvement and support from their parents are the more important ones. Apart from that the assistance from office staff and other colleagues to monitor the students help the online teaching and online test on the correct path. In order to break monotony/boredom or fatigue in online teaching, the teachers should interactively take the classes, and present their topic in innovative methods by using different ICT techniques. The teacher should also relax to avoid health-related issues. Due to COVID-19 and pandemic situations online teaching is the only tool to sustain educational objectives. Therefore teachers should be open-minded, interested, and flexible in developing themselves became self-taught, and try to improve their teaching skills to tackle the online teaching challenges and handle online classes effectively and efficiently.

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A study of School Teachers on Adaptation to Online Education during Pandemic Period

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Abstract

A qualitative study was conducted among Delhi private and government school teachers on how they have been adopting to online education during this covid-19 pandemic. Views of the teachers were captured on the impact on the quality of education, role of ICT/Technology and adaptation from all three – parents, children, and teachers in this new format of teaching. Another aspect that was explored has been a blended mode of learning. Even though the perception is positive towards online teaching, there is a fear of the quality of education and how students, teachers and parents have been coping with some of the challenges that online teaching brought about. Online teaching in all its glory cannot be removed altogether and a fine balance between offline and online (blended) learning would need to be established over a period as things return to normalcy.

Keywords: COVID-19 Pandemic, Online Education, Blended Learning, Impact on Teachers

Introduction

In the year 2019, we had a traditional teaching system i.e., 35 or more students in a classroom with subject teacher teaching (some ICT being leveraged by a fraction of teachers in a classroom). Teachers have fixed time schedules, and a number of classes to attend social gatherings in the school arena. Students were also somehow, on the same learning path in school, sitting with their friends, doing physical activity, and a timetable to follow. Schools have some functions like the Republic Day Celebration, Independence Day, School Foundation Day, Sports Day, and other co-curricular activities to make the students physically as well as mentally active. The examination was held in school, mock practices, and practical lab examinations. Come 2020 and a global pandemic break. With COVID-19, online learning came to the forefront.

Overnight, education moved from the traditional teaching system to online based teaching. Zoom, Google Meet and Microsoft Teams became the new buzzwords of school education. Suddenly the internet and mobile became the most important utility in a household. Mental health, steep learning curve and socio-economic status differences, were just some of the prominent issues that came to the forefront. There was a lack of unavailability to the internet in many areas. The impact can be seen after 2 years of online classes. The monotony of online classes has been affecting both students and teachers which lead to a reduction in interest levels affecting students' performance in the classroom. This has also been affecting their mental and physical health. Kamal & Illiyan (2021) in their study on "School teachers' perception and challenges towards online teaching during COVID-19 pandemic in India: an

econometric analysis" showed positive perception of virtual teaching during COVID-19 for reducing the learning gap and shaping pupils' future during the crises. Though many of the Delhi school teachers encountered obstacles in online teaching such as technical obstacles, difficulties in online exams and assessments etc. As we come out of the pandemic, it is important to understand the impact of the pandemic on schoolteachers as they adopt online education. This research paper takes a view of how teachers adapted to online education over the last 2 years.

Review of Literature

According to Jung, there are 12 teacher personas that any teacher can co-relate to. These are – Ruler, Artist, Sage, Innocent, Explorer, Rebel, Hero, Wizard, Jester, Orphan, Lover, and Caregiver. Each of these could be identified in an offline teaching mode and with online teaching mode and reduction in interest levels across both teachers and students, it becomes hard for teachers to be one or a mix of these personas in the classroom. Teachers and their personas greatly influence children towards higher goals of learning. As per Piaget, there are sequences of stages of cognitive development that are influenced by the environment. Even though Vygotsky indicated that children's learning is determined by a term namely "Zone of Proximal Development", it is the environment that is introduced that eventually brings up that ideal mix of learning and development towards students' higher-order thinking skills.

Patricia, Aguilera and Hermida (2020) in their research found that motivation, self-efficacy, and cognitive engagement decreased among students post transition. It was felt that face-to-face education had an ecosystem to support learners and it would take significant time to find such an ecosystem for online teaching. One thing that the researchers did point out was the fact that online teaching was a response to an emergency circumstance which showcases creativity and flexibility at that point in time. Driessen (2020) in his research observed socio-economic status differed across students and teachers which impacts levels of financial stability. As a result, the use of technology may be different among different students. Bali and Lui (2018) conducted research on the topic of student perception towards online vs face-to-face classroom teaching before the pandemic hit us. This study though does not truly represent the education situation as in COVID where online was the only option. Surprisingly, the study concluded that there was not a significant difference among online and face-to-face learning across different levels of education levels. Patson, et al (2021) found significant differences between students and one size fits all approach would not work. Some students were more adaptive in comparison to other students. Martin, A. J. et al (2021) found that online and parental learning support and background attributes were significantly associated with the role of adaptability in students' online learning of mathematics during periods of remote instruction. Adaptability played an important role in students' online learning during COVID-19 and beyond.

But one thing that Muthuprasad (2021) confirmed was that there was a positive attitude towards online learning as it provided flexibility to learn at their own pace by recording the sessions and having the on-demand ability to view the content despite challenges in access to technology for a portion of the student community. Mercer, Hennesy and Warwick (2017) in their research on the topic of methods which can improve the quality of classroom interactions among teachers and students. Their

work included important aspects of the role of digital technology and its use in supporting classroom dialogue. The results were positive which has a direct impact on classroom pedagogy and practices.

Research Objectives

The objectives of this research were:

1. To analyse the perception and challenges of teachers for online classes and whether it has impacted the nature of education quality and standards.

2. To determine the adoption strategies that schools have adopted

3. To evaluate the role of technology in delivering quality education

Research Methodology

Nature of research

Qualitative in nature.

Sample size and sampling technique

This research is qualitative in nature (limited study) with a sample size of 40 teachers aged between 30-50 years. Of these 40 teachers, 20 were from Private schools and 20 were from Government or Government-aided schools confined to the Delhi region only. The primary sampling techniques used for this research were purposive and snowball sampling techniques. As per Vehovar et. Al. (2016), purposive is a non-probability sampling where selection is based on characteristics of the population and the objective of the study and snowball is also a non-probability sampling where participants are contacted through referral.

Research Methods and Tools

There were primary three research methods leveraged as part of this research for data collection:

1. Questionnaire,

2. Semi-structured interviews, and

3. Classroom Observations.

The major theme of the questionnaire is outlined below: -

• Experience and perceptions of online teaching

• Challenges faced by teachers and students

• Assessment techniques alongside online teaching

The major areas of investigation as part of semi-structured interviews were:

• Adapting to online teaching

• Perception on the impact on quality of education.

• Conducting online classes techniques.

• Role of technology

The major areas of investigation as part of Observations were:

• Classroom participation and engagement

• Quality content of education

• Use of technology during class

Mode of Interview conduct

The model for conducting interviews was telephonic as this research study was conducted during the summers of 2021.

Research Questions / Hypothesis

The researcher has tried to answer the below questions through these observations, questionnaires and interviews were:

1. Does the teacher have a positive

perception of leveraging online learning?

2. Does the teacher believe that the quality of education is suffering on account of online learning vis-à-vis traditional learning?

3. Does the teacher believe that the journey towards online learning was easy for all teachers, students, and their parents?

4. Does the teacher believe that technology has played a pivotal role and can be leveraged once traditional learning begins?

Data Analysis and Observations

Experience taking online classes

For the majority of teachers, taking classes online was a new experience and it took the teacher some time to get acquainted. Only a few had prior knowledge of online teaching because of which they acquired skills at a better pace. Various teachers were using different teaching platforms such as Google Meet, Zoom, Microsoft Teams and others. Most teachers voiced that school authorities were very supportive in this transition to online classes by extending technical help where required. Some of the feedback shared by teachers on their experience is captured here.

"Where to adapt right now, I think everyone is adapting. Now according to the class schedule that we do, we must watch the whole day. And whatever extra work is done, they also do it at home. As far as children are concerned, I have seen that children are active in the morning class, and in the later classes, the response is not so much. According to me, children are also adapting".

Most teachers had similar feedback about adopting the technologies and how fatigue sets in the students as the days passes and months have passed.

Perception of online teaching-learning process

Pre-pandemic, teachers were not comfortable with the online teaching process and seemed to believe that it was a distraction. The perception of teachers has gone through a significant shift with many teachers voicing a shift in attitude towards leveraging technological advancements and online classes even when schools open. They are thankful for the online education systems because these changes have set a new pedestal in these times. Some of the teachers did feel that online learning has been forced onto them and this is the new normal and it would be hard to move students back to offline mode fully.

"The Pandemic has changed the education sector; it has pushed optimization in delivery methods. Schools and educational institutions have been forced to move online. A new normal has been created and it is teaching online."

For sure, the use of ICT has added a new dimension to learning where many students find the lessons more stimulating and engaging as compared to traditional classroom environments.

"ICT tools can improvise the teaching process of a teacher, a blend of traditional and modern teaching tools would have a more practical impact on brains of students, with Powerpoint, audio-visual aids, and knowledge updates with a single click of a mouse."

Another teacher remarked that ICT and blended modes of learning enable a better learning experience, especially catering towards the diverse needs of various learners.

"I prefer the blended mode more as compared to offline and online learning

as it caters to the diverse needs of students, as in if a student is not doing well in a particular subject matter, he can be provided with hand notes and various other videos and presentations in order to enhance his or her learning and eventually he or she will be able to perform better thereafter."

Challenges faced by teachers and students

One of the biggest challenges that students indicated was the lack of resources on teachers' end due to which subject matter clarity was many times a challenge. Lack of resources could be in terms of tools required to explain a concept or in some cases internet connectivity that could lead to content being taught but clarity not emerging for students.

"Teachers mostly face challenges like lack of IT support, continuous technological changes, unequal access for all students, optimized software for mobile devices and security issues because of Adaptability Struggle, Technical Issues, Computer Literacy, Time Management, and Self-Motivation."

Many times, connectivity on the student's end was also seen as a major challenge. A teacher responded,

"These are now, yes of course, new terms for us. They are useful for the new generation but not for us. Proper infrastructure should be there to use appropriately like we should have our own personal computer systems in the school, but the facilities are not there (talking in consideration of traditional means). Big and false promises are made haywire. We are not able to practice it. Our school is very much lacking to include such concepts. But, from the time the system has shifted to online mode of education, we now acquire our own personal laptops or systems but need to become familiar

with various online teaching-learning applications to make the classroom become more efficient and effective."

Maintaining discipline in the classroom was also becoming a challenge and the easy online way was to mute all participants or manage host controls such as disabling chat, mic and share options for students when they joined. Another common problem observed has been the tendency of students to turn off the video which could be due to the preference of the student or a genuine connectivity issue. Attendance has also been a challenge seen more in government school students.

"कोई फायदा नहीं होता उसका भी, माँ-बाप तब भी नहीं बोलते अपने बच्चों को, कई बच्चों की फीस पूरी न होने की वजह से भी वो ऑटोमेटिकली पीछे से ब्लॉक हो जाते हैं, तो क्लास ले ही नहीं पाते, इस मामले में तो टीचर्स भी हेल्पलेस हो जाती हैं |"

("It is of no use, even when parents do not speak to their children, due to non-fulfilment of fees for many children, they are automatically blocked from behind, so they are unable to take classes, in this case then Teachers also become helpless").

From a student's perspective, having the class material recorded or shared post the class on the choice of tool (google classroom, WhatsApp group, Microsoft teams or others) became a norm.

"In the case of poor connectivity issues even teachers cannot help it out, the students eventually have to leave the meeting and thereafter they learn through the notes provided, YouTube videos and various other learning platforms like Vedantu, Byju's Learning App."

One teacher put out the advantage and challenge well with this remark,

"Online classes have a broader perspective. When you are confined in a classroom, you only learn what is limited

to the books/syllabi, but with an online class, you can Google everything more about the ongoing topic, broadening the scope. Online classes don't give you the opportunity to raise doubts. This is a big disadvantage, and I believe unless a person raises questions while learning, his learning is incomplete."

Quality of education

Quoting what one of the teachers said,

"शिक्षा में गुणवता तो होनी चाहिए और मेरे हिसाब से शिक्षा का बेसिक रूल यही है कि ऐसी शिक्षा होनी चाहिए जो कि सार्वजनिक हो, सबको समझ में आए और सरल हो | संक्षेप में सरल रूप में होनी चाहिए | जहाँ तक एफेक्ट होने का सवाल है, तो हाँ ये ऑनलाइन शिक्षा से काफ़ी प्रभाव पड़ा है, बच्चे को समझ आया या नहीं ये हम पता नहीं कर सकते|"

("There should be quality in education and according to me the basic rule of education is that there should be such education which should be public, easy to understand and easy to understand. In short, it should be in a simple form. As far as the effect is concerned, yes it has been affected a lot by online education, we cannot know whether the child understood it or not.)

As per Psacharopoulos & Woodhall (1985), Quality of education is a process that imparts knowledge, skills and capabilities to the learners which aid in the social and economic development of the nation. Another teacher echoed the sentiment were in,

"Quality of education has decreased drastically; only 50 per cent of teaching-learning is being done now."

Education is not only about subject knowledge but participation in inter-school and intra-school activities form a critical component towards students' learning. With the online way of learning/teaching, outside-the-classroom activities were a major causality.

Assessment of students

Assessment is a complex process where the CBSE (Central Board of Secondary Education) has set certain norms and principles. Based on these guidelines, teachers create different methods of assessing students and various work assignments that can be used for student evaluation. The end goal of these assessments is to assess a student's understanding of a given topic or subject. Especially for practical-based subjects like science, there has been a significant shift in how practicals are conducted and their assessments. Instead of live practicals, the teachers are recording videos of the experiments and then play them for students.

"In the previous year I found it difficult to conduct activity classes but as of now, I conduct activities by making a video of myself doing that practice, sharing it with students and asking them to write their observations and understanding from that activity."

Another teacher put forward her viewpoint in a manner-

"होम बेस्ड सामान से ही एक्टिविटी करवाती हूँ मैं | जैसे मैं फूड्स का चैप्टर पढ़ा रही हूँ तो घर में से ही सामान आ जाता है | इससे एक और चीज़ आसन हो जाती है, बच्चे भी आराम से उस एक्टिविटी को परफॉर्म कर लेते हैं |

Most teachers acknowledged that assessments have moved to students uploading their work online (Word documents or paper-based writing with scanned copies) being used majorly. Practicals saw a drop due to limitations among students to conduct the same. However, teachers had mixed opinions on assessment methods being used with cheating and chaotic assessment methodology leading to a lot of problems.

"The uploading of answer sheets" scenario makes everything chaotic. Some upload the sheets on the portal,

some mail them to the teacher and some even break the protocol and send them on WhatsApp. Hence, it is very difficult for the teacher to collate the response sheets."

Classroom observations done as part of this research echoed many of the statements shared by teachers as remarks or other tooling used. Few that were observed consistently across 20 classrooms that were observed online are mentioned below:

- Few students didn't respond, and, in many cases, there was a lack of interest in students as seen from them feeling sleepy during classes.

- Many times, the classes which did not use ICT in the classroom content led to less interest from students.

- Engaging students in group activities and group submissions resulted in a high degree of interest from students.

Adoption strategy towards online learning

Regarding the adoption strategy, teachers and students in a school were primarily using one of the online learning platforms such as Zoom, Google Classroom, and Microsoft Teams to carry forward with the teaching-learning process. Over a period, technical support became a key enable towards adoption of these new technology platforms in the online teaching world. Selvaraj, A. et al study indicates the teachers' and students' adaptation during COVID-19 to the change of emergency remote learning platforms using various online collaborative tools in hand, without any pre-planned course structure and training. A good summary of the adoption strategy is summed up in this response from the teacher,

"These are now, yes of course, new terms for us. They are useful for the

new generation but not for us. Proper infrastructure should be there to use appropriately like we should have our own personal computer systems in the school, but the facilities are not there (talking in consideration of traditional means). Big and false promises are made in haywire. We are not able to practice it. Our school is very much lacking to include such concepts. But, from the time the system has shifted to online mode of education, we now acquire our own personal laptops or systems but need to become familiar with various online teaching-learning applications to make the classroom become more efficient and effective."

Teachers also emphasized the role that school has been playing towards helping teachers adapt to the new ways of learning with in-service teacher training programs.

"School authorities have arranged training programs for teachers through Diksha App and Chocolate App. Also, they've arranged educational programs on teaching strategies. Yes, these played a significant role in my learning as I came to know about making Google forms and Excel spreadsheets and made us capable of making audio video files of educational topics and concepts."

Role of Digital Technology in this new learning process

Technology and its related aspects have been a major contributor towards the progress and development of the education sector. Continuing with the old traditional methods of teaching are nowadays not much prevalent in today's scenario. Teachers as well as students have become tech-savvy and demand change in the modes of delivering subject matter content.

As one teacher summed up,

"Online classes have a broader

perspective. When you are confined in a classroom, you only learn what is limited to the books/syllabi, but with an online class, you can Google everything more about the ongoing topic broadening the scope."

However, from the responses of various teachers, the opinion is divided among teachers on whether digital technology has been helpful or not. An example shared by a teacher is quoted below,

"Only and only one difficulty comes, that is not all students are habitual of giving online exams that are going to affect their performance and also the speed issue is going to be the main for the subjective exams as most of the students face this problem."

Conclusion

Teachers, Students, and parents all three have played a pivotal role towards education during this pandemic. Teachers form the centre of the education process and are the indispensable vehicle towards the good quality of education. "Educate" in the real sense of that word is not to transmit from teachers to students some information about mathematics or history or geography, but in the very instruction to bring about a change in the mind of human beings.

The study explored teachers' perception of education shifting from a traditional classroom environment to an online way of teaching imposed by the COVID-19 pandemic. Teachers who were part of the sample set for this study brought in both their past and present experiences of teaching, challenges they have faced, an impact on the quality of education and how they foresee education once offline classrooms start operating again.

The respondents were happy about the fact that despite a pandemic which completely shut down traditional classroom education overnight as we knew it, online teaching brought a new life into education and teaching. Teachers did share their worries and anxiety towards fulfilling parents' expectations about the quality of education being imparted alongside learning and coping with the new teacher-learning processes. Most teachers acknowledged that online education and the new way of teaching brought all of them out of their comfort zone and they had to unlearn and learn new ways of teaching and engaging with students. There were many challenges that were faced by teachers, students, and parents but despite some of these challenges, students' learning continued through the 2 years of the pandemic. Quality of education brought in different perspectives from different teachers and respondents. For sure the teacher's exceptional and creative personality and ability to handle classroom situations had a big impact on the quality but for sure across all types of learners in a classroom, ensuring the same quality being delivered became very hard.

National Council of Educational Research and Training (NCERT) on its part mapped all online materials available through the Ministry of Education's (MoE) online platforms with curricular standards. Diksha, an online National Teacher Platform, was leveraged to provide teacher training and resources, including lesson plans and worksheets linked to the curriculum (NCERT, 2020a). In August 2020, the MoE and NCERT released a new set of learning guidelines for students and teachers. These guidelines were a significant departure from the initial AAC (Alternate Academic Calendar) as they recognized the diversity of the country and varying degrees of ownership of technical devices and opportunities available to students, stating that "following only one model of teaching and learning will not work" (NCERT, 2020c, p.3).

These steps by the government helped the teacher adapt to the online mode of teaching. The use of ePathshala (e-school) and guidelines for studying at home for teachers, parents and school principals were some of the initiatives which were helpful for teachers to cope as they transitioned to online teaching as part of adaptation.

Most teachers did share that the future of education, once things got back to normalcy, is neither offline nor online teaching but a fine balance of blended learning for students. Bashir, A. et al, highlighted the adaptability during the pandemic as it had prepared students to work remotely and reflected global adaptations made by many organizations to evolve. Therefore, lessons learned are to create opportunities for hybrid teaching, learning and assessment approaches. Hybrid teaching, learning and assessment bring in good aspects which have come out with online teaching (bringing about interest and spark among students, collaborative in nature to name a few) would need to be continued alongside offline or classroom environments of teaching.

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An Assessment of Challenges Faced by Educators in Online Education for Higher Secondary Classes in Kerala

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Abstract

The closure of schools with the global pandemic COVID-19 affected the education system across the world. Digital education through the internet emerged as a possible solution to classroom education, including in countries like India. A cross-sectional study was carried out among higher secondary school teachers in Kerala, India. The main objectives of the study were to assess the challenges faced in online education by educators of higher secondary classes in the state. A total of 220 teachers were included in the study by simple random sampling. A self-administered questionnaire was used to measure impediments and challenges faced by the teachers. Among the study population, half of them experienced a high level of impediments and challenges. In general, teachers mostly faced challenges like lack of IT support, continuous technological changes, and unequal internet access due to locality and geographical factors. Language teachers experienced higher levels of impediments and challenges compared to other teachers.

Keywords: Online Education, Digital divide, COVID-19, Connectivity, E-assessment tools.

Introduction

The COVID-19 pandemic has been one of the biggest crises faced by people across the world. Various measures by the authorities to prevent the spread of the pandemic such as social and physical distancing, lockdown of business and commercial establishments and closure of schools and religious institutions deeply interrupted every regular aspect of people's life. The education system has faced a huge challenge for the reason that most governments around the world have temporarily closed educational institutions to arrest the spread of the COVID-19 pandemic (Schleicher, 2020). Digital education emerged as a possible solution to face-to-face regular classroom education.

Education plays an imperative role in the modern, technological world as it is the most dynamic element in its evolution. It brings economic and social prosperity and strengthens the foundation of society. Education stimulates the members of society with extensive knowledge and skills, and a better understanding and perspective of cultural norms and values. Recognising the importance of education for the overall progress of humanity, the United Nations Sustainable Development Goal 4 (SDG-4) aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" by 2030 (Boeren, 2019).

In India, the system of education during ancient times was way different from what it is today. In the beginning, Gurukul was the place where a student had to go to learn and gain knowledge, and education was provided by a

Guru (teacher). The students used to stay at the guru's house and the kind of education they received was closely linked to nature and life. As time passed, the system of education has also undergone a transformation. The introduction of Information and Communications Technology (ICT) in education led to better teaching methods and improved student learning. According to UNESCO (2002) "ICT is a scientific, technological and engineering discipline and management technique used in handling information, its application and association with social, economic and cultural matters". ICT is similar to Information Technology (IT), but emphasises mostly communication technologies which include the internet, wireless networks, cell phones and other communication mediums (Ratheeswari, 2018). Educational quality can rise with the appropriate use of ICT and it also helps to connect learning to real-life situations (Lowther et.al, 2008; Weert & Tatnall, 2005). Simultaneous interaction with both learner and teacher takes place in the teleconferencing classrooms with ease and convenience (Sánchez & Alemán, 2011). The availability of the internet and the flexibility of online courses have made online education an essential part of higher education (Li & Irby, 2008; Luyt, 2013; Lyons, 2004).

Online education is electronically supported learning that relies on the internet for teacher–student engagement and the delivery of class materials. Research outcomes point out that the efficiency of educational processes can improve through the proper implementation of e-learning in education (Singh, 2016). The absence of physical boundaries, more learning engagement experience than traditional learning and its cost-effectiveness make digital learning a more supportive tool for students to learn in the confines of their comfort zone. On the other hand, digital learning has its own limitations and challenges, as face-to-face interaction is usually perceived as the best form of communication compared to the rather impersonalised nature of remote learning (Seema & Nangia, 2020). It is very difficult to transform the teaching process to online learning since there are many impediments that teachers face in finding suitable approaches to teach learners through online teaching (Xhaferi & Ramadani, 2020). Online teaching can be even thought of as problematic for the reason that the responsibility for making an online course an interactive and exciting experience, both for the students and the instructor, lies on the instructor (Lyons, 2004).

In a study from Jordan, a little more than half of the teachers reported increased difficulties with remote teaching due to intermittent internet connectivity and online fatigue (Tuma et al., 2021). Oyedotun (2020) suggested that the rapid change to online pedagogy due to the pandemic in developing countries has brought to the fore the inequities in the education sector of developing nations, including lack of devices and internet access in rural areas, limited training among teachers to impart teaching on the online platform.

Now that technology has become a building block of the lives of individuals, it becomes imperative for teachers to be comfortable with its handling in the education system as well. The present education system also consists of older-generation teachers. Hence, sufficient orientation needs to be done to make them accustomed to the needs of the technological world and meet the ICT demands (Singh, 2016). The instructor may be faced with strange situations while starting to teach online such as finding students in the class who are not signed in his/her class, and students may act inappropriately during casting the lecture (Hassan, 2021). Educators also face a lot of trouble while working

on the updated online devices in the form of how to start using them, when to use them, how to reduce distractions for students, and how to hone students' skills in the online platform (Dhawan, 2020).

Online learning created new responsibilities and demands thereby increasing the time teachers need to spend preparing classes, ensuring better internet connectivity, and following up with their pupils in various formats. Hence, it requires trained and empowered teachers who are able to make decisions based on the type of resources that can be used and where it is possible, and also have the right information to make decisions about their use (CEPAL, 2020). All these called for the need to ensure digital equity as one of the main factors that should be considered in online learning. The unavailability of proper digital tools, devices and internet or Wi-Fi connections can cause a lot of trouble in online learning. A country like India has marked digital inequalities in terms of access to technology, and the sudden shift to online education led to a major disruption in education for many students and teachers. Hence, online learning can become more effective only by reducing the digital divide (Dhawan, 2020).

Although online education was present in the education system, it became more essential with the onset of the pandemic to facilitate teaching and learning. The present study is based on a cross-sectional study measuring the impediments and challenges faced by higher secondary school teachers in conducting online classes in Kerala, India. The main objectives of the study were to assess the impact of digital devices and internet connectivity in imparting education through the online platform, to assess the need for teacher training in utilising the available digital technology, to evaluate the impact of the teacher's personal and domestic environment on his/her professional conduct in a work from home situation, and to gauge the level of professional satisfaction among educators in the era of online education.

The study has found that among the study population, half of them experienced high levels of impediments and challenges in online education. All of the teachers faced at least some challenges in delivering education digitally, lack of IT support, continuous technological changes, and unequal internet access. Language teachers experienced higher levels of impediments and challenges compared to other teachers.

Methodology

The cross-sectional study was carried out among higher secondary school teachers in Kerala, India. After obtaining informed consent, teachers were selected by simple random sampling out of a population of 20,000, maintaining high confidentiality at all stages of the study. The sample size consisted of a total of 220 teachers aged 40–56 years. A self-administered questionnaire was used as the study tool to measure impediments and challenges faced by higher secondary school teachers. The questionnaire had three parts consisting of the socio-demographic profile, measurement of impediments and challenges faced by the teachers. Socio-demographic details such as gender, subject, school type and residing area were collected. A total of 16 questions each with five options such as strongly agree, agree, neutral, disagree or strongly disagree were asked for estimating the level of impediments and challenges. Each of these options was given a score of 5, 4, 3, 2 and 1, respectively. Out of these 16 questions, one question was negatively stated; therefore, the scores were reversed on this question. Scores were greater

than the mean score (50) for severely affected groups. The data collected were tabulated using MS Excel and analysed using SPSS 20.0. Descriptive statistics such as frequency, percentage and mean were used to summarise the data. Percentages were generated for the qualitative variable and compared by Chi-square test. Variables such as mean and standard deviation (SD) were computed after checking for normal distribution and compared by using a t-test for quantitative analysis. P-value of < 0.05 was taken as statistically significant.

Limitations

The universe of the study conducted was restricted to the higher secondary school teachers following the state syllabus in Kerala. Hence, the teachers who are working in the private sector schools and following the Central Board of Secondary Education (CBSE) and Indian Certificate of Secondary Education (ICSE) were not covered in the study. However, it needs to be mentioned that they are a minority when compared to the teachers following the state syllabus.

Results

The higher secondary education sector in Kerala includes classes 11 and 12, involving students in the age group of 15 to 18 years. Schools in the government, government-aided and private sectors provide higher secondary education in the state. Kindred subjects are categorised into groups of four along with English as the first and second language of the student's choice. The students could opt for any group according to their aptitude and skill sets and pursue their education.

A. Distribution of study population according to socio-demographic variables

The majority of the respondents were female (77.27 per cent) as given in Table 1. While 33.6 per cent of respondents were science subject teachers, 22.7 per cent were language teachers. Most of the respondents (56.4 per cent) were teaching in aided schools. About 55 per cent of respondents were residing in rural areas.

Table-1: Distribution of respondents according to socio-demographic variables (n = 220)

Variable	Category	Number	Percentage
Gender	Female	170	77.3
	Male	50	22.7
Designation	Higher Secondary School Teacher (HSST)	163	74.1
	High School Teacher (HSA)	4	1.8
	Post Graduate Teacher (PGT)	7	7
	Principal	6	2.7
	Teacher	34	15.5
	Trained Graduate Teacher (TGT)	6	2.7

Subject	Language	50	22.7
	Science	74	33.6
	Commerce	27	12.3
	Computer Science	55	25
	Social Science	14	6.4
School type	Aided	124	56.4
	Government	48	21.8
	Unaided	48	21.8
Residing area	Rural	121	55
	Urban	99	45

## B. Distribution of the study population

Figure-1 shows the factors related to impediments and challenges for educators. Figure-2 shows that scores of impediments and challenges are between 30 and 80. The mean score was 56.74 (7.39); the histogram shows it is normally distributed. Table-2 shows that impediments and challenges are categorised into two by using a mean score. While 51.8 per cent of respondents experienced high levels of impediments and challenges, nearly 60 per cent of the participants reported a lack of professional satisfaction in imparting education through the online medium.

Figure-1: Factors related to impediments and challenges for educators
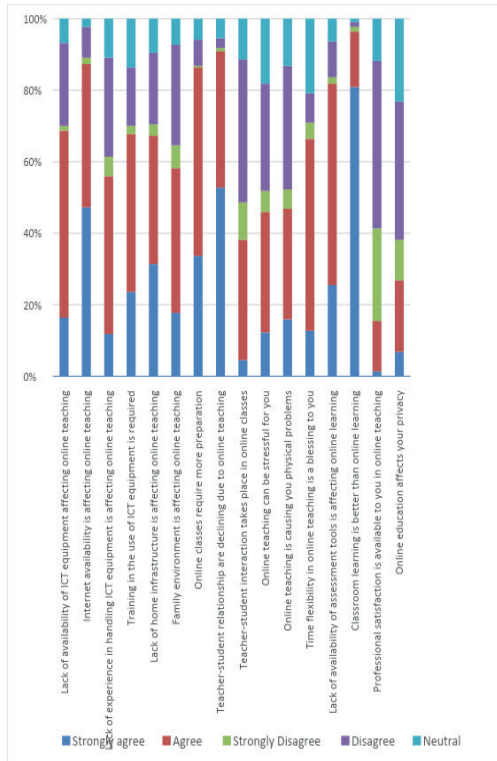
Figure-2: Histogram showing impediments and challenges
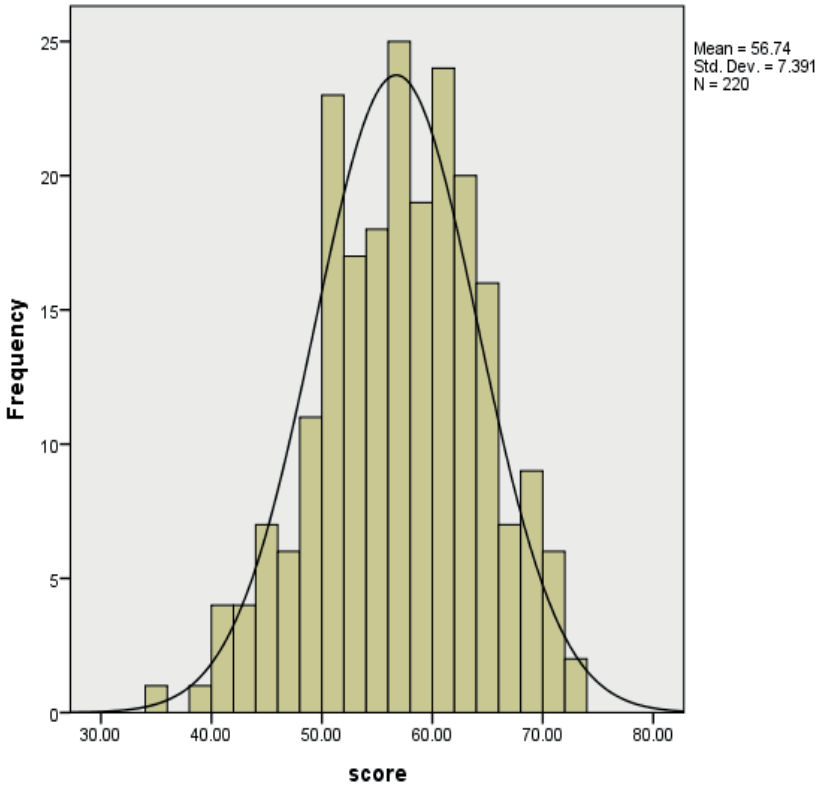
Table-2: Assessment of impediments and challenges

Variables	Frequency	Percentage	95% CI
Impediments and challenges (< 56)	106	48.2	54.41–73.66
Impediments and challenges (> 56)	114	51.8	59.17–78.64

C. Factors associated with impediments and challenges

Table-3 shows the different factors associated with impediments and challenges. They are gender, subject, school type and residing area. Subject and school type are statistically significant with a p-value less than 0.05 for these factors. Language teachers experienced higher levels of impediments and challenges compared to other teachers.

Table-3: Socio-demographic factors associated with impediments and challenges

Variable	Category	Score		Chi-square	p- value
		Low	High		
Gender	Female	82 (48.2)	88 (51.8)	0.001	0.977
	Male	24 (48)	26 (52)		
Subject	Language	16 (32)	34 (68)	14.16	0.007
	Science	35 (47.3)	39 (52.7)		
	Commerce	13 (48.1)	14 (51.9)		
	Computer Science	37 (67.3)	18 (32.7)		
	Social Science	5 (35.7)	9 (64.3)		
School type	Aided	77 (62.1)	47 (37.9)	34.01	<0.001
	Government	23 (47.9)	25 (52.1)		
	Unaided	6 (12.5)	42 (87.5)		
Residing area	Rural	58 (47.9)	63 (52.1)	0.007	0.935
	Urban	48 (48.5)	51 (51.5)		

D. Distribution of study population according to variables

Table-4 shows that only 39 per cent of teachers have the availability of online teaching tools. While 60 per cent of teachers don't have availability of online assessment tools, 67.3 per cent did not receive correct guidelines for online teaching. The majority of the teachers are using APPs in online teaching. The data also show that only 4.5 per cent of students dropped out of school due to the non-availability of ICT equipment.

Table- 4: Distribution of respondents according to the availability of e-teaching/learning tools

Variable	Category	Number	Percentage
Availability of online teaching tools	Yes	87	39.5
	No	133	60.5
Availability of online assessment tools	Yes	88	40
	No	132	60
Availability of the right guidelines for online teaching	Yes	72	32.7
	No	148	67.3
Use any APPs in online teaching	Yes	173	78.6
	No	47	21.4
Any dropouts from your school due to lack of availability of ICT equipment	Yes	10	4.5
	No	210	95.5

The study was conducted through 220 school teachers and the required information was sought from them. Statistical analysis of that data yielded some results. Calls were made and interactions were done with the respondents to find out the reasons behind the results. The results are as follows:

Language teachers vs computer teachers: Language teachers were not at ease with using digital platforms and it reflected in the transaction of information. Computer teachers transact through computers even in offline classes. Hence, the shift in medium does not have much of an impact. Language is learnt and taught best through face-to-face communication. Gestures and body language also play a significant role. These elements are lost in online classes.

Government vs aided vs unaided: Unaided school teachers with their meagre remuneration find it difficult to make arrangements for gadgets and internet data packages. The pressure from the school management for better results further added to their difficulty. Aided teachers also often face such pressure tactics from school management. However, their access to gadgets and technology is equal to government school teachers due to parity in remuneration.

Discussion

The COVID-19 pandemic had an immense impact on the education sector all over the world. Schools, colleges and universities discontinued face-to-face teachings and adopted online mode. Both teachers and students faced many issues during online education. Accessibility, affordability and flexibility are the broadly identified challenges with e-learning. There are several studies that have concluded non-availability of technical infrastructure and irregularly interrupted internet connectivity as the biggest challenges for both students and teachers. Many countries have substantial issues with reliable internet connection and access to digital devices (Murgatrotd, 2020). For instance, in the case of India, according to the key indicators of the Household Social Consumption on Education in India report, based on the National Sample Survey (NSS) 75th Round 2017–18, fewer than 15 per cent of rural Indian households have internet access.

Teaching numerical subjects like math, financial accounting, cost accounting, etc. or numerical problems are difficult, and sometimes tedious, in online teaching as compared to classroom teaching. In online teaching methodology, it becomes difficult for teachers to motivate students and they face the problem of keeping records of students' progress, especially in higher education institutions where the number of students is large (Gurung, 2021). Studies by Gurung also revealed that many challenges were faced by teachers during online teaching such as difficulties in teaching numerical subjects, monitoring discipline, reaching students in remote areas, the problem of electricity/internet connectivity, lack of technical/software knowledge, and more time requirement in preparing course content. Further, they also faced other problems like lack of time, lack of confidence, difficulty to assemble all the students for the class, lack of concentration, lack of cooperation from the parents and difficulty to follow up on the learning of students (Seema & Nangia, 2020). The same trends were observed in this study also.

Teachers faced educational institution-based support barriers such as the budget for purchasing advanced technologies, technical difficulties as well as lack of training, limited awareness of online teaching platforms,

security concerns and lack of clarity and direction (Rawal, 2020). Other than the technological issues various other hurdles too were faced during online classes. They included issues of figuring out online class etiquette, parents hovering during online classes, difficulty in maintaining discipline online, etc. The educators experienced a lack of appropriate materials and resources for online teaching as well as service training. Proper training and support have not been provided to instructors who are transitioning course content from face-to-face to online mode (Kyei-Blankson & Keengwe, 2011). Teachers mostly face challenges like lack of IT support, continuous technological changes, unequal access for all students, unoptimised software for mobile devices and security issues. Some other challenges include no clarity in voice due to low internet signal, lack of electricity, sudden electricity shut down and lack of technical and software knowledge. The availability of electricity is a significant challenge to taking advantage of education online. In a survey conducted in 2017–18 by the Ministry of Rural Development, Government of India, found that only 47 per cent of Indian households receive more than 12 hours of electricity and more than 36 per cent of schools in the country operate without electricity (Rawal, 2020).

From a gender perspective, women tend to dominate the teaching profession, especially at the school level in several countries in both public and private sectors (Seema & Nangia, 2020; Aytaç, 2021; UIS, 2018). The same trend seems to be reflected in this study as well.

The current study highlighted that impediments and challenges faced by educators in online education for higher secondary classes in Kerala were high. It showed that half of the respondents experienced high challenges followed by the medium and low categories of challenges during online teaching. The challenges faced by the educators in online teaching in the present study has already been reflected in studies of Rawal, 2020; Seema & Nangia, 2020; Gurung, 2021; Murgatrotd, 2020; Kyei-Blankson & Keengwe, 2011 and Aytaç, 2021.

Conclusion

Impediments and challenges in online education are very high. Among the study population, half of them experienced a high level of impediments and challenges. It has been observed that all of the teachers faced at least some challenges in delivering education digitally. Teachers mostly faced challenges like lack of IT support, continuous technological changes, and unequal internet access. Language and social science teachers are more likely to face a high level of impediments and challenges. Problems were mostly faced by unaided school teachers when compared to another type of school teachers. Online teaching and assessment tools were a big problem in the area of online education. There were no right guidelines available for imparting online education. The majority of the study population reported that their domestic environment affected their professional performance in a work from home situation. Educators also reported a dip in professional satisfaction in imparting online education.

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MOOCs Adoption Pattern during Pre and Prevailing Pandemic Periods in Indian Context – A Comparative Study

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Abstract

Covid-19 has impacted education globally. However, it paved the opportunity for online education practice. Massive Open Online Courses (MOOCs) became an effective mode of online education. This study attempted to quantify MOOCs comparative impact in terms of adoption across varying parameters like geographical distribution and gender. The study was conducted on 2 MOOCs-one conducted before covid-19 and the other during the covid-19 period. It is found that learners' participation rose to 81.5 per cent during covid-19 as compared to 74.6 per cent during pre-covid. MOOCs were adopted by more learners from remote regions of the country during covid-19. There was a statistically significant association between region influence on learners and learners' participation during the pre-covid and covid-19 periods with respect to the study variables. It is also observed that female participation has risen by 122 per cent during covid-19 as compared to their participation during pre-covid. The learner participation has significantly increased in all activities like assignments submission, learning resource access and participation in the quiz. The study suggested that MOOCs can help the education system as an effective model for reaching unreached people during this pandemic situation and also help increase inequitable gender participation.

Keywords: MOOC adoption pattern, massive open online courses, disruptive technology, online education, participation and engagement pattern, educational technology

Introduction

Education has taken a significant makeover with disruptive technologies like Massive Open Online Courses (MOOCs) in recent times all over the world. This is further accentuated by the unforeseen catastrophe like covid-19 which has forced everyone to stay home and explore the possibilities of learning online.

The impact of the covid-19 pandemic was recorded across the world which caused major interruptions in students' learning disruptions in the academic programmes, suspension of examinations, cancellation of internal & international conferences and created gaps in the teaching-learning process (Jacob et al., 2020). The United Nations Educational, Scientific and Cultural Organization (UNESCO) is continuously tracing the influence of the pandemic on education. Around 87 per cent of

the world's students are affected by the closure of educational institutions due to covid-19. In this regard, UNESCO has announced the launch of a global education alliance to support countries in expanding the best distance learning solutions and reaching children and youth (UNESCO, 2020). The pandemic situation challenged the education system across the world and forced educators to shift to an online mode of teaching overnight.

A positive effect of covid-19 was also reported by adopting online learning strategies which progresses learning efficiency and performance (Gonzalez et al. 2020). Universities that serve formal education transferred their face-to-face education to distance education and started to reinforce it during the covid-19 period (Vezne, 2020). MOOCs help educational institutions to make educational resources more accessible and affordable. All over the world, institutions are offering MOOCs to improve their distance education provisions (Joo, So & Kim, 2018; Gameel, 2017).

The outbreak of covid-19 influenced the digital revolution in higher education through online lectures and interaction in virtual environments, digital open books, teleconferencing and online examination (Strielkowski, 2020; Kumar, 2020). Due to covid-19 crisis, teachers and students started using online learning platforms such as Zoom, Google Hangouts, Google Meets, Google classrooms, Telegram, LinkedIn learning, Learning Management System (LMS), SoloLearn, Udemy, Facebook, YouTube and many more to widen their academic exposure (Mishra et al., 2020). The combined mode of MOOC micro-video was applied to the online training of nursing interns during the covid-19 pandemic period, and this achieved good results (Shenoy et al., 2020; Zhou et al., 2020).

Zayapragassarazan (2020) put forward a theory that the identification of appropriate digital platforms will help learners to involve themselves in an online teaching-learning environment. MOOCs are accepted as significant progress in higher education and millions of students are enriching their existing skill (Gupta & Gupta, 2020). Alhazzani (2020) found a significant impact of MOOC on student academic performance, learning skills and improvement in communication between students and faculty. Xiao and Ran (2020), investigated the effect of online teaching on student autonomous learning with MOOC during the covid-19 pandemic and the result showed that the outcome of MOOC proves fruitful during this period. Also, MOOC is an active attempt to use information communication technologies to improve students' autonomous learning abilities. In India, University Grand Commission (UGC) has asked universities and colleges to consider the SWAYAM MOOCs as credit courses (Manash Pratim Gohain, 2020).

Thus, it can be seen that covid-19 has strongly influenced the education sector through the use of technology. It is very much essential to assess the extent of influence on education with its status in the pre-covid backdrop. A study was conducted to compare the adoption pattern of online courses during pre and covid-19 regimes with the following specific objectives.

1. To study the participation and engagement through MOOCs during the pre-covid and covid-19 regimes.

2. To identify the parameters influencing MOOCs adoption pattern during the pre-covid and covid-19 periods.

Method

The study was conducted considering two benchmark courses viz. MOOC on Teaching Excellence and Designing e-learning Content, each of which was offered during pre and covid-19 periods. Data was analysed using standard data interpretation procedures which are described below.

Course Selection for the Study

The dataset used in the study was obtained from Moodle LMS e-learning platform. Institute provides various MOOCs through Moodle LMS platform. Two different MOOC courses were considered namely "Teaching Excellence" was conducted during November 1-30, 2019 (Pre-covid MOOC) and "Designing E-learning Content" was conducted during July 1-30, 2020 (Covid MOOC). The courses were divided into four weeks and mainly consisted of video lectures, reading materials, powerpoint presentation, discussion forums/doubt clarification from faculty assignments and quizzes. Two topics were presented per week. Each topic consisted of one video lecture, reading materials, PowerPoint presentations and a discussion forum/ doubt clarification from faculty. A successful completion certificate was awarded to the learners who viewed the course contents and participated in the assignment submission, discussions and quiz participation with more than a 40 per cent score.

Data Collection and Analysis

Data was collected from Moodle LMS portal which has pre-defined functionalities of capturing learners' login activities, participation in a discussion forum, assignment submissions, quiz participation and certification for the course. Data for analysis of learners' motivation to participate in MOOC was taken from the learners' feedback submitted through a google form. The number of learners registered during the pre-covid and covid-19 periods was 1,329 and 2,773 respectively. While collecting the data, the dataset includes some rows (basic information) with empty values, which were removed in the study as part of the data cleaning process. After the data cleaning process, the number of learners considered for this study during the pre-covid and covid-19 periods was 992 and 2,259, respectively.

Descriptive statistics were carried out to understand the region and gender-wise distribution of the learners. Simple frequency distribution was calculated to assess the learners' registration, learners' logs during the course period, learners' participation pattern, assignment submission, quiz participation and certification. The Chi-Square test was carried out using statistical software R to determine the association between various parameters of the study with respect to the geographical area. Analysis was also carried out on identifying the motivating factors for the participants to take part in MOOC during both the pre-covid and covid-19 periods.

Chi-Square test (χ2)

where, O is the observed frequency and E is the expected frequency

Findings and Discussion

The present study was carried out for the overall assessment of the adoption pattern of learners during the pre-covid and covid-19 period with respect to the following parameters.

Analysis of Learners' Participation in MOOCs during Pre-covid and Covid-19 Period

Course registration patterns, active participation, assignment submission pattern, participation in quizzes and

learner certification were analysed during both periods of MOOCs. Figure-1 shows learners' overall participation in various activities during pre-covid and covid-19 periods. A total of 2,259 learners registered in the covid-19 period, which was 127 per cent higher than the 992 learners registered in the pre-covid period. This clearly shows that the learners have evinced more interest during the pandemic period to participate in online programmes like MOOCs to utilise their time at home more effectively.

Figure-1: Learners' Participation Pattern of MOOC during the Pre-covid and Covid-19 Periods
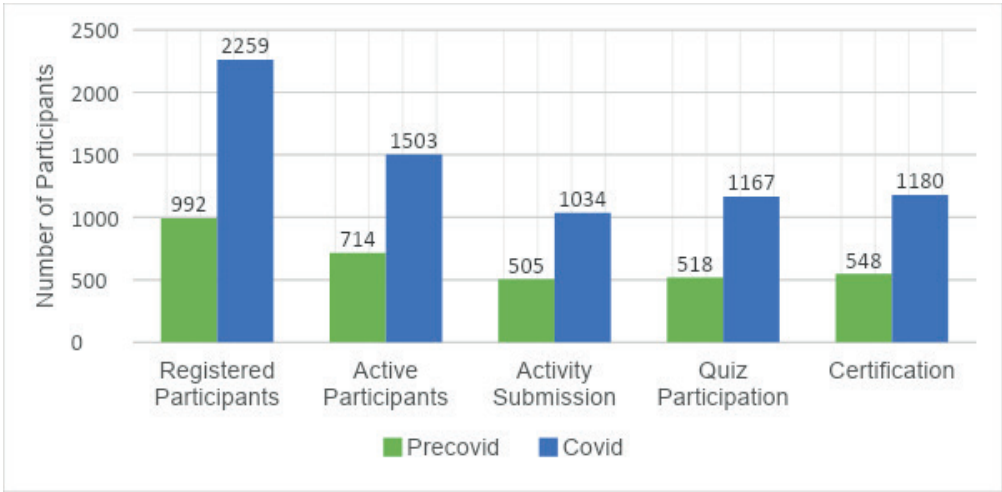
The number of active learners during the pre-covid was found to be 714 as compared to 1503 during covid-19 periods, thereby indicating an increase of 111 per cent. A similar trend was observed for course completion, with 1,180 learners completing successfully during the covid-19 period as against 548 during the pre-covid period. This indicates 115 per cent increase in course completion. There was a significant increase in the number (more than 100 per cent increase) of learners' participation in all activities during the covid-19 period. It further indicates that because of the covid-19 (lockdown) situation, the learner might have got more time to participate in all activities to complete the course successfully. The pandemic seems to have compelled the learners to attend online courses for their capacity development as they could not attend conventional training programmes.

Analysis of Learners' Engagement in Courses

Milligan et al., (2013) stated that understanding the learners' engagement is critical to the success of any online education, with the requirements that the learner should self-motivate and self-direct their learning. They identified confidence, prior experience, and motivation as the key factors of learners' engagement in MOOCs. An attempt was made in this study to quantify the engagement pattern of the learners in both MOOCs.

Table-1: Week-wise Analysis of Learners' Engagement (through number of hits) in MOOCs during Pre-covid and Covid-19 Period

Week	Number of hits during Pre-covid	Number of hits during covid-19	Change (%)
1	16,392	51,360	213
2	21,558	31,534	46
3	29,807	71,387	140
4	50,877	91,020	79
Total	118,634	245,301	107

Learners' engagement in the course was analysed through the week-wise course login details i.e. viewing the course content, discussion forum participation, interaction with faculty, assignment and quiz submission etc. As shown in Table 1, the learners' participation was growing exponentially from week 1 to week 4 during both MOOCs except for the second week of the covid-19 period as this week contained fewer activities compared to the previous MOOC. Learners' participation was highest in the final week of the 4 weeks because of more activities like completion of viewing course content, assignment submission and quiz participation. It was also observed that the covid-19 period had 107 per cent more participation compared to the pre-covid period.

Figure - 2: Day-wise Analysis of Learners Interaction in MOOCs during Pre-covid and Covid-19 Period

Weekly peaks
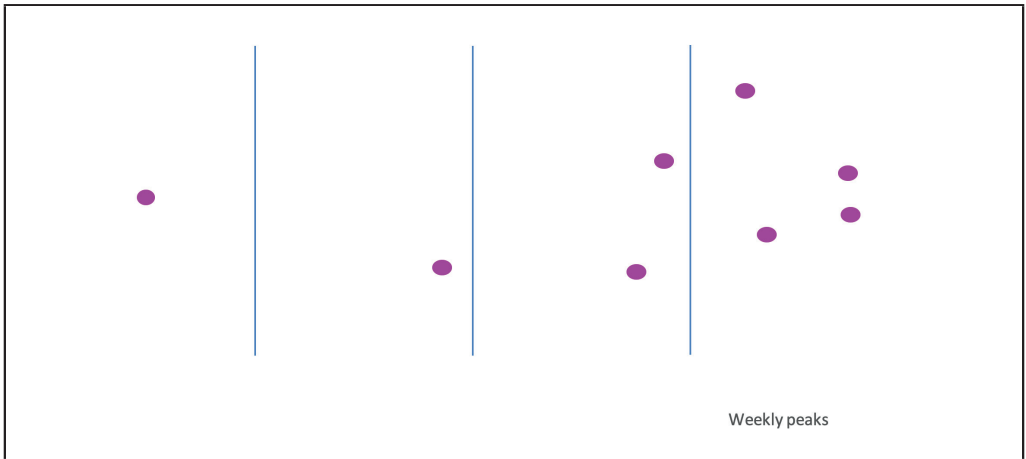
As shown in Figure-2, during the covid-19 period, there were more hits than the pre-covid period for 28 days out of 30 days. Average hits per day during the pre-covid and covid-19 periods was 3,954 and 8,176, respectively. The maximum number of hits in a day was 11,059 and 20,531 during the pre-covid and covid-19 periods respectively. It is observed from Figure-2, there was a peak in the 2nd, 3rd, 4th week of the pre-covid period and 3rd, 4th week of the covid-19 period which captures learners' engagement in activities like assignments, doubt clarification or discussions which were planned towards the end of the week.

Region-wise Learners' Engagement in MOOCs during Pre-covid and Covid-19 period

India is a vast country with varying landscapes of cultural and sociological factors. Hence, the study also considered identifying the demographic regions of the country which responded well to adopting online learning during the covid-19 period, with the benchmark of similar study for the pre-covid period.

Region-wise Course Registration Pattern

As seen in Table-2, the participants' registration had increased in all six regions of the country during the covid-19 period. In particular, the remote areas like the Northeast region recorded the highest increase of 383 per cent. It shows that MOOC is an effective model for reaching the unreached (difficult areas) people during this pandemic situation. It was followed by the South region which showed an increase in registration by 155 per cent during covid-19. This was followed by North, Central, East and West regions.

Table-2: Region-wise Participants' Registration Pattern in MOOCs during Pre-covid and Covid-19 Period

S.No.	Region	Pre-covid (Numbers)	Covid-19 (Numbers)	Change (%)
1	Central	42	81	93
2	East	77	148	92
3	North	151	371	146
4	Northeast	12	58	383
5	South	396	1011	155
6	West	314	590	88
Total		992	2259	128

Region-wise Pattern of Active Participants

MOOC is known for high drop rates thereby resulting in low active participation in the course. This study focused on the "activity pattern" of those active participants across the different regions of the country. Learners who participated at least in any one of the activities or viewing content were highlighted in Table-3. The South region had the highest number of active learners among other regions and less number of active learners from the Northeast region in both courses. Even though the Northeast region had less number of active learners, it showed the highest increase in percentage (425 per cent) during the covid-19 period. It indicates that Northeast learners have more proactively participated during the pandemic situation.

Table-3: Region-wise Active Participants in MOOCs during Pre-Covid and Covid-19 period

S.No.	Region	Pre-Covid (Numbers)	Covid (Numbers)	Change (%)
1	Central	29	51	76
2	East	53	95	79
3	Northeast	8	42	425

4	North	104	229	120
5	South	282	725	157
6	West	238	361	52
Total		714	1503	111

Region-wise Assignment Submission Pattern

Learners were expected to submit the assignment for successful course completion. Results revealed that assignment submission of participants increased in all six regions during the covid-19 period compared to the pre-covid period. The Northeast region had less number of assignment submissions.

But, there was the highest percentage of increase that was asserting much improvement compared to pre-covid period. The West region had the least percentage of increase in the submission of assignments compared to other regions. The highest number of South region learners has submitted their assignments which was the second highest increase in percentage compared to the pre-covid period.

Table-4: Region-wise Assignment Submission Pattern of Participants during Pre-covid and Covid-19 Period

S.No.	Region	Pre-covid (Numbers)	Covid (Numbers)	Change (%)
1	Central	16	30	88
2	East	31	78	152
3	North	77	181	135
4	Northeast	5	33	560
5	South	188	566	201
6	West	201	279	39
Total		505	1034	105

Region-wise Participation Pattern in Quiz

Quiz is an important aspect of online learning as it gauges how much a learner learned from the course. It also helps to assess knowledge and understanding of the course content (Kalantzis & Cope, 2012). Table-5 indicates a total of 125 per cent increase in quiz participation during the covid-19 period and also

indicated that all regions have recorded more than 100 per cent increase in quiz participation during the covid-19 period except for the Central and West regions. The Northeast region had the highest increase in percentage of quiz participation whereas the West region recorded the least increase in percentage of learners' participation in the quiz.

Table-5: Region-wise Learners' Participation Pattern in Quiz during Pre-covid and Covid-19 Period

S. No.	Region	Pre-covid (Numbers)	Covid (Numbers)	Change (%)
1	Central	14	28	100
2	East	36	65	81

3	North	75	163	117
4	Northeast	6	26	333
5	South	187	514	175
6	West	187	238	27
	Total	518	1167	125

Region-wise Learners' Certification

Course completion certificates were awarded to the learners who fulfilled the assignment submission, discussions and quiz participation with more than 40 per cent score. In the South region, the highest number of learners were awarded completion certificates during the covid-19 period. But in the pre-covid period, the South region had the second highest certified learners. In the Northeast region, 4 times more learners were awarded certificates during the covid-19 period compared to the pre-covid period. More than double the number of learners got certificates compared to the pre-covid period in all regions except the East and West region.

Table- 6: Region-wise Learners' Certification in MOOCs during the Pre-covid and Covid-19 period

S. No.	Region	Pre-covid (Numbers)	Covid (Numbers)	Change (%)	Pre-covid Completion Rate (%)	Covid Completion Rate (%)
1	Central	18	32	78	3.3	2.7
2	East	37	78	111	6.8	6.6
3	North	78	183	135	14.2	15.5
4	North East	7	33	371	1.3	2.8
5	South	201	573	185	36.7	48.6
6	West	207	281	36	37.8	23.8
Total		548	1180	115		

Association between Region influence on Learners and Learners' Participation

A Chi-square test was carried out to check whether there is any association between regional influence on learners and learners' participation during the pre-covid and the covid-19 periods with respect to registration, discussion, assignment submission, quiz participation and certification.

Null hypothesis (H0): There is no significant association between any region influence and learners' participation during the pre-covid and the covid-19 periods in terms of registration, discussion, assignment, quiz and certification.

Alternative hypothesis (H1): There is a significant association between regional influence and learners' participation during the pre-covid and the covid-19 periods in terms of registration, discussion, assignment, quiz and certification.

Data pertaining to during pre-covid and covid-19 period performance is given in Table 6. The statistical analysis showed

that P-value and chi-square values are 0.001 & 20.06 for learners' registration in the MOOCs, respectively. For active participants in MOOC, the P-value and chi-square value is 0.001 & 31.32 respectively. P-value and Chi-square value is 0.001 & 39.52 respectively for learners' assignment submission in the MOOC platform. In the case of quiz participation, the P-value and chi-square value is 0.001 & 46.13, respectively. For the MOOC certification P-value and chi square value is 0.001 & 42.18, respectively. Since, the P-value is less than 0.01 level of significance for all variables, it can be concluded that there was a significant association between regional influence on learners and learners' participation with respect to registration, active participants, assignment, quiz and certification during the pre-covid and the covid-19 periods.

Table-7: Association Analysis of Regional Influence on Learners and Learners' Participation

S. No.	Variables	Chi-square value	P-value
1	Registration	20.06	<0.001**
2	Active Participants	31.32	<0.001**
3	Assignment	39.52	<0.001**
4	Quiz	46.13	<0.001**
5	Certification	42.18	<0.001**

** Significant at 1% level

Gender-wise Learners' Participation in MOOC during Pre-covid and Covid-19 period

The study also explored the gender influence on learner participation during both the periods.

Gender-wise Course Registration Pattern

The registration pattern of learners is given in Table-8 which described that total 627 male participants registered in the pre-covid period whereas 1,364 (118 per cent increase) registered in the covid-19 period. Female participants registered in the pre-covid and the covid-19 period were 365 and 895, respectively. Male participants registered more than females in both courses during the pre-covid and covid-19 periods. This is in agreement with the findings of Wu and Chen (2017), who reported registrations of 59.1 per cent of male learners as compared to 40.9 per cent of female learners for MOOCs. Another study by Kaveri et al., (2016) who reported that 72 per cent of learners were males, also corroborates this fact. However, it was observed that the female learners had the highest increase in percentage (145 per cent) as compared to males (118 per cent). It shows that female learners actively registered during the covid-19 period more than male learners.

Gender-wise Pattern of Active Participants

Results (Table 8) indicated an overall 111 per cent increase in participation in the course like, viewing the course content, participating in the discussion forums, assignment submission and taking final quizzes during the covid-19 period. Out of these, more percentage (122 per cent) of female learners actively participated in the covid-19 period compared to male learners.

Gender-wise Assignment Submission Pattern

Table 8 shows that male and female participants have equally submitted the assignments as a part of course completion. Coincidentally both genders registered a 105 per cent increase in assignment submission during covid-19 period.

Gender-wise Learners' Participation Pattern in Quiz

Table 8 indicates that nearly more than double of the learners of both genders were involved in attempting quiz during the covid-19. Out of this 132 per cent and 122 per cent increase in female and male learners for attempting quiz during covid-19 respectively.

Gender-wise Learners' Certification

More number of male learners got the certificate in the covid-19 period but the increased percentage is less compared to females. It shows that during the covid-19 period more percentage of female learners participated to get the certificate. It may be interesting to note that Healy (2017), had observed that female performance in online programmes was low probably because of differences in internet access, language and other psychological barriers. However, the covid-19 seems to have maintained a similar trend in accessing online courses for both genders because of equal opportunities to access the resources because of stay-home learning.

**Table- 8: Gender-wise Participation in MOOCs during Pre-covid and Covid-19 period**

Categories	Gender	Pre-covid (Numbers)	Covid-19 (Numbers)	Change (%)
Registration in MOOC	Male	627	1364	118
	Female	365	895	145
	Total	992	2259	128
Active Participants in MOOCs	Male	447	911	104
	Female	267	592	122
	Total	714	1503	111
Assignment Submission Pattern	Male	309	633	105
	Female	196	401	105
	Total	505	1034	105
Quiz Participation Pattern	Male	319	707	122
	Female	199	460	132
	Total	518	1167	125
Learners' Certification	Male	338	715	112
	Female	210	465	121
	Total	548	1180	115

Motivating Factors to Learners' Participation in MOOCs during Pre-Covid and Covid-19 Period

Data for this analysis was taken from the learners' feedback submitted through a google form. Figure-3 illustrates the different factors that motivated learners to enroll in the course during the pre-covid and covid-19 period. Results revealed that in courses, knowledge purpose and career advancement were the important motivating factors. Knowledge purpose (52.5 per cent) and career advancement (47.3 per cent) was the greatest influencing factor during the covid-19 and pre-covid periods, respectively.

The second-highest motivating factor was career advancement (42.9 per cent) and knowledge purpose (43.8 per cent) during the covid-19 and pre-covid periods, respectively. It shows that personal development was an important influence for learners to enroll in MOOCs. Seniors' advice, lack of time for conventional courses and recognition as NAARM alumni were the least (less than 5 per cent) stimulating factors for learners during these two MOOCs. This finding is in agreement with that of Alario-Hoyos et al., (2017) who indicated intrinsic goal orientation and self-efficacy as the strong factors for enhancing learning and performance in a MOOC.

Figure-3: Motivating factors for Learners' Participation
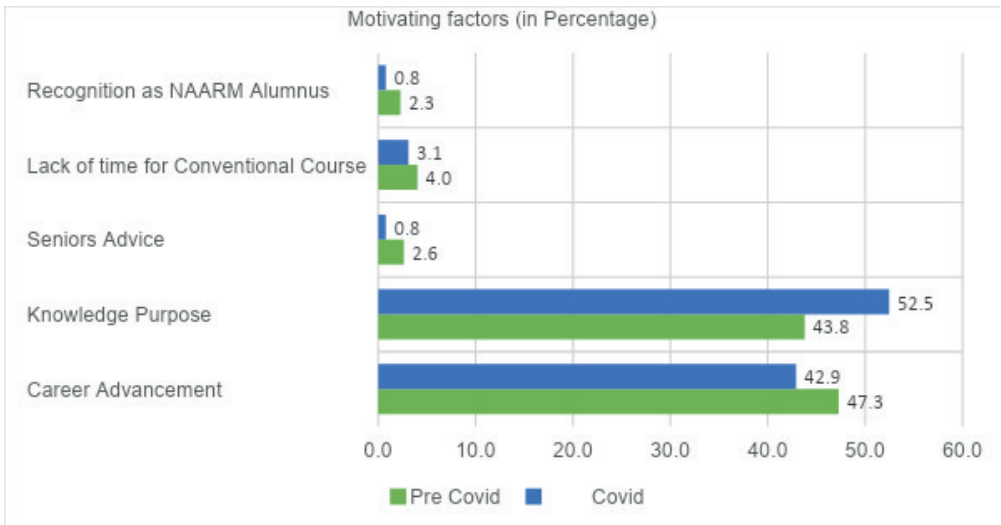
Conclusions

The study has emphatically established the fact that learners have actively moved towards online education in the form of MOOCs during the covid-19 period. The study on the geographic and gender distribution of learners has reinforced the fact that MOOCs can be an effective mode of learning to reach remote and unreached areas and also to encourage participation among both genders equally. The study has far-reaching relevance and impact for a country like India where there is a humongous magnitude of learners to be provided with the education, coupled with challenges like the covid-19 scenario. The practice of MOOC can thus be institutionalised among all educational organisations for effective and inclusive education.

Implications and Recommendations

The findings reveal a positive shift towards adopting MOOCs, in the wake of covid-19. This augurs well in line with the National Education Policy (NEP) 2020 which highlights the role of technology in online education.

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A Study on the Attitude towards E-Learning and its Implication on School Children during Covid-19 Pandemic

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Abstract

E-learning is a network-enabled, computer-mediated learning of skills and transfer of services. E-learning functionally rests on computer-based virtual learning and education where the content is delivered by audio-video tape, CD-ROM, satellite TV and Internet, which had revolutionized the field of education since the beginning of the 21st century, but its impact was not felt as strongly in the traditional system of education until the COVID-19 catastrophe. This study explores the effect of sudden changes in the form of online education and e-learning that happened to the education system during the covid-19 pandemic in India. Certainly, the pandemic made us move towards a new normal but does it apply equally to the education system as well? The primary concern of this study was to explore the implication of online learning on school children through exploring their own lived experiences, therefore, it entails the researcher to adopt a mix-method research technique in order to collect and analyse the data. This paper especially focuses on the personal experiences of school-going children who had been the most vulnerable during the pandemic and hence it also brings into focus the problems faced by them during online classes.

Keywords: E-learning, web content, technology, paradigm shift, Pragyata guidelines, Manodarpan, Government of India.

Introduction

Under Covid-19, educational institutions are transforming teaching-learning activities from direct, one-to-one interaction in a live classroom to e-learning and online teaching. E-learning is now becoming the new normal in the backdrop of Covid-19 after the state had imposed a nation-wide lockdown for a relatively long period and imposed restrictions on the opening of educational institutions such as schools, colleges and universities. E-learning became imperative to educational institutions that had to adopt and adapt themselves according to the new normal. Students willingly or unwillingly adjusted to e-learning using web-based applications and online education for their school-based learning activities.

E-learning and online teaching is not a new phenomenon. After the advent of video sharing platform YouTube where anyone can upload videos, certain educationists such as those facilitated by Unacademy, Byjus, Vedantu, Study IQ and alike, had been creating their own YouTube channels and had been uploading informative and educational videos. Scholars have been sharing their research papers in PDF format on Google Scholars and other search engines, many research journals and publications, news and print media are already on the internet providing web-based learning materials. However, when school learning is considered,

it is definitely the newest attempt and one of its kind. Though etymologically e-learning covers any electronically mediated learning, it can be defined from different perspectives as attempted by many researchers such as Grimes (2009, quoted in Mishra and Mishra, 2013) who define "e-education refers to the application of internet technology to the delivery of the learning." E-learning means electronic learning, so it refers to a wide range of processes and applications which are designed to deliver instruction through electronic means (Mishra and Mishra, 2013). So it appears that the definition of e-learning is broader than but includes online learning, web-based training or computer-based training but most importantly it signals the paradigm shift in education and training that is in progress (www.virtual-college.co.uk)

Review of Literature

A systematic review was taken to investigate the impact of e-learning on school children however, most of the research work focused on the worth and merit of e-learning and the changes e-learning brought in the wake of globalization. Research especially related to its implication on school children during the pandemic was too scarce, apart from some newspaper articles which voiced the concerns of the educationists and parents. There is a multitude of advantages and disadvantages of online learning as exhibited by Khan and Setiwan, 2019, their work also examines the ways to overcome these drawbacks, the researcher-duo suggests that students should not only "read the materials, listen to the lectures, but also participate in the observation and experience certain educational or teaching scenario and acquire skills in action". A study conducted by Allworth, 2014, also emphasized maintaining good communication between the

learner and the instructor, especially at the postgraduate level, one can see that even if learning is enabled with the help of machines it cannot eliminate the human element. Ensuring the importance of reflective thinking in the education process Al-Fahidi, 2008, explores whether, at a higher educational level, there is a link between the students' computer competency and their attitude towards e-learning. He found that 77.8 per cent of participants responded with the acceptance that the course helped them in improving their critical thinking. Ruiz J G et.al, 2006 also probed the role of e-learning in medical education by outlining the effectiveness and faculty development needs for the implementation, evaluation and strategies for e-learning in academic scholarship, whereas Trubina and Anna, 2016 highlight the nurturing activities involved in e-learning in the information society. They explore the claim of information technology of modifying the flow of the mental process of the cognitive activity of students, rebuilding the structure and function and thereby changing the whole structure of the training activities.

Need of the study

From students' perspectives learning on school premises had fundamentally included participation, inspiration and collaboration between teachers and peers but a sudden change in the pattern of school education during the pandemic and the lack of human communication in e-learning and online teaching had strongly influenced the academic performance of our young children so much that it might have brought a change in the attitude and belief system of the students. It is also evident that attitudes are not formed instantly rather they brood over time yet this unexpected alteration in the pattern of school education may have influenced the student's attitude

negatively, but we are not sure about it. Whether this online education had been advantageous or disadvantageous to school children had been a contentious issue and a matter of debate among academicians, educationists, government and alike. In the past two years, many newspaper articles had been published that had emphasized the effect of online education on the mental and physical health of school children. An article published by India Today in its online print dated September 18, 2021 and titled "effects of online education on mental and physical health" quotes that "attending online classes from home has led to a string of mental and physical health issues for both students and teachers".

It thus becomes very much pertinent and imperative to conduct research work in this current, ongoing scenario, to probe deeper into how this online education and e-learning are affecting our younger generation. Apart from the physical and mental problem that is posed by online education, are there some other problems or issues that the students are facing? Does online education help students progress in their studies or is it a deterrent and imposing restrictions and hindering their academic achievement, performance and growth? What implications and prospects does it hold for the students and other stakeholders? With these questions in mind the researcher was very much intrigued to look for answers to the following research question:

Research Question

1. What is the attitude of students toward e-learning?

2. Is E-Learning effective enough in imparting quality education?

Statement of the Problem: The present study is entitled, "A Study on the Attitude towards E-Learning and its Implication on School Children during the Covid-19 Pandemic".

Operational definition

1. **E-Learning-** It refers to the education provided to the students in a virtual setting using technological devices and web-based applications.

2. **School children-** In this study, school children refer to students of class 9 enrolled in any government, private, aided or unaided school.

3. **Covid-19 Pandemic-** It refers to the pandemic stage in India, during which a nationwide lockdown was imposed on the country and the schools remain closed during the first wave and the second wave of the pandemic.

Objectives of the study: The objectives for the present study are bifurcated according to the phases: Quantitative and Qualitative.

Objectives for the Quantitative Phase:

1. To study the attitude of students toward e-learning.

   1.1 To study the attitudes of students towards e-learning with respect to their following personal variables-

      (a) Type of school (Government and Private)

      (b) Gender (Boys and Girls of government schools)

      (c) Gender (Boys and Girls of private schools)

Objectives for the Qualitative Phase:

1. To study the advantages and disadvantages of e-learning as perceived by the students.

2. To study the problems and challenges, if any, faced by the students during e-learning.

3. To study the coping strategies if any adopted by the students to cope during e-learning.

Research Hypothesis:

Research hypothesis for objective number 1.1(a), 1.1(b) and 1.1 (c) with reference to the personal variables were formulated as-

HR1: There is a significant difference between the attitude of students of private schools and students of government schools towards e-learning.

HR2: There is a significant difference between the attitude of male and female students of government schools towards e-learning.

HR3: There is a significant difference between the attitude of male and female students of the private schools towards e-learning.

Null Hypothesis:

A Null Hypothesis is a statement of 'no effect' or 'no difference' present. The statement is being tested against research hypotheses. The null hypotheses of the study were:

HO$_1$: There is no significant difference between the attitude of students of private schools and students of government schools towards e-learning.

HO$_2$: There is no significant difference between the attitude of male and female students of government schools towards e-learning.

HO$_3$: There is no significant difference between the attitude of male and female students of private schools towards e-learning.

Methodology

Under Mixed Method Approach this study was conceived to carry out in two phases, Quantitative and Qualitative. In the present study quan→QUAL sequential design (Explanatory Field Study) had been used. Here in this study, the quantitative phase of the study was done before the qualitative phase of the study and the qualitative data collected was used to interpret and contextualise the quantitative finding.

Population

The population for the study was defined as all the students of class 9 of secondary schools studying in government and private schools of Varanasi district during the session 2020-2021.

Sampling technique

Maximum variation case under the Purposive sampling technique was employed for drawing the sample of the present study. Since the pandemic was in continuation, random sampling was not possible, because schools were functioning with only 50 per cent strength of the students; and that too based on odd-even roll numbers, also any unauthorized, newcomer or independent researcher was not received warmly inside the school premises. A total of 104 samples were drawn from the population, 50 students from government schools and 54 students from private schools which comprised the sample for the first phase of the study. For the second phase of the study a subset (i.e. outlier case) from the first sample was drawn to constitute the sample.

Tools of the study

1. For the first phase (quantitative) of the study, an E-learning Attitude Scale (ELAS) developed by Bhalla and Rani, 2016, was used to

measure the attitude of students towards e-learning.

2. For the second phase (qualitative) of the study a semi-structured interview schedule constructed by the researcher was used.

Research Procedure: As per the availability of the students in the schools according to the odd-even roll number, the E-Learning Attitude Scale (ELAS) was given to the students, after the first phase of data collection, the scoring and analysis were done and z-scores of all the students were interpreted. For the second phase of the study, a sub-set of 10 students who either scored too high or too low on ELAS (i.e. outlier case) were selected as a sample from the first sample set. These students were interviewed, discourse analysis was employed followed by coding, themes were identified and thematic analysis in terms of research questions was done.

Findings of the study

Objective No.1: To study the attitude of students towards e-learning.

The following table shows the analysis done on the part of achieving objective no. 1:

Table-1: Table showing the Mean, Standard Deviation and its Interpretation of ELAS for students of class 9

Students	No.	Mean	Standard Deviation	z-score	Interpretation
All students	104	104.64	10.99	-0.15	Average favourable
Government school	50	100.56	12.87	-0.38	Average favourable
Private school	54	108.42	7.04	0.09	Average favourable

Discussion:

The analysis of the data shows the combined mean as well as separate mean for both the government school students and the private school students. The total means for all the students was 104.64, whereas the mean scores of government school students and private school students were 100.56 and 108.42, respectively. These scores when transformed into z-score, the norms for the interpretation of z-score resulted into Average Favorable Attitude towards E-Learning. It can also be interpreted as although the students are slightly inclined towards e-learning but still there are some obstacles that hinder the extremely favorable or even moderately favourable attitude of students towards e-learning.

Objective No. 1.1 (a): To study the attitude of students towards e-learning for the type of school (Government and Private). For the achievement of this objective, the null hypothesis was stated and verified statistically as:

HO$_1$: There is no significant difference between the attitude of students of private schools and students of government schools towards e-learning.

Table-2: Table showing t-test value for an attitude of students of private schools and government schools towards e-learning

Type of school	No. of students	Mean	Standard Deviation	t-value
Private	54	108.42	7.04	
Government	50	100.56	12.87	3.834*

*Significant

Interpretation: The t-value in the above table is greater than 1.96 which reveals that the students of private schools differ significantly (at 0.05 level of significance) than the students of government schools in their attitude towards e-learning. Hence, the related null hypothesis, in this case, is not accepted. Students from Private schools have a more positive attitude towards e-learning and online education. This may be attributed to the fact that they have much easier access to electronic devices and gadgets compared to government school students, as during the interview one student from a government school mentioned that he does not have a smartphone for his personal use but rather a common device is shared between his siblings to join the online class, whereas all the students from the private school claimed to possess a personal smartphone.

Objective No. 1.1 (b): To study the attitude of students towards e-learning with respect to gender (Boys and Girls of government schools). For the achievement of this objective, the null hypothesis was stated and verified statistically as-

HO$_2$: There is no significant difference between the attitude of male and female students of government schools towards e-learning.

Table-3: Table showing t-test value for attitude of male and female students of government school towards e-learning

Gender	No. of students	Mean	Standard Deviation	t-value
Male	29	100.44	12.91	
Female	21	100.71	12.80	-0.074*

*Not Significant

Interpretation: The statistical analysis shows that at (df=48) at 0.05 level of significance, the calculated t-value (t= -0.074) was found to be not significant for difference in mean score of male and female students of government school on their attitude towards E-learning. Hence, the related null hypothesis in this case was accepted. Thus it is inferred that the male students of government school do not differ significantly in their attitude towards e-learning and online education than the female students of government school.

Objective No. 1.1 (c): To study the attitude of students towards e-learning with respect to gender (Boys and Girls of private schools). For the achievement of this objective, the null hypothesis was stated and verified statistically as-

HO$_3$: There is no significant difference between the attitude of male and female students of private school towards e-learning.

Table-4: Table showing t-test value for attitude of male and female students of private school towards e-learning

Gender	No. of students	Mean	Standard Deviation	t-value
Male	25	110.56	7.15	
Female	29	106.58	6.39	2.235*

*Significant

Interpretation: The statistical analysis shows that at (df =52) at 0.05 level of significance, the calculated t-value (t= 2.235) was found to be significant for the difference in the mean score of male and female students of a private school on their attitude towards E-learning. Hence, the related null hypothesis, in this case, is not accepted.

Thus, it is inferred that statistically, both male and female students of private schools do differ significantly in their attitude towards e-learning. The male students of private schools have an above-average favourable attitude towards e-learning and online education.

Objective No.2: To study the advantages and disadvantages of e-learning as perceived by the students.

Advantages of E-Learning and Online Education

1. **Ubiquitous, Omniscient and Universal-** One of the most common advantages of online education that emerged under this study was that since online education does not require the face to face interaction between the learner and the instructor, and can be imparted from any place, at the ease of our home, where-ever we find good connectivity and as long as our technical devices are working it gives ease to both the students and teachers to log-in to their account and connect in a virtual setting, who may be distant physically but connected virtually.

2. **Collaboration between teacher and students-** Many respondents were of the view that there was present vitality and synergy, whenever they will see their teachers and other fellow students online, since they were distant apart due to lockdown and other restrictions they still felt connected with them not in terms of virtual connectivity but emotional connectivity.

3. **Student-centered-** Some students were of the opinion that online classes kept them very attentive as they did not want to miss important teaching points and that the teacher's focus was also on the students. The whole learning process revolved around the needs of the students.

4. **Access to resources-** Since the online classes were carried on via web-based applications such as Zoom or Google meet, it was very much feasible for the teachers to even share their screen and whiteboard, sharing videos and alike made the lecture intriguing and engaging. Moreover, many other resources were also available online such as sidebooks, animated videos, research papers and materials that aided and facilitated online education and e-learning.

Disadvantages of E-Learning and Online Education

1. **Equity and accessibility to technology-** Since the respondents of this study were from all sorts of schools, one clear thing that was visible from their responses was the great digital divide this online education had created. And this division only worsened on the pretext of non-accessibility, non-availability of technological devices, internet connections and reach to internet resources. One of the respondents who were in a government school and belonged to a lower-income group said that "*I really want to study, but my parents can afford only one smartphone with a data pack and that too is shared between my other siblings, I get only a small time-duration to attend the classes*".

2. **Computer literacy-** Computer literacy is not something that is widely spread in our country. The parents, students and teachers as well fidgeted with the peripherals and other devices. Some students had not known before how to connect to live classes or make an email account or use zoom and google meet. This condition was more widespread among those students who belonged to government schools and had lesser interactions with the latest technologies.

3. **Limitations of technology-** Even those students who were apt to techniques and tools and had access to the internet also faced serious limitations posed by the technology. Most of the students complained about the lesser speed of the internet, lower bandwidth and network issues and alike. Sometimes due to network failure, they sometimes failed to write their online exams.

Objective No. 3: To study the problems and challenges, if any, faced by the students during e-learning.

1. **Effect on Physical health of students-** almost all respondents were of the opinion that increased screen time is causing several health issues such as headache, burning sensation in eyes, weak eye-sight issues, increase in the number of vision if using spectacles, rashness and dryness of eyes. Apart from these, lack of movement, low physical exercise/work, constant sitting in front of mobile and tablets and deformed posture cause serious pain in the neck and backbone. Increased weight and habit of munching during online classes were also highlighted by some respondents.

2. **Effect on Mental health of students-** the students mostly were of the opinion that online teaching has created a gruesome burden on them because in addition to attending regular online classes they need to prepare for class assignments, tests, and other activities and that too recorded. Lack of interest in studies, monotonous timing of class, switching off camera and lack of co-curricular activities put a lot of mental stress and anxiety on students. The respondents complained that concentration plunged, which makes it difficult for most of the students to keep up with the teaching-learning activities.

As the period of lockdown during the first wave was extended for educational institutes even after June, the Union Ministry of Human Resource and Development (now Ministry of Education) released the PRAGYATA guideline on July, 14 2020. The MHRD released the PRAGYATA guidelines

on Digital Education, with an aim to improve online education and ensure the safety and academic welfare of the students by Plan, Review, Arrange, Guide, Yak (talk), Assign, Track, and Appreciate (PRAGYATA).

"The COVID-19 pandemic sternly impacted schools and children across the globe, in India alone, over 240 million children have had to face a negative impact of the pandemic in terms of education. To overcome the loss faced by schools or the children, the Government of India initiated the Digital campaign for a conducive environment for moving towards digital education" (MHRD, 2020).

Some important guidelines extended through this were-

• Keeping an overall and holistic development of the learners with an aim "*to cut down undue screen time*".

• Guidelines also tend to cater to a diverse set of stakeholders including school heads, teachers, parents, teacher educators and students.

• The guidelines stressed the use of an alternative academic calendar of NCERT, for both, learners having access to digital devices and learners having limited or no access.

The duration of classes as per the PRAGYATA guidelines are as follows:

Division	Screen Time for students
Pre-primary students	Not more than 30 minutes a day
Elementary classes	Not more than 2 online sessions per day, 30 to 45 minutes each as decided by states and UTs
Secondary classes	Maximum four sessions per day, 30 to 45 minutes each as decided by the concerned state/UT government

Whether the schools are following these guidelines or not is a matter of grave concern as well as an area to be researched.

Objective No.4: To study the coping strategies if any adopted by the students to cope during e-learning.

All of the students (10 in number) denied using any coping strategies, it was obvious that online education had definitely put them under a lot of pressure and apart from muting their audio or switching off the camera, students didn't come up with any other strategy to deal with the stress, anxiety and fatigue faced by the students. Even most of the respondents fumbled on this aspect because reaching the timeline and completing the course and maintaining another academic record

was a pain-taking task that they needed to do or otherwise fear of losing their rank among their peers exhausted them mentally.

Showing great concern for the young generations of our country, the HRD ministry in July launched MANODARPAN: An initiative to provide psychosocial support to students for their mental health and well-being during the COVID-19 outbreak and beyond. The following components and features are encompassed in this novel initiative: -

• **Guidelines for all-** advisory guidelines for students, teachers and faculty of school systems and universities along with the families of the learners had been incorporated under this section.

- **Self-directed web page-** the web page on the MHRD website carries advisory, practical tips, posters, videos, do's and don'ts for psychosocial support, FAQs and an online query system that can be retrieved by the user.

- **Tele-counselling-** a national level database had been accordingly placed along with a directory of counsellors at the school and university level whose services are offered voluntarily to learners for tele-counselling service on the national helpline.

- **National toll-free helpline-** the launch of a toll-free helpline number by the MHRD for a country-wide outreach to students from school, universities and colleges is operated by a pool of experienced counsellors, psychologists and other mental health professional and is sought to well continue beyond the COVID-19 pandemic.

- **Handbook on Psychosocial support-** a learner-friendly handbook on psychosocial support enriching life skills and well-being of students is also published online. The booklet includes FAQs, facts and myths and covers ways and means to manage emotional and behavioural concerns.

- **Interactive online chat platform-** for direct contact, counselling and guidance by psychologists and other mental health professionals available for students, teachers and families during COVID-19 an interactive online chat platform had also been provided on this web page.

- And apart from the components of webinars, audio-visual resources including videos, posters, flyers, comics and short films had also been scheduled to be uploaded as additional resource materials on the webpage. A section on peer support from others is also a special feature of this web page.

Yet again, how many students, teachers, parents and school administrators are actually aware of such a support system is a matter of investigation. It is very well evident that at least those sampled in this study did not know about any such initiative taken by the government

Conclusion

Overall, we can say that online education has some serious repercussions on the part of students and their learning. This research work provides us with an insight that although the impact of online education is far-reaching, the effect of learning via a computer at home may vary for different backgrounds of students. It is important to remember the extraordinary challenges many students face during e-learning and online education. Young children had to scramble to figure out how to do school in quarantine. Remote learning has taken a huge toll on many kids. Students are left unattended at home during their online learning if both parents are working. Even many students who had parents who could be home with them struggled with the demands and expectations of online school. If our country is to advance technologically, we first need to lessen the digital divide and the government and educational institutions should formulate sound policies based on sociological and psychological frameworks if we are to proceed in the direction of online education and e-learning.

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Online Learning during Pandemic in India: Parents' Perspective

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Abstract

COVID-19 has impacted several economies globally, with most countries closing their academia resulting in the transition of face-to-face classes to online learning and later converted into the blended mode of education. This has affected over 320 million students in India. With self-initiative and parental involvement along with internet availability, online education has become a household function. "Learning Enhancement Guidelines", issued by MHRD, puts the focus on parents' role in online learning. This paper is an attempt to understand the perceived role and contributions of the parents in the learning of their wards under online learning. Parents contributed in various ways to online learning for their wards but they faced a lot of issues and challenges in the online mode of education for their children. For many parents, financial crunch, lack of infrastructure for online learning and lack of technological skills to help their wards in handling online classes and providing relevant educational resources, lack of subject content understanding to support the learning of their wards were major challenges in online learning during the Pandemic.

Keywords: Pandemic, Online Learning, Parents' Perspective,

Introduction

The COVID-19 Pandemic brought a sudden halt to all essential services including education. As the lockdown was eased in stages, essential services including the educational sector restarted in a phased manner. Even though the quarantine and movement restrictions were relaxed in various economies, the track to normalcy and recovery is expected to be very slow and uncertain.

Online learning became the new custom. With the rise of the new online model, the education sector faced a new challenge of managing the schedule of such online learning. Parents as well as teachers need to be well-versed in technology to adapt to this new format. Online learning was not only the need of the hour but it is fully supported by NEP 2020 also.

NEP 2020 recommends a multi-modal approach to learning including face-to-face learning, online learning and distance learning or virtual learning thereby focusing on online teaching-learning. Online mode of learning not only gives round the clock facility but defeats the time limitation also. Though there were many teaching methods available, with the sudden emergence of the pandemic, the online mode of learning came as "Best of all worlds". NEP 2020 gives the flexibility to students to choose the activities which suit their circumstances, giving it a stature of "a la carte model".

"On 14 July 2020, MHRD proposed some guidelines for online classes under "Pragyata", recommending a cap on screen time for students with two online sessions of up to 45 minutes each for classes 1-8 and four sessions

for classes 9-12. It further proposed that the duration of online classes for pre-primary should not be more than 30 minutes" (The Economic Times, 2020).

To keep students busy at home and engage them in continued learning, the National Council of Educational Research and Training (NCERT) has come up with an Alternate Academic Calendar (AAC) for various stages of school learning wherein the teachers will keep in touch with the parents through mobile phones and instruct them of the interesting activities to be conducted at home and also to supervise their children.

This Pandemic has brought with it many new challenges, for not only the teachers and students but also for parents at the same time. Parents' role is intensified to observe the emotional well-being of their wards by providing encouragement and support besides taking care of their physical health while keeping them busy with learning. Parents and other family members need to be vigilant towards the emotional behaviour of children of primary and pre-primary levels. Many Parents were not happy with the decision of reopening the schools. "Reopening Of Schools: Parents Not On Board" clearly indicates the hesitancy shown by parents (Times of India, 2021). On the other hand, some Parents approached the Supreme Court for seeking direction from the Centre and States on reopening of the schools claiming to end the deprivation of regular schooling in a congenial atmosphere for the underprivileged and disadvantaged sections of society (Times of India, 2021). This indicated the wariness of parents towards both modes of teaching-learning, traditional as well blended.

Review of Related literature

Singh (2018) explored the scope & challenges faced by developing countries in digital education including infrastructural bottlenecks, issues of language and attitude from a cultural viewpoint, lack of trained faculty and less tech-savvy parents.

Ali (2019) advocated the necessity and importance of ICT in education, especially for the professional development of educators and opined that ICT like Massive Open Online Courses (MOOCs) offer a potent stage with low cost and higher efficiency. The paper also suggested the ICT options available include videoconferencing and various websites.

Kanvaria (2020) summarized that the confinement at home due to the lockdown has brought about distance learning through digital mode and discussed the factors affecting the teaching cum learning of educators, students and teacher educators. He, however, also commented that this boon of distance learning came together with a question mark over the quality of such education.

Olasile Babatunde Adedoyin & Emrah Soykan (2020) differentiated online learning from emergency remote teaching. CRM methods are adopted without getting into the depth of theories and models of effective online education, and hence should only be taken as a platform for digital education.

Hodges et al. (2020) suggested online education during the Pandemic to be "Emergency remote teaching" which is lacking a prudent design and development process.

Strielkowski (2020) is the forerunner who branded the digital transformation during the Covid-19 crisis as a "Saviour" rather than a disruptive process. He also reiterated that the innovations in the higher education field, which would otherwise take many years to come into existence, appeared in a very short

time, mainly due to the Pandemic.

Wu et al. (2020) studied the effect of the national policy of home quarantine during the outbreak of Covid-19 on the mental health of students' parents in China and found that the mental health of parents was affected mainly by a variety of factors like good marital relationships, social support, harmony in family and history of mental illness. It was found that depression, anxiety and stress were significantly higher in the parents with conflicts in the family than those with a harmonious family.

Kapasia et al. (2020) enumerated challenges faced by college-going students in West Bengal during the lockdown period and suggested interventions required to build a resilient education system.

Gupta (2020) studied the perspective of teachers of schools in the Faridabad district towards Hybrid learning during the Pandemic and suggested recommendations for policymakers and schools.

Rationale of the Study

Many guidelines have been issued by the Government from learner's and teacher's perspectives with a focus on online learning of kids during their confinement at home due to lockdown. During this difficult time of the Pandemic, the most general apprehension is about the quality of education provided by these online methods together with the capability and ability of educational institutions in adapting to them in a substantial manner. Besides this, the COVID-19 fear has brought about many new challenges for parents and families in the learning spectrum.

In the current scenario, where alternative modes are being used for online learning, the parent's role has become even more significant as they spend maximum time with the children's waking hours. Their behaviour, attitude and cooperation will have a mighty impact on their kids. Parents therefore must support their children's cognitive, affective and psychomotor development. Parents' role is crucial and needs to be further studied at length. Hence the purpose of this study is to find the perspective of parents towards the online learning model during this COVID-19 Pandemic.

Research Questions

1. Are the parents aware of the guidelines issued by the government regarding online learning of children at home during the Pandemic?

2. What role and contributions have the parents played/made in their ward's online learning during the Pandemic?

3. What are the challenges faced by parents in their ward's online learning during the Pandemic?

Objectives

1. To study the contributions of the Parents in their ward's online learning during the Pandemic in India.

2. To find out the challenges faced by the parents in their ward's online learning during the Pandemic in India.

Sample

The technique of Purposive sampling was used to collect the data from 93 parents of school-going students for classes k -12 from Faridabad.

Tools

An online survey was conducted to collect the information. A structured questionnaire was designed by authors in Google forms in consultation with

colleagues & experts from the field. On the basis of discussion and the opinion of experts, the dimensions were listed for opportunities and challenges in the questionnaire. The dimensions were technology, discipline, assessment & supervision, socio-economic factors, digital competency, compatibility, workload, health problems, digital divide, human & pet intrusion, flexibility, interactivity, autonomy etc. A rough draft consisting of 35 statements was prepared on the basis of the dimensions. After a try-out, 28 statements were finally shortlisted for the questionnaire. Statements were then placed in logical sequence (dimension-wise). This structured questionnaire was sent to the parents through WhatsApp and E-mail. The survey included some questions designed to reveal parents' awareness of guidelines issued by the Government regarding online learning during school closures at the time of the Pandemic. Two open-ended questions queried parents about their experience while children were being educated at home during COVID-19 school closures.

Analysis of Data

Descriptive statistics was carried out to understand the perspective of Parents. Analysis was done using Google analytics. Analysis of the data was done using statistical tools like a percentage.

Findings of the study

Nearly the majority (59 per cent) of the parents were aware of the Alternative Academic Calendar (AAC) and Learning Enhancement Guidelines issued by NCERT regarding online education and capping screen time for students. Further, the parents (62 per cent) informed that their ward's school was implementing NCERT's Alternative Academic Calendar/guidelines for attending online classes. A large number (41 per cent) of the parents were not aware of AAC as schools have not shared any such guidelines with them.

Most (88 per cent) of the parents told that their wards were using laptops and desktops for online learning at home during the Pandemic. Few (12 per cent) of them reported that their wards had to study through textbooks /books available at home during the Pandemic.

Table-1: Contribution in child's online learning at home during the Pandemic (n= 93)

Parameter	Frequency (n)	Percentage (%)
I am able to contribute to my child's online learning at home during Pandemic		
Through my ICT skills in joining the class (while operating Google meet, Google classroom, YouTube, YouTube Live, Zoom meetings etc.)	32	35
By increasing my ICT skills on my own	17	18
By updating my ICT skills through learning support from my ward's school	11	12
By increasing my subject knowledge	22	24
By providing dedicated study place to my child	38	41

Parameter	Frequency (n)	Percentage (%)
By providing all the required resources in order to study online at home	49	53
By helping in completing home assignments given to my ward	47	50
By providing help from online material available for completing assignments	25	27

Half (53 per cent) of the parents contributed to their ward's online learning during the Pandemic by providing all the required resources in order to study online at home and 41 per cent of the parents could provide a dedicated place for study to avoid any disturbances during online learning at home during the Pandemic.

Some (35 per cent) of the parents could contribute towards their ward's online learning in joining the class and handling the Google meet, Google Classroom, YouTube, YouTube live, zoom meetings etc. Few (18 per cent) of the parents accepted that they had to upgrade their ICT skills on their own to help their wards in their online classes and studies at home during the Pandemic, whereas 12 per cent of the parents got support from the school of their wards in updating their ICT skills.

Half (50 per cent) of the parents contributed to the learning of their wards by helping in completing and submitting/sending assignments in online mode. While some (24 per cent) of the parents reported that they had to update their subject knowledge to contribute towards their wards' online learning at home during the pandemic. Some (27 per cent) of the parents had to search for online material to help their wards in their online learning at home during the Pandemic.

Table-2: Challenges faced by the ward during online learning at home during Pandemic (n = 93)

Parameter	Frequency (n)	Percentage (%)
All the subjects cannot be taught effectively during online classes specially subjects with practical and laboratory sessions	87	94
Lack of physical proximity with peer group hampering emotional and mental well-being of the child	79	85
Complements/encouragement by teachers do not seem to have same positive effect as in traditional teaching	32	35
Background noise of announcement from teachers' side while classes are being conducted	11	12
Commands to pets and interruption from courier deliveries	14	15
Disturbance by phone calls/messages while attending class through phone	19	21
Added pressure as principal and parents are watching their live class performance	25	27

Almost all (94 per cent) parents had the opinion that all the subjects cannot be taught effectively during online classes, especially subjects with practical and laboratory sessions. Most (85 per cent) of the parents reported that lack of physical proximity with the peer group was the biggest contributor in hampering a child's mental and emotional well-being.

Regarding the teaching–learning environment, they reported different kinds of issues and challenges faced by their wards in online learning such as disturbance by phone calls/messages while attending online classes through phone (21 per cent), background noise due to announcements from teachers' side, commands to the pets and courier deliveries at home etc. Some (35 per cent) of the parents also mentioned that compliments and encouragement by teachers did not seem to have the same positive effect as traditional teaching.

Some (27 per cent) of the parents felt that students were under added pressure as parents and teachers were watching their live class performances at home during the pandemic.

Table-3: Contribution towards mental well-being while online learning during the pandemic (n = 93)

Parameter	Frequency (n)	Percentage
I am able to contribute to my ward's mental wellbeing		
By involving the child in fun-filled activities	54	58
By involving the child in physical activities	54	58
By keeping a check on posture while online studies	19	21
By educating/implementing a healthy lifestyle	49	53
By introducing a screen-free zone at home	30	32
By talking with my ward about responsible use of internet	38	41
By discussing with my ward netiquette	30	32

Table 3 shows that the parents contributed to their wards' mental well-being by involving them in some physical and fun-filled activities, educating and implementing a healthy lifestyle, continuously check on their posture while online studies, keeping out their wards for some time from mobile/laptops and talking to their kids regarding the responsible use of the internet and making aware of netiquette etc.

It shows that some of the parents could contribute meaningfully in supporting their wards during the Pandemic. There were parents who could not provide support to their wards to keep them mentally healthy so that the children can focus on learning in online mode.

Discussion

It was found that more than half of the parents (59 per cent) were aware of the Alternate Academic Calendar (AAC) issued by NCERT and their ward's school conveyed the guidelines online through phone messages or emails. This clearly indicates that parents were concerned with the education of their wards even during the pandemic period to cut

down the learning loss created due to the sudden emergence of the COVID-19 resulting in the closure of schools.

Some parents played a significant role in their wards' learning during Pandemic in India. They contributed by providing required resources to their children for online learning such as mobile/laptops with internet in order to study online at home.

Annual Status of Education Report 2020, also highlighted that 54.29 per cent of the population was subscribed to the internet in 2019-20 and there was a substantial increase in the broadband subscribers/users in the year 2019-20 during the Pandemic in India, which indicates that parents contributed in their ward's learning by providing them infrastructure required for online classes at home during the Pandemic. Some parents also provided academic support in explaining the concepts and completing their ward's online assignments. Some parents had to upgrade their subject knowledge and improved ICT skills to contribute towards their wards online learning at home.

More importantly, parents contributed to their wards' mental well-being by involving them in physical and fun-filled activities, educating and implementing healthy lifestyle keeping the child away from mobile/laptop for some time at home. Some parents counsel their kids regarding the responsible use of the internet.

This implies that some parents not only contributed by providing necessary infrastructure and technology to their wards but tried to maintain a positive attitude towards learning and looked into the emotional and physical well-being of the students which certainly works as a main driving force behind sailing through this tough time of Pandemic. OECD skills outlook 2021

throws light on the significant role played by parents' emotional support to students as a main driving force behind their learning achievements. A strong positive relationship between learning achievements and emotional support provided by parents was reported. While a positive attitude plays an important role in achieving learning goals during normal times, it becomes all the more significant during this challenging time, when students are facing challenges of online learning (OECD, 2021).

Though parents showed a positive attitude towards online learning for their wards and contributed to support the children in online education, they faced a lot of issues and challenges in the online mode of education for their children. Some parents found the adverse effect on the discipline of the students as there was no face-to-face interaction with the teachers. The majority of parents felt that practical subjects which require laboratory sessions and activities could not be taught effectively online. The online assessment was also found to be a challenge. "Offline assessment continues to retain its credibility" clearly shows that the integrity of online assessment is questionable (Times of India, 2022). Many parents found that the lack of proximity with the peer group was hampering a child's mental and emotional well-being. Some parents reported disturbance by phone calls/messages, courier deliveries and commands to pets and background announcement noise in the school as one of the challenges in online teaching-learning during the Pandemic. Though some of the parents were considering their presence in their wards' classes as a support to their learning while others considered it as added pressure on their children as well as an additional responsibility of helping schools in teaching kids at home during the pandemic. Abuhammad (2020) also observed that parents faced many

types of barriers like financial, technical and logistical to help their children with distance learning during the Pandemic.

Conclusion

The study found that some parents were not only restricted to their daily routine tasks but they had to shoulder the additional responsibility of helping their wards by providing the required resources to their children for online learning such as mobile/laptops with internet in order to study online at home, involving them in physical and fun-filled activities, educating and implementing healthy lifestyle keeping the child away from mobile/laptop for some time at home in order to keep their wards mentally healthy, supporting schools in various ways etc.

The majority of parents contributed in various ways in online learning for their wards but they faced a lot of issues and challenges in the online mode of education for their children. For many parents, financial crunch, lack of infrastructure for online learning and lack of technological skills to help their wards in handling online classes and providing relevant educational resources, lack of subject content understanding to support the learning of their wards were major challenges in online learning during the Pandemic.

It is not sure that we will have Covid free scenario in the near future, which leads us to ensure covid-appropriate measures all the time and it should be Non-negotiable. Covid environment leads to the situation where Blended learning will stay so long as the Pandemic lasts.

We have to build on and strengthen family support by increasing parents' ICT skills, developing a positive attitude towards online learning and enhancing their awareness of judicious use of the internet with safety and security in order to make them able to counsel their wards for responsible use of the internet and making them aware of netiquette etc.

Implications

Based on the findings, school management can devise ways and means to bring parents into their fold for the enhancement of their contribution towards their ward's overall growth. Findings can help policymakers to incorporate and implement various plans of action under national-level policies to provide quality education to all the stakeholders including parents even during the time of the Pandemic.

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Research Article

Exploring the Effect of Anonymity in Cyberbullying of Females in Higher Education Institutions in India

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Abstract

The rise of electronic information technology, as well as the resulting ease of access to it, has increased the frequency of incidences of cyberbullying, particularly in the twenty-first century. It has become such a kind of global issue that governments and other concerned authorities are still struggling to address it. The increase in cyberbullying involves age as well as gender-oriented cyberbullying. It is a significant issue that threatens the young generations, especially females, self-esteem and obscures their future prospects in India, and it cannot be ignored. In light of this troubling situation, this paper aims to explore the idea of anonymity in cyberbullying and examine the relationship between anonymity and gender-oriented cyberbullying of female students in Indian Higher Education Institutions. The data were also collected using the cyberbullying scale from four different universities in India and the study was carried out on a sample of 1473 female respondents. The findings of the study on cyberbullying of female students in Indian higher education institutions show that 38.08 per cent of the female victims believe that the perpetrator pretends to be someone else as anonymous while treating the victims badly through the internet or phone calls as to cyberbullying them. At the same time, 25.86 per cent of the female students also responded positively to life-threatening cyberbullying incidents that mostly happened through cell phones or internet messages.

Keywords: Cyberbullying, Higher Education, Anonymity, Gender

Introduction

The conceptualization of cyberbullying as a form of electronic bullying poses a well-known risk that arises out of technological advancement in the twenty-first century. It consists of "voluntary and repeated actions against one or more people using computers and electronic gadgets" (Aboujaoude et al., 2015). On a day-to-day basis cyberbullying is becoming more prevalent in modern societies with the increasing process of digitization.

The tremendous effect of digitization leads to a serious threat to the privacy matter of individuals through the digital platform. Recently, the pandemic has accelerated the use of digital devices at an unprecedented rate and transformed the nature of usual life activity towards the technological world. Despite its vast success, the use of technology has always been accompanied by its misuse leading to victimizing of the innocent ones, especially females, through cyberbullying. The surge in the use of

technology allows the perpetrator of cyberbullying to act in an anonymous scenario of the digital world. The anonymous nature of cyberbullying hinders making the policy to counter it at the mass level which leaves the victim helpless and feared.

Thus, the purpose of this research is to document cyberbullying victimization of young girls and women in Indian higher education institutions.

Objectives

A. To study the concept of cyberbullying in an anonymous environment

B. To analyse the effect of anonymity in gender-specific cyberbullying in higher education.

Research Questions

1. What is the concept of cyberbullying in an anonymous environment?

2. How does the nature of anonymity affect gender-specific cyberbullying for the females studying in higher education?

The Rationale of the Study

The anonymous environment of cyberspace provides a safe place for cyberbullying any individuals that mostly victimize the vulnerable group of society like children and females. In higher education institutions many students become a victim of cyberbullying due to various reasons. Among these various reasons, female students are believed to suffer gender-oriented victimization in the cyber world. Thus, it becomes essential to know how to tackle online cyberbullying in this anonymous environment. Moreover, it is expected to know the relational understanding of cyberbullying of female students with its nature of anonymity. The females studying in higher education explore a lot of synchronous and asynchronous

environments but are not aware of the cyber safety and repercussions of cybercrimes. Higher education female students are many a time in the starting phase to explore communication and technology, and because of a lack of awareness about digital etiquette and technical skills females either become a victim of cyberbullying. Therefore, it is expected to give more emphasis on gender-specific cyberbullying for females studying in higher education and to account for the victims' as well as perpetrators' experiences in the anonymous environment.

Concept of Cyberbullying

Cyberbullying is generally defined as a "voluntary act, in which the action is intentional and not accidental"; "repetitive act, in which the activity is repeated over time and not restricted to a single incident"; it engrained "perception of damage by the victim, in which the victim perceives the damage inflicted"; Cyberbullying is carried out "through the use of electronic equipment such as computers, cell phones, and other electronic gadgets" (Ferrara et al., 2018; Kowalski et al., 2014). The use of electronic gadgets allows the perpetrator to hide behind a wall of anonymity. Qualitative studies on cyberbullying posit that anonymity "raises the level of experienced fear because anyone, including friends or other trusted people, could be the bully" (Badiuk, 2006). On the internet, anonymity can take many forms. However, many authors denied accepting that anonymity is a necessary condition in defining the behaviour of cyberbullying (Barlett et al. 2016). This is due to the reason that victims of cyberbullying might be aware of who bullied them but this possibility always lacks strong conformity.

Providing the denial of anonymity as an important determining factor of cyberbullying, Knack et al., 2021

describe anonymity as a situation where individuals can hide their presence from other people, including other bystanders, and victims. Knack et al., 2021 also argue that anonymity is a key component of cyberbullying, and it refers to "anonymous posts and interactions in which a person's identity cannot be identified by looking at their IP address, usernames, or handles". Further, "anonymity can also be used as a description when the actual name/identity of a person's offline presence is more difficult to determine even in the obvious existence of an online one" (Knack et al., 2021).

The anonymous form of cyberbullying was found to be more severe because of the fact that the content can be shared among a larger audience within a very short period of time. Due to its severity in terms of anonymity, the effect of cyberbullying can be observed at the psychological level which might lead to feelings of helplessness and constant fear (Sticca & Perren, 2013). These feelings of helplessness and constant fear provide a possible explanation for associating cyberbullying experiences with depressive symptoms (Machmutow et al. 2012; Roth and Cohen 1986).

Gender Oriented Cyberbullying

Cyberbullying and cyber victimization have been studied in several kinds of literature with regard to gender, and the results have been inconsistent (Saleem et al., 2021). According to several studies, females are more likely than males to be victims of cybercrime (Saleem et al., 2021). However, a few studies also suggest that men are getting more victimized through cyberbullying in comparison to women. There have also been reports of results with no significant differences (Saleem et al., 2021). At the same time, some argue that "women are more commonly targeted" (Sourander et al., 2010), and "men cyberbully more

and to a greater extent" (Guo, 2016; Sest & March 2017). Jagayat & Choma (2021), widely explain the platforms used for cyberbullying ranging from gaming platforms to social networking sites (Jagayat & Choma, 2021). These online networking platforms have inherited and normalized the repressive structures and phenomena of old patriarchal cultures, resulting in the subtle patriarchal oppression of women (Gray, Buyukozturk & Hill, 2017).

A "Cyber Violence against Women and Girls" report by the United Nations (UN) presents a "call-to-action towards extreme forms of cyberbullying towards women, amidst a rise in highly publicized cases" (UNBC & UN, 2015). Recently UNFPA has launched a 'body right' campaign to end gender-oriented cyberbullying of women in the increasing scenario of digitalization. The campaign highlights that corporate logos and copyrighted IP are more highly valued and better protected online than images of human bodies, which are often uploaded to the internet without consent, and used maliciously leading to cyber victimization of people, especially women (United Nations Population Fund, 2021).

Cyberbullying in Higher Education

The prevalence of cyberbullying in higher educational institutions has been mapped out in many academic kinds of literature. According to Beebe's (2010) study, "50.7 per cent of undergraduate students reported experiencing cyberbullying victimization once or twice in their college tenure" (Beebe, 2010). Dilmac (2009) observed that "22.5 per cent of the students cyberbullied another person at least once" and "55.35 per cent reported being a victim of cyberbullying at least once in their lifetime" (Dilmac,2009). According to Y. Peled (2019), summarized the earlier literature on cyberbullying of students in higher education and resulted in

arguing that the percentage of students getting cyberbullied in 2017 and 2018 is similar to the earlier data (Peled, 2019). However, most of the early research has very few participants due to which cyberbullying among higher education students have still not fully developed. According to Y. Peled (2019) who also conducted correlation analyses and "confirmed significant relationships between cyberbullying, mainly through instant messaging and the academic, social, and emotional development of undergraduate students" (Peled, 2019). "Instant messaging (IM) was found to be the most common means of cyberbullying among the students". Research has indicated that there is a link between high school and college in terms of the category in which students fall either in the victim category or perpetrator category. So, Beran et al., 2012 argue that the students who get victimized in high school are most likely to fall into the category of cyber victims in college life.

Even though cyberbullying extends into higher education institutions, students tend to "hold a less-accepting view of cyberbullying" (Boulton et al., 2012). In the present scenario, with the shift of working nature from face-to-face working place to remote due to the pandemic, the students of higher education institutions are facing more cyberbullying than the previous years (Jain et al., 2020).

Research Design and Data Collection Tool

Sampling Design

The approach for picking a sample from the population is known as the sampling design (Levy, 1999). A purposive sampling technique is being used at the national level in selecting four universities as Primary Sample Units (PSUs) for collecting samples. Four universities namely the University of Delhi, Delhi;

University of Mumbai, Maharashtra; Indira Gandhi National Tribal University, Amarkantak, Madhya Pradesh; and Banasthali University, Rajasthan are being selected as a Primary Sample Unit. All four universities have been selected on the basis of their locational nature in terms of urbanization, social structure, administrative structure, and the ease of technology use inside the campus. The nature of all four universities differs from each other in many terms. The University of Delhi and the University of Mumbai are located at the heart of metropolitan cities in India that include diverse nature of students from across the society. The students in both universities are more accustomed to the use of technology which has a greater possibility of being involved in cyberbullying either as a victim or perpetrator anonymously. Moreover, the University of Delhi is a public central university that has slightly different rules and regulations in terms of tackling the issues of cyberbullying at the campus premises than the publicly funded state university like the University of Mumbai.

The other two universities namely Indira Gandhi National Tribal University, Amarkantak, Madhya Pradesh; and Banasthali University, Rajasthan are located in semi-rural areas in India that have a low propensity in terms of ease of technology use resulting in different patterns of involvement in cyberbullying either as victims or perpetrators. The students in both universities are less diverse in terms of identity since most of the students belong to the particular region in which the universities are geographically located. Among all the selected four universities, Banasthali University, Rajasthan is a women's university whereas rest three universities are for both boys and girls. The heterogeneous nature of all the selected four universities reflects the diverse nature of sample sites that ensures the presence of maximum

variability within the primary data.

Participants

Following the choice of four sample locations that represented the variety of universities found throughout the nation, participants were selected from each university through the random sampling selection procedure. The sample size is 1,473 which were collected from the selected sample sites among which 515 are from the University of Delhi, Delhi; 597 samples from the University of Mumbai, Maharashtra; 316 samples from Banasthali University, Rajasthan; and 45 samples from Indira Gandhi National Tribal University, Amarkantak, Madhya Pradesh. The present research follows a quantitative research paradigm. Survey methods were used to analyze gender-specific cyberbullying in the anonymous virtual world. The participants were 1,473 females from four heterogeneous Universities namely the University of Delhi; University of Mumbai, Maharashtra; Indira Gandhi National Tribal University, University of Amarkantak, Madhya Pradesh; and Banasthali University, Rajasthan.

Study Tools

For the study tools, questionnaires were prepared for a survey of female students studying in Indian Higher Education Institutions. This questionnaire was used to collect data on internet usage, demographics, and participant awareness of cyberbullying as well as their self-reported history of cyberbullying experience as either a victim or a perpetrator. This tool was also intended to understand more about how victims of cyberbullying are affected psychologically. In the present study, the Cyberbullying and Victimization Experiences Questionnaire-Greek

(CVEQ-G) tool is being used to collect data (Antoniadou et al., 2016) with 0.892 reliability.

Data Collections and Data Analysis

The study is cross-sectional in nature and was designed to document cyberbullying victimization of adolescent girls and women in Indian higher education institutions and to analyze how the nature of anonymity in gender-specific cyberbullying affects the females studying in higher education in India through quantitative approaches. Descriptive analysis has been used for data analysis. Scoring has been done by the responses received for the respective items.

Findings

The findings of the study from Table-01 on cyberbullying of female students in Indian higher education institutions show that 38.08 per cent of the female victims believe that the perpetrator pretends to be someone else to be treated badly through the internet or phone calls. Among these 3.46 per cent of the respondents believe many times, 21.79 per cent of the respondents believe sometimes whereas 12.49 per cent of the respondents believe 1-2 times. The data projects that a very significant size of perpetrators tries to hide their original identity by taking advantage of anonymous space for cyberbullying. In addition, 38.83 per cent of the female students are those who were mocked or treated/spoken badly through an anonymous message sent by the perpetrator to any third person to cyberbully females. The frequency of these kinds of anonymous messages is such that 12.29 per cent faced it 1-2 times, 19.96 per cent faced it sometimes and 6.04 per cent faced it many times (Table 01).

Table-1: Percentage Distribution of Victims' Perspective on Cyberbullying and Anonymity

Variables	Never (%)	1-2 times (%)	Sometimes (%)	Many times (%)	Everyday (%)
Has anybody sent you a message (via cell phone or the Internet), pretending to be somebody else, in order to treat you badly?	61.91	12.5	21.79	3.46	0.34
Has anybody sent others a message (via cell phone or the Internet) in order to mock you, speak badly about you, or say things about you that are not true?	61.17	12.3	19.96	6.04	0.54
Has anybody sent you a message (via cell phone or the Internet) in order to mock you, or talk badly to you?	42.3	19.3	29.74	8.49	0.2
Has anybody sent photos or videos of you to others, without your permission, in order to mock you?	71.97	10.2	13.71	3.73	0.41
Has anybody shown your messages to others (via cell phone or the Internet), without your permission, in order to mock you, speak badly about you, or say things about you that are not true?	60.9	13.7	19.48	5.7	0.27
Has anybody sent you a message (via cell phone or the Internet) in order to threaten you?	74.13	7	15.61	2.85	0.41

Along with it, 57.7 per cent of the female students in Indian Higher education also receive anonymous messages through the internet or cell phones with the intention to talk badly or mock them. Among these, 19.28 per cent of them receive messages 1-2 times, 29.74 per cent receive such kinds of messages sometimes, 8.49 per cent receive such kinds of messages many times and 0.2 per cent of the females even receive this kind of message every day; 28.03 per cent of the female students are cyberbullied through the circulation of their photos or videos to others without the victim's consent to mock them. Among them, 10.18, 13.71, and 3.73 per cent faced this kind of cyberbullying 1-2 times, sometimes, and many times respectively; 39.10 per cent of the female students have also experienced a kind of cyberbullying where the victim's messages were shown to others without her/his consent to mock the victims. At the same time, 25.86 per cent of the females were cyberbullied to an extent of life-threatening messages (Table-1). The frequency of this anonymous kind of cyberbullying of female students is basically measured on a scale ranging in ascending order of 1-2 times, sometimes, many times, and every day.

Graph-1: Percentage Distribution of Victim's Perspective on Cyberbullying and Anonymity
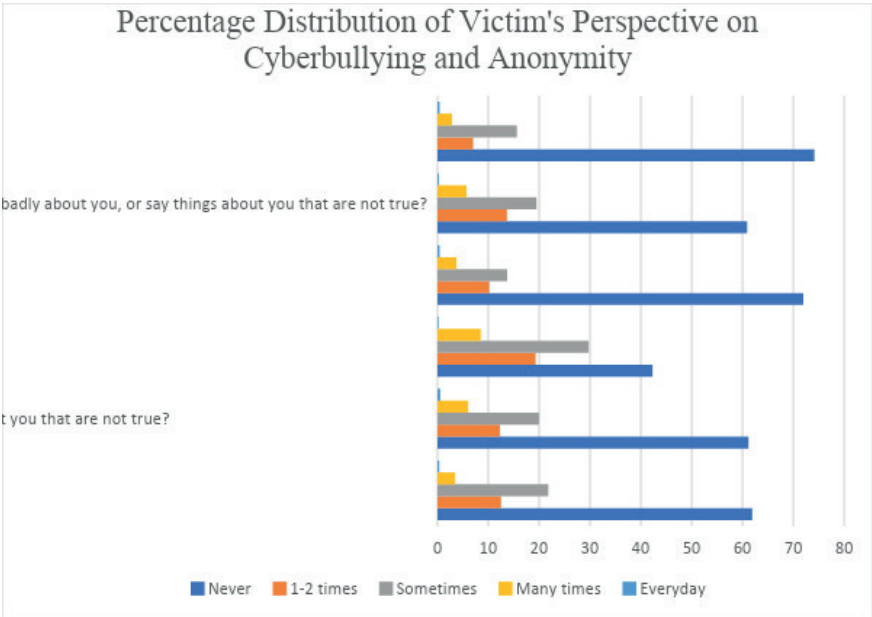
The findings of the study from Table-2 also suggest that 6.1 per cent of the female students were also involved in cyberbullying with an intention to treat others badly while pretending to be someone else; 9.36 per cent of the respondent cyberbullied others by mocking or by talking badly; 9.84 per cent of the respondent also sent photos or videos of someone to others, without the victim's permission in order to mock her/him; 10.65 per cent of them "sent or shown messages of someone to others without the victim's permission in order to mock her/him, speak badly about her/him or say things about her/him that are not true"; 5.36 per cent of the female students also responded positively to life-threatening cyberbullying through cell phones or internet messages (Table 02).

Table-2: Perpetrators' perspectives on Cyberbullying and Anonymity

Variables	Never (%)	1-2 times (%)	Sometimes (%)	Many Times (%)	Every day (%)
Have you sent a message to someone (via cell phone or the Internet), pretending you're somebody else in order to treat her/him badly?	93.89	2.44	3.055	0.48	0.1
Have you sent a message to someone (via cell phone or the Internet) in order to mock her/him or talk badly to her/him?	90.63	2.65	6.1	0.54	0.07
Have you sent photos or videos of someone to others, without her/his permission, in order to mock her/him?	90.16	3.05	6.25	0.34	0.2
Have you sent or shown messages of someone to others (via cell phone or the Internet), without her/his permission, in order to mock her/him, speak badly about her/him, or say things about her/him that are not true?	89.34	3.05	6.86	0.61	0.13
Have you sent someone a message (via cell phone or the Internet) in order to threaten her/him?	94.63	1.97	2.51	0.75	0.14

Percentage Distribution of Perpetrator's Perspective on Cyberbullying and Anonymity
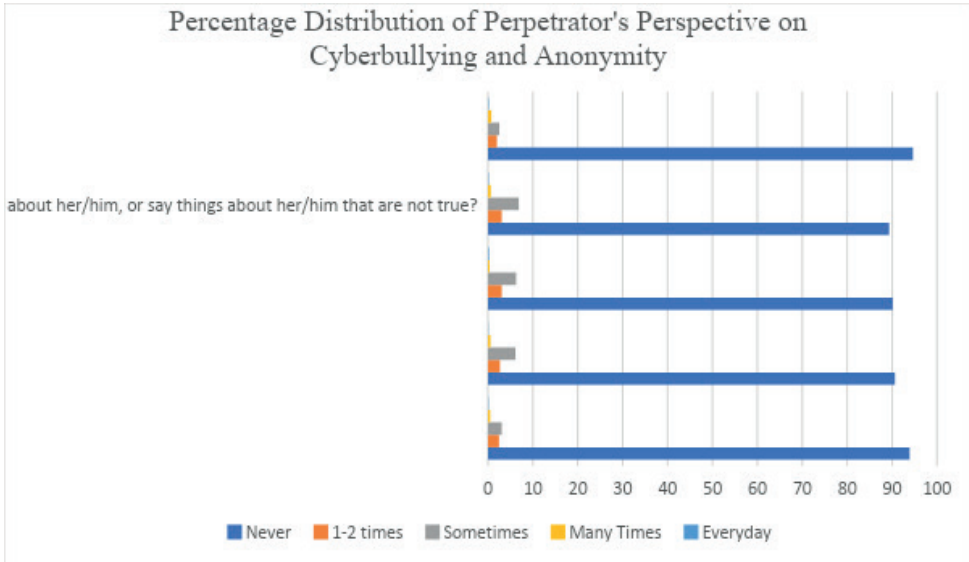
The primary data from Table-03 also suggest that the anonymity of cyberbullying has a psychological impact on the victims in the sense of helplessness, nervousness, tiredness, fear, etc. Various parameters were considered to determine the psychological conditions of the respondent during the past four weeks from the time of the interview. The data shows that 7.06 per cent of the respondents 'all of the time' have felt tired out for no good reason, 22.94 per cent of the respondent 'most of the time' have felt tired out for no good reason, 29.93 per cent of the respondent 'Some of the time' have felt tired out for no good reason, and 22.06 per cent of the respondent 'little of the time' have felt tired out for no good reason.

Table-3 Percentage Distribution of Psychological Effect of Anonymity in Cyberbullying

Variables	None of the time (%)	A little of the time (%)	Some of the time (%)	Most of the time (%)	All of the time (%)
In the past 4 weeks, how often have you felt tired out for no good reason?	18	22.06	29.93	22.95	7.06
In the past 4 weeks, how often did you feel nervous?	20.37	27.63	31.7	16.22	4.07
In the past 4 weeks, how often did you feel so nervous that nothing could calm you down?	41.28	24.71	20.84	9.84	3.33

In the past 4 weeks, how often did you feel hopeless?	33.81	24.98	23.15	13.1	4.96
In the past 4 weeks, how often did you feel restless or fidgety?	29.4	29.67	22.74	14.87	3.33
In the past 4 weeks, how often did you feel so restless you could not sit still?	45.49	24.51	18.67	8.69	2.64
In the past 4 weeks, how often did you feel depressed?	35.84	27.22	20.37	12.15	4.41
In the past 4 weeks, how often did you feel that everything was an effort?	24.03	25.66	27.09	17.18	6.04
In the past 4 weeks, how often did you feel so sad that nothing could cheer you up?	37.14	25.73	19.62	13.58	3.94
In the past 4 weeks, how often did you feel worthless?	41.55	21.59	19.28	11.47	6.11

The data from Table-3 also reflect that 4.07 per cent of the respondents 'all of the time' have felt nervous, 16.22 per cent of the respondent 'most of the time' have felt nervous, 31.70 per cent of the respondent 'Some of the time' have felt nervous, and 27.63 per cent of the respondent 'little of the time' have felt nervous. At the same time, 3.33 per cent of the respondents 'all of the time' have felt so nervous that nothing could calm her down, 9.84 per cent of the respondent 'most of the time' have felt so nervous that nothing could calm them down, 20.84 per cent of the respondent 'Some of the time' have felt so nervous that nothing could calm them down, and 24.71 per cent of the respondent 'little of the time' have felt so nervous that nothing could calm her down (Table-3).

Graph-3: Percentage Distribution of Psychological Effect on Respondents in Cyberbullying

Percentage Distribution of Psychological Effect on Respondents in Cyberbullying
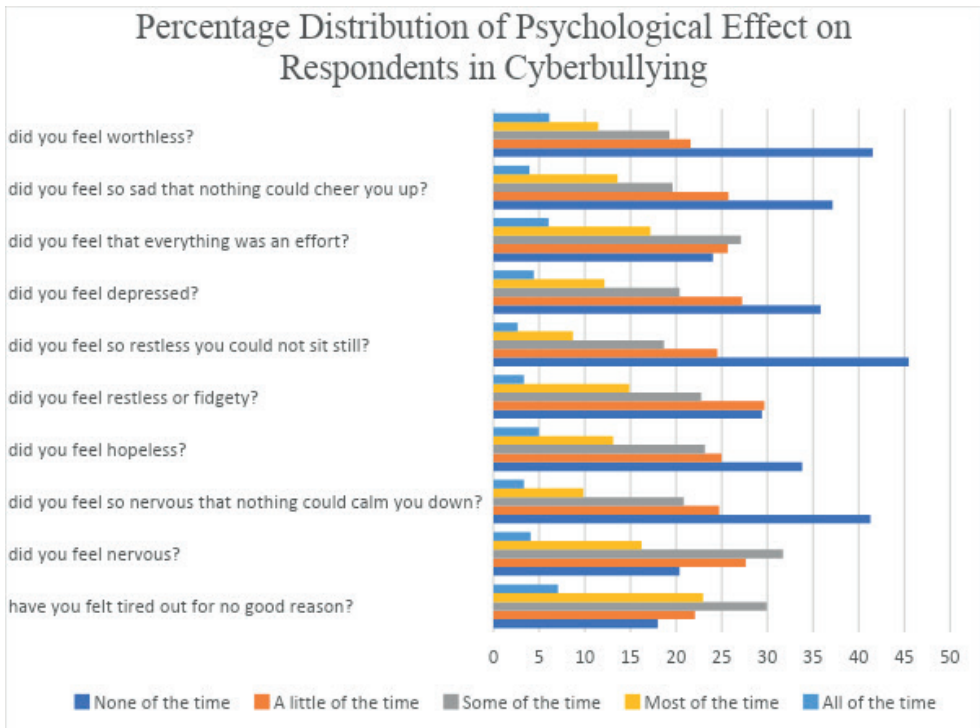
The data shows that 4.96 per cent of the respondents 'all of the time' have felt hopeless, 13.10 per cent of the respondent 'most of the time' have felt hopeless, 23.15 per cent of the respondent 'Some of the time' have felt hopeless, and 24.98 per cent of the respondent 'little of the time' have felt hopeless. In total, 66.19 per cent of the respondents have felt hopeless in the past four weeks. The data also shows that 4.41 per cent of the respondents 'all of the time' have felt depressed, 12.15 per cent of the respondent 'most of the time' have felt depressed, 20.37 per cent of the respondent 'Some of the time' have felt depressed, and 27.22 per cent of the respondent 'little of the time' have felt depressed. In total, 64.15 per cent of the respondents have felt depressed in the past four weeks (Table-3).

Discussion

The findings from Table 01 and Table 02 highlight that fewer female respondents are getting involved in anonymous cyberbullying as perpetrators than being the victim of it. This is similar to the finding made by Sourander et al., 2010 in their research that women are more targeted in cyberbullying and victims of it. Although, Sourander et al., 2010 make an explicit comparison with the men and the present study did not make any comparison with the men but is limited to the argument that women are getting more victimized rather than being perpetrators. This also does not conclude that women are not participating in cyberbullying as perpetrators. As data from Table 02 suggest that a significant number of females in Indian higher education institutions get involved in cyberbullying as perpetrators too. Looking from the victim's perspective the identity of the

perpetrator remains hidden behind the veil of anonymity. Hence, this study on cyberbullying of female students in Indian higher education institutions does not make any distinction regarding the perpetrator's identity or location in this anonymous world.

According to the findings of various research, anonymity was more of a perception among teens than a reality. Mishna et al., (2009) studied opinions and perceptiveness concerning cyberbullying. The anonymity and concealment in cyberspace may allow perpetrators to disregard cyber etiquette, reputation, and social respect (Yuanyuan Chen et.al., 2022). It clearly highlights that the anonymity in cyberbullying of females in higher education institutions has a miserable effect on the psychological level of victims.

The present study also highlights that females studying in higher education are facing extreme vulnerability in terms of psychological harassment due to an anonymous environment, Ybarra et al. (2006) identified that victims of cyberbullying often report feelings of depression, low self-esteem, helplessness, social anxiety, alienation and social isolation. The main motive for the perpetrator behind bullying females using cyber media is to sustain "Unevenness of Power " from a non-digitized patriarchal society where women are socially suppressed in the patriarchal structure. This unevenness of power gives the leverage point to the perpetrator in feeling themselves socially strong or weakening females through cyberbullying Abbasi et.al (2018). Female students also suffer much oppressive treatment through cyberbullying especially because of gender identity or sexual orientation. Although female students in Indian Higher Education institutions often get involved in cyberbullying as a

perpetrator who shows behavioural aggression, because it is easier for the perpetrator to show a more real self in virtual, hidden, and uncontrolled cyberspace Yuanyuan Chen et.al (2022).

Conclusion

The anonymous nature of cyberbullying provides an illegitimate ground to the perpetrator for gaining unauthorised access to personal information as well as using them for cyberbullying. So, the relational understanding of anonymity and cyberbullying on a larger ground provides a sense of the disturbing nature of the cyber world that makes this virtual place very unsafe for women who are in the phase of determining their career goals. It affects the women psychologically who are studying in higher education institutions in India as it hinders in deciding their future prospects.

Ethical Clearance

The entire manuscript is based on the field survey that can be taken upon request; therefore, no ethical review board clearance is required for this research work.

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Effectiveness of Art Integrated Learning Addressing the Issues and Concerns of Adolescence: A Pilot Study using Audio-Video Programme

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Abstract

Integration of art and technology with the teaching-learning process opens up the door to provide opportunities for experiential learning. Adolescence is a delicate life stage where a child undergoes changes (physical, emotional and behavioural) and faces challenges to deal with these issues due to a lack of awareness and knowledge of the fact. It's important to prepare children for facing the challenges and issues related to adolescence. But often this area is affected by a lot of hesitation, social taboos and myths; hence some creative, innovative and interactive ways to deal with these issues are needed. In the present study, a novel approach in the form of an audio-video program focusing on the integration of art forms, technology and nature with the scientific facts on adolescence, its challenges and related issues was validated. The study was conducted on 85 learners and 12 teachers of four government schools. The study was found beneficial for teachers and adolescents in making them understand how to handle the issues and challenges in an interactive, interesting and joyful manner through the Art Integrated Approach to Learning. Such audio-video material will increase awareness to minimize the risk factor and indulging in the wrong habits of learners.

Keywords: Adolescence, adolescent-related issues, school, parental involvement, myths in society, art-integrated learning

Introduction

The ultimate aim of education envisaged is to nurture the holistic development of a learner to make independent thinkers, problem solvers, think tanks for new ideas constantly and creatively to meet the challenges of the time. National Education Policy 2020 (MHRD, 2020) recommends experiential learning and the merging of disciplinary boundaries to provide opportunities for learners to achieve their goal. The term holistic development directs towards a child-centered approach to learning by creating conducive learning environments through various age-appropriate activities. The approach recommends catering to various needs of learners towards all-round development to achieve the ultimate goal of education.

Every human being shows three distinct phases in their life – juvenile phase, reproductive phase and senescent phase and three distinct life stages – childhood, adolescent stage and adulthood. The adolescence phase which ranges between 11-19 years of age group is regarded as a transition period from childhood to adulthood (WHO, 2017). During this phase, a feeling of independence and establishing one's

own position and identity in a peer group, family and society generates, and hence requires attention and special needs (Ragelienė, 2016).

When a child enters the adolescence stage, many internal and external changes occur. These changes are physical, psychological, emotional, social, cognitive and behavioural (Karademirci et al., 2012; Özdemir et al., 2016; Todd, 2007). During this time, a child is totally unaware of how to deal with the changes and issues related to adolescence, hence is regarded as the most challenging stage of life. However, these problems and issues are transient but the majority of the time left unnoticed. The emotional problems are often neglected as they cannot be detected easily, hence leading to long-term social implications such as isolation, depression, loss of self-esteem and confidence, etc. in an adolescent (Masselink et al., 2018). The root cause for this is the lack of proper education and support from parents, teachers and society. Therefore, this phase requires a lot of attention, care, moral support and proper guidance from parents (Ruholt et al., 2015), teachers (Verhoeven et al., 2019) and society (Panahi, 2015) which helps in the overall positive development of an adolescent. A school is an institution which provides opportunities for all-round development where an adolescent spends about half of the day. As the teacher encounters them constantly, they play a vital role in understanding and helping them to overcome their problems and issues by listening and responding positively. But in reality, this, generally, could not happen due to the hesitation of teachers and students to talk about such issues. The curriculum at school education has provided space for dealing with such issues at appropriate level. The chapter "Reaching the Age of Adolescence" is the part of the syllabus in science for class VIII (NCERT Science Textbook for Class VIII) but it has been found through interaction with teachers and students that not much is discussed about it in classrooms and very less emphasis is given to it. The lack of guidance and care from the parent's side also pushes adolescents to resolve their queries by seeking help from non-reliable resources like peer group interaction, using technology viz. television, internet and other social media aids (El et al., 2016). In most cases, their curiosity remains unanswered or they get misleading answers. Consequently, adolescents show greater risk to develop various psychosocial problems, which may influence their identity, self-esteem, and academic performance (Timalsina et al., 2018). Thus, it is important to have discussions, awareness, and prevention programmes to help adolescents with the issues they face.

Ample research studies have been conducted in the areas which mainly focused on psychosocial problems, emotional and behavioural problems faced by adolescents' (Banstola, 2017; Bista et al., 2016; Huli, 2014; Koirala et al., 2016; Pathak et al., 2011; Sharma, 2020). Few studies have addressed how to deal with these issues by coping with stress and discussed the role of parents, teachers and the community in adolescence issues (Jahan & Shakil, 2015). But no such attempt has been found on how to deal with the issues related to adolescence by dealing with scientific concepts in an artistic, interesting, and interactive manner.

Keeping all this in view and the need of the hour, a script focusing on such delicate areas was prepared and converted into an audio-video programme "*Kishorawastha ki Aur*" (कशोरावस्था की ओर). In the study, the audio-video programme was used as an educational tool to bring awareness about issues related to adolescence and how to handle them.

The audio-video programme has been designed by integrating scientific concepts with art to present things in an interesting, interactive and child-centered manner. This programme is dedicated to all the adolescents' who struggle with all sorts of questions, curiosities and challenges related to their developmental (adolescent) stage. This was an endeavour to present their natural curiosity about themselves. The programme also aimed to break certain myths and misconceptions regarding adolescence prevailing in society. The programme is an effort to present the integration of science with nature and art forms like dance, music and puppetry to enrich student's perspectives and make their learning facile and interesting, thus promoting art-integrated learning. This programme is also helpful for teachers who otherwise find it difficult to talk about these topics.

Research Questions

The study attempted to answer the following questions:

* Does the audio-video programme fulfill the objective of linking science with arts and nature?

* Can audio-video programmes be effective to prepare children to discuss issues and challenges faced by them during the age of adolescence?

* Does the audio-video programme bring any change in the perspective of children?

* Does the audio-video program promote a scientific understanding of the issues and stereotypes related to adolescence?

Objectives of the study

The major objectives of the present study were:

1. To develop a linkage between science, art and nature.

2. To create awareness about issues and challenges related to adolescence.

3. To improve the scientific perspective on adolescence by employing the connection between science and nature.

4. To demystify stereotypes and prevalent assumptions related to adolescence.
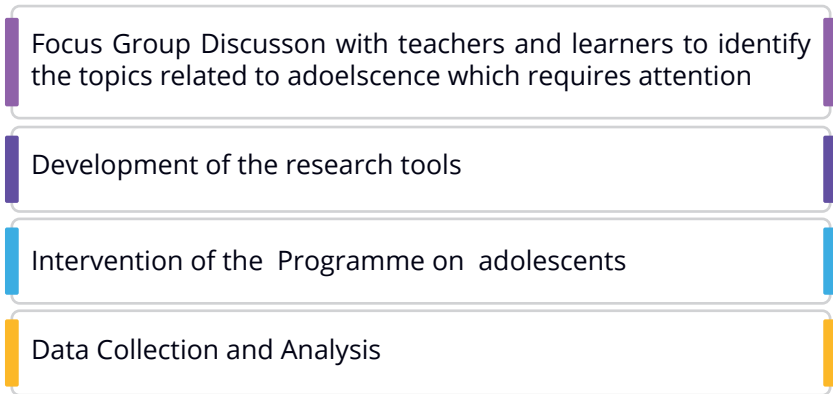
Thus, the proposed work aims to create awareness and how to deal with the issues related to the adolescent stage with the help of the developed and produced audio-video programme "*Kishorawastha ki Aur*" by taking up a small study on the effectiveness and achievement of the proposed objectives.

Research Methodology

Study Design

The variables used for the study were independent and dependent variables. The independent variable was the developed audio-video programme. The three dependent variables were adolescents' awareness about the issues related to adolescence and how to deal with them, the breakdown of myths or taboos related to adolescence prevailing in society and understanding adolescence with the help of art-integrated learning.

Figure-1: Steps of research study

Focus Group Discusson with teachers and learners to identify the topics related to adoelscence which requires attention

Development of the research tools

Intervention of the Programme on adolescents

Data Collection and Analysis

Sample size and Sampling method

The study was conducted in four government schools mentioned in Table 1. From the selected schools, learners of class VIII with the age range of 12-14 years were taken as samples for the study. The data was collected from a total of 85 learners and 12 teachers. The research study consisted of a pre-experimental research design and single group pre-test-post-test method and the technique adopted was purposive sampling.

Table-1: Details of the sample schools with number of learner' and teachers who viewed the developed programme and responded to the questionnaires

| S. No. | Name of the school | Nature of the school | Number of learners | | | Number of teachers |
			Number of boys	Number of girls	Total learners	
1.	Rajkiya Pratibha Vikas Vidyalaya (RPVV), Vasant Kunj, New Delhi	Co-education	16	9	25	2
2.	Sarvodaya Kanya Vidyalaya (SKV), Gazipur, Uttar Pradesh	Girls	-	15	15	4
3.	Government Boys Senior Secondary School (GBSSS), Gazipur, Uttar Pradesh	Boys	17	-	17	4
4.	Navyug Senior Secondary School (NSSS), Peshwa Road, Delhi	Co-education	13	15	28	2
Total			46	39	**85**	**12**

Tools for the study

The tools used for the study were developed in two phases – Phase I and Phase II. During Phase I, a script in the form of audio-video material was developed and produced by CIET, NCERT. During Phase II, questionnaires for learners and teachers were developed. The tools used for the study are listed below:

a. Audio-video programme " Kishorawastha Ki Aur"

b. Pre-intervention questionnaire for learner

c. Post-intervention questionnaire for learner

d. Pre-intervention questionnaire for teacher

e. Post-intervention questionnaire for teacher

Intervention stage

The developed pre-intervention questionnaires were filled out by learners and teachers to get feedback on their existing perception of adolescence and issues related to it. Afterwards, they were shown the developed audio-video programme followed by filling out post-intervention questionnaires to seek change in their perception (if any) on dealing with challenges faced during adolescence and the use of nature and art-integrated learning to understand them.

Data collection

The data was collected from learners and teachers in the form of filled questionnaires. There was no missing data.

Results

Learners' perception of the adolescent stage and issues (pre-intervention results)

The respondents have felt various changes in them in the recent past in their physical appearance (60 per cent), academic performances (55.2 per cent), eating habits (52.9 per cent), sleep disorders (23.5 per cent), mood swings (41.1 per cent), fights or arguments with elders (11.7 per cent), paying attention only to friend's advice (24.7 per cent), attraction towards opposite sex (15.2 per cent) and properly dressing up for the school (64.7 per cent). 43.5 per cent of respondents were not uncomfortable with these changes happening to them. If given an opportunity to share their experiences and problems with someone, 65.8 per cent respondents would like to share with their mother, 23.5 per cent with their father, 18.8 per cent with their teacher, 23.5 per cent with their friends, 18 per cent with their siblings but nobody wants to share with a counsellor. 50.5 per cent the respondents want their parents should listen to them patiently, 56.4 per cent want their parents to respond positively towards them and 50.5 per cent want their parents to behave friendly with them. To seek answers for such changes, 61.1 per cent of respondents discuss with their friends. 28.2 per cent watches videos, 29.4 per cent surf the internet, 38.8 per cent ask parents and only 20 per cent ask the teacher. According to the respondents, either only females are responsible for determining the sex of a baby child or God decides. 95.2 per cent of respondents think there must be a scientific reason behind the changes taking place in them during this stage of life, but nobody actually knew the correct reason. 92.9 per cent respondents have never learnt any scientific concept through dance and music. 97.6 per cent respondents think that nature cannot be used as an example to observe and understand changes taking place in the human body or the living world.

The change in learners' perception of the adolescent stage after watching the programme is mentioned in Table 2.

Table-2: Learners' perception of the adolescence after watching the programme

S.No.	Statement	Percentage of respondents agreed with the statement
1.	Changes in adolescence are natural and universal.	94.1%
2.	Changes in adolescence are manageable.	80%
3.	Changes in adolescence need to be shared with right person.	96.4%
4.	Accept the period of adolescence as a challenge and handle it calmly.	96.4%
5.	The adolescence stage is not a disease.	94.1%
6.	Body undergoes changes due to secretion of hormones during adolescence.	97.6%
7.	The time of appearance of such changes may vary from person to person.	63.5%
10.	All changes in an individual do not happen at once, they appear with progression of time.	95.2%
11.	Personal hygiene is important for healthy growth.	96.4%
12.	Physical exercise is important for health.	98.8%
13.	Boys and girls both should take care of sexual hygiene.	91.7%
14.	Prefer eating fast food in place of junk food.	80%
15.	A Balanced diet is essential for a healthy body and mind.	97.6%
16.	Dieting options are not useful for the body.	56.4%
17.	It is not correct to blame only the mother for a girl child.	98.8%
18.	Male and female both are responsible for determining sex of a baby child.	75.2%
19.	God do not determine the sex of a baby child.	91.7%

Teachers' perception about adolescent stage and issues (pre-intervention results)

They deal with issues related to adolescent learners by classroom discussion (91.6 per cent), one-to-one counselling (58.3 per cent), counselling parents (16.6 per cent) and using technology (58.3 per cent). The most common pedagogical practice used by the teachers to transact the chapter "Reaching the Age of Adolescence" was the lecture method which would explain adolescence through an exclusively educational programme. Teachers knew both father and mother are responsible for determining the sex of a baby child. They have never taught any scientific concept through dance and music to children. All the respondents said that nature can be used as an example for teaching about changes in the human body or living world. Growth is a natural phenomenon taking place in all living organisms. In nature we have plants which undergo changes when they enter the reproductive phase.

Teachers' perception about adolescent stage and issues (post-intervention results)

All the teachers said that the programme can bring awareness on issues related to adolescence as it indicates that adolescence is accompanied with varied changes which can be handled calmly. The programme is helpful to break various myths prevailing in the society. The programme clearly defines gender identity. To explain the concept of adolescence through this video programme, is very easy and helpful for teachers. The interviews with doctors and teachers clarify many doubts. The presentation of scientific concepts through dance and music was appropriate and relevant.

Discussion

The present research study on audio-video programme "*Kishorawastha Ki Aur*" showed a significant impact on developing understanding among learners about adolescents. The learners' and teachers' responses indicate that the programme is helpful in bringing awareness on issues related to adolescence and how to deal with them. They realised that adolescent stage is not a disease; it is natural, universal and accompanied with physical, behavioural and social changes. After watching the programme, they came to know the correct scientific reason behind such changes i.e. secretion of hormones in their body which happens during adolescent stage. All the changes in an individual do not happen at once, they appear with progression of time. Majority of the learners' irrespective of the gender wanted to share their issues with mother and their friends, which indicates a strong and comfortable bond with them. It was found that learners might have tried to talk with their parents regarding their problems they face during adolescence as it was totally new to them but have rarely received the support and concern from them. As a result, the majority of the learners wanted change in their parent's behaviour and sought support when they discussed their issues with them. They wanted parents to create a friendly environment where they patiently listen to their problems and respond positively (Branje, 2018). They understood that changes at this stage may be a taken as challenge but can be handled calmly with a right approach. This may be done by sharing with parents, teachers or counsellors which indicate that communication is very important rather than not communicating or searching answers through non-reliable sources like the internet, social media, etc. The programme was found also helpful to break various myths and taboos which

are still prevailing in our society even in the 21st century such as God does not determine the sex of a baby child. The sex of a baby child is determined by sex chromosomes (XX in females and XY in males) present in mother and father. Mother alone should not be blamed for a girl child. Both father and mother are responsible for determining the sex of a baby child. The programme was also beneficial in breaking myths related to menstruation such as girls during menstruation cannot enter the kitchen and cannot play sports (Garg & Anand, 2015). The programme resolved the misunderstanding on the difference between fast food and junk food. During this stage, eating habits also change, thus it is important to focus on health by doing exercise regularly, avoiding dieting and eating a balanced diet and preferring fast food like nuts, fruits, etc. instead of junk food like chips, pizza, soft drinks, etc. Both personal and sexual hygiene are important for boys and girls for healthy growth. The learners and teachers could relate how nature can be used as an example to observe and understand changes taking place in the human body or the living world. Growth is a natural phenomenon taking place in all living organisms. In nature, we have plants which undergo changes when they enter the reproductive phase. For the first time they have learnt any scientific concept through dance and music. Everyone enjoyed watching the progamme and understood new and relevant ways to present a scientific concept through fusion of art, music and dance (Marshall, 2014). However, they suggested using contemporary dance form in place of classical form. This clearly indicates the declining interest of youth for our cultural heritage which needs special attention to work upon. It was demanded to add more interviews in the programme which would help in clearing more doubts regarding adolescence. Both teachers and students found the developed programme beneficial. Teachers appreciated the topic of the programme as it requires a lot of attention nowadays and the way it was presented.

Conclusion

The programme was beneficial in creating awareness about how to deal with the issues related with adolescence and the reasons for the changes and how to discuss such issues without any hesitation in a conducive environment. The programme with the help of art forms like dance, music and puppetry developed a new pedagogy to explain scientific concepts. The programme also emphasized the vital role of parents and teachers in adolescent's life as a strong support system. The programme also helped in breaking various myths prevalent in the society which misguides an adolescent.

Thus, this study established an example to deal with adolescent related issues by integrating nature and art forms with scientific concepts. This may be useful to deal with the issues and concerns related to this particular age at emotional, psychological and mental level. Prevailing mindset in society may be worked upon by creating awareness among children as they are going to become the pioneers of future generations. Hence, this programme may be utilized as an educational tool to reshape the thinking process and behavioural patterns in the present society.

The programme has been uploaded on NCERT officials you tube channel for wider dissemination and use.

This was an experimental study to explore new ways of learning focusing on integrated approaches. Similar strategies may also be adopted in different areas to step up towards holistic development of a child by addressing his/her various developmental aspects.

Declarations:

Competing interests: The authors declare there is no competing interest.

Author contribution: RV conceptualized and designed the idea, RV, MS did the survey, RV and MS drafted, wrote, analyzed the result and edited the manuscript.

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Research Article

Happiness Curriculum: Experience during the Online Scenario

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Abstract

Happiness is a leading concern in everyone's life, having different connotations for every individual. There can be no universal definition of happiness, as it is relative to everyone in their journey of life. In this era when people especially, children are witnessing several man-made and natural crises having a great impact on their impressionable minds, it is the need of the hour to underline the need of teaching happiness. Furthermore, the fierce competition to be "career ready" has led to increased pressure on both the child and the parents. The relationship between happiness and education can be understood in the sense that one is the means to achieve the other and vice-versa. They both are continuous processes in themselves. There is a global need to develop curricula that are accommodative of the psycho-socio development of the children as well as to truly accomplish the purpose of education. The present paper is based on a study related to analyzing the effectiveness and ease of implementation of the innovative practice of the Happiness Curriculum during the pandemic in an online methodology.

Keywords: Happiness Curriculum, school education, psycho-socio development, well-being.

Introduction

Every child across the world is a creation of their conditioning which is interdependent on their upbringing and immediate setting. The constantly changing socio-economic dynamics of the families have serious and direct impacts on the physical, social and mental well-being of the children. In addition to this, students come to school with stressors arising from countless sources like "peer-interaction conflicts", "socio-cultural components", and "vulnerabilities" to physical and mental health risk factors. The recent report by NCRB has also pointed towards the ever-increasing suicide rate after 2019 among students in India. Ergo, presently the challenges before the education system have gone beyond poor learning standards and academic results and emphasis has to be laid on the achievement of the true purpose of education. Education systems around the world are facing challenges in preparing students to deal with the demands of unpredictable environments.

However, with the onset of the present pandemic, the world in general and students in specific are facing a plethora of unprecedented issues and concerns. The rate of orphan children has increased substantially with the death of primary caregivers which in itself raises several social and emotional concerns for children across the country. Consequently, in light of recent developments, the need of the hour is to understand the coherence between

the pre-pandemic happiness curriculum framework and the existing situation.

Happiness Classes – Scope of Curriculum

The rationale behind the Happiness Curriculum was the need to enhance and expand the scope of the true purpose of education. It is set against the backdrop of increasing stress among students throughout the global education system and India's low ranking on the happiness scale on the basis of the World Happiness Report. Teaching happiness in schools will increase "their ability to manage stress, self-awareness and emotional awareness". This will further help in the true purpose of education by creating a confident, happy, mindful, and responsive generation which in turn leads to happiness and peace in society in general.

The scope of the curriculum initially when it was launched in 2018 was for the nursery to grade 8 students across Delhi government schools. Discussions are now being held to extend this to private schools as well. The key objectives aimed to be achieved through the Happiness curriculum besides a holistic approach towards education, amongst learners were:

**Figure-1: Objectives of the Happiness Curriculum**

Key Components of the Happiness Curriculum

The elementary approach of the Happiness curriculum rests on the Happiness Triad proposed by philosopher Agrahar Nagraj in 1999. It is a model for happiness concerning the four elements which are "material", "behavioural", "intellectual" and "experiential" aspects of human life. When these are clubbed together they can be converted into the three pillars of the Happiness Triad. The three pillars are learning, feeling and awareness are depicted in Figure-2.

Figure-2: Happiness Triad
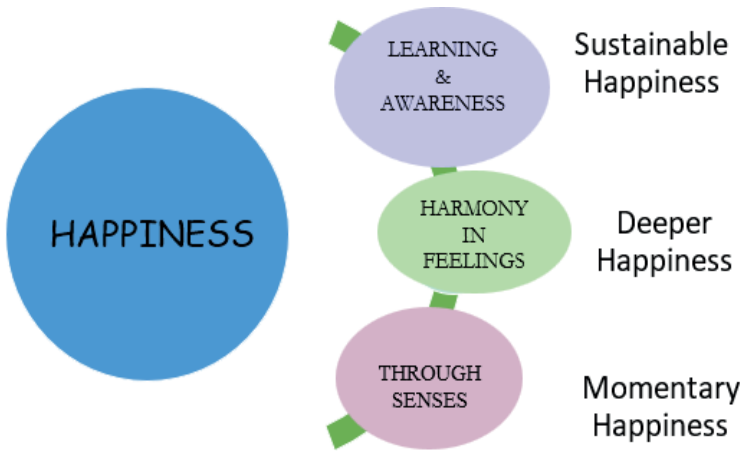
This happiness triad shows that the first pillar of happiness which can be achieved through our senses and is highly enjoyable but momentary, and thus the term momentary happiness. The second pillar of feeling depicts deeper happiness as feelings such as affection, empathy, love, trust, etc. make us content and peaceful. They have a longer impact on humans. Lastly, the pillar of learning and awareness depicts sustainable happiness in the sense that happiness can be yielded by experiencing and learning by an individual.

The Happiness curriculum aims to bridge the existing gap between pillars of happiness. Furthermore, the framework of the Happiness Curriculum is depicted in the following figure;

Figure-3: Framework Design of the Happiness Curriculum
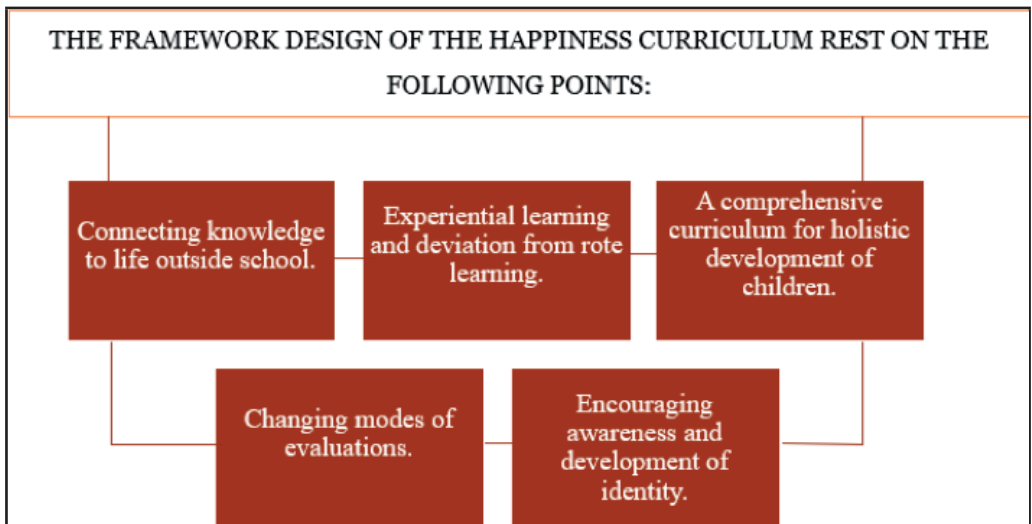
Challenges Posed by the Covid-19 Pandemic – A Study

The curriculum was introduced in the pre-pandemic school setting in 2018. Wherein the first class (ranging from 25-35 mins) was scheduled as the Happiness class. However, with the onset of the Pandemic, the schools were shut for almost a period of two years. Therefore, in order to examine the effectiveness of the Happiness Curriculum during the pandemic the researcher has conducted the present study.

Objectives of Research

•   To study the effectiveness of the Happiness Curriculum during the pandemic.

•   To study the implementation of Happiness classes during the COVID-19 pandemic.

•   To understand the major challenges faced by the students during the pandemic.

Research Methodology

The study was planned to find results through an empirical research methodology with primary and secondary methods of data collection. An empirical research approach is selected because the concept of this research was concerned with interactions, experiences, perceptions & behaviour and understanding these is more important than looking for a quantifiable outcome. A tool with 15 items was prepared to comprise open-ended and multiple-choice questions, this was disseminated through a google form. The tool was validated by experts, but for its scalability, it will be improved in future. This is a preliminary paper which will be utilized as a pilot in my research.

Population: The teachers who have conducted Happiness classes in Delhi Government schools.

Sample and Sampling Technique: The participants were selected through non-probability sampling techniques for this study from schools within the territory of Delhi. The sample comprises 30 teachers who are conducting Happiness classes in Delhi Government schools.

Demographic Variables

•   The research consisted of 80 per cent female individuals and 20 per cent male individuals.

•   The age group (26-35 years) of the research participant have maximum participation in the study

•   The research participants were teaching the flowing subjects depicted by Figure 4

## Figure-4: Depicting the Teaching Subjects of Research Participants
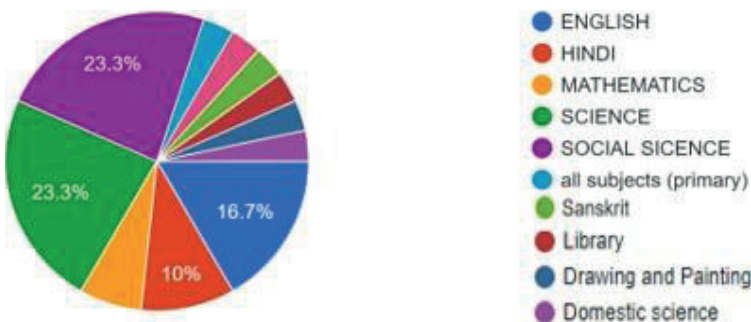
Analysis of the Data

✤ **Item 1** was designed to ask the teachers their viewpoint about happiness classes and how much advantageous did they find those when they were introduced, the analysis of the collected data revealed the percentages of various viewpoints of the respondents, which are depicted by the pie chart shown in Figure 5;

Figure-5: Percentages of respondents with various viewpoints
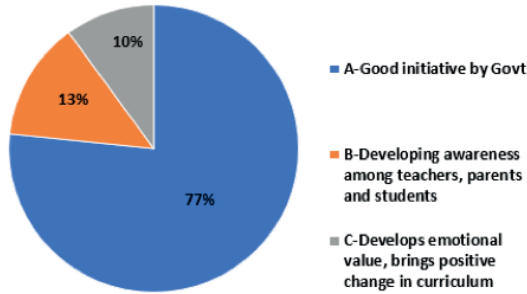
- 77 per cent of the respondents had the opinion that point A, says that happiness classrooms are a good initiative by Govt.

- 13 per cent of the respondents had the opinion that point B says that happiness curriculum helps in developing awareness among teachers, parents and students.

- 10 per cent of the respondents had the opinion that point C says that happiness curriculum develops emotional value and brings positive change in curriculum.

Interpretation and Discussion

The analysis of the data related to item 1 reveals that most of the respondents (77 per cent) had the opinion that the happiness classroom is a good initiative by the Govt., which improves the level of concentration of students, enhances their creativity, helps students to express themselves better, and is interesting for all the students. This opinion indicates the positive aspects added by this curriculum in the life of many people.

✤ **Item 2** was designed to inquire about the training status of teachers with respect to their training for effectively conducting the happiness classes and mode of training. The analysis of the collected data revealed the percentage of how respondents got trained for happiness classes, which is depicted in Figure 6:

Figure-6: Percentages of respondents about how training was conducted
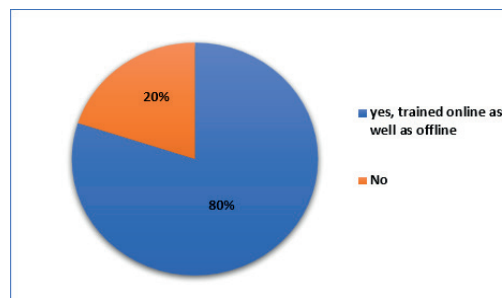
- 80 per cent of the respondents had admitted that they got requisite training through both modes.

- 20 per cent of the respondents had admitted that they do not get any sort of training and were directly given the classes to conduct.

Interpretation and Discussion

The analysis of the data reveals that the majority of the respondents (80 per cent) answered in the positive, that they were trained for happiness classes in online and offline mode and the rest of the participants were not trained. This is indicative of the training status and highlights the need to have fully trained teachers to successfully conduct happiness classes.

❖ **Item 3** was designed to ask the teachers about activities (if any) that were conducted before happiness classes started in their schools, the analysis of the collected data revealed the percentage of activities conducted and those are depicted inFigure 7:

Figure-7: Percentages of respondents about any activity conducted before happiness classes
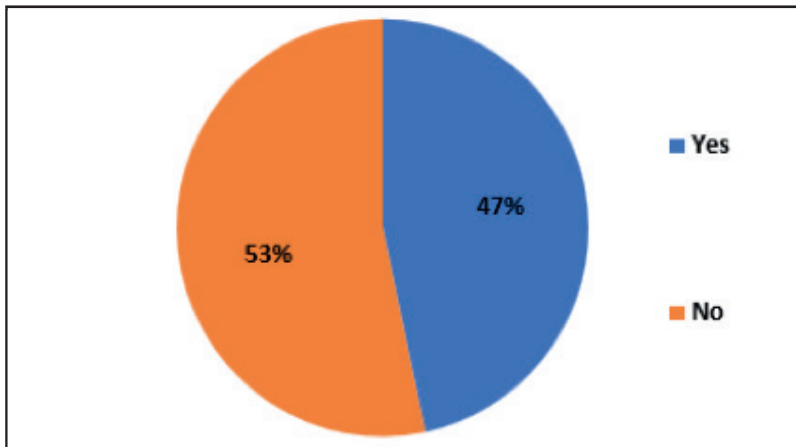
- 53 per cent of respondents responded that no such activities were conducted before the implementation of Happiness classes.

- 47 per cent of respondents answered that the various activities were conducted before the happiness classes were started in their school.

Interpretation & Discussion

The data reveals that more than half of respondents had responded that no such activities were conducted before the implementation of Happiness classes and the rest of them answered that the various activities were conducted before the happiness classes were started in their school.

❖ **Item 4** was designed to ask teachers about the mindfulness activities conducted in school during happiness classes, the analysis of the collected data revealed about various activities undertaken during these classes are as follows: storytelling, focus-increasing activities like observing sounds around, observing the pattern of your breath, Motivational story, etc.

Interpretation and Discussion

During the analysis, 100 per cent responded with the affirmation that mindfulness activities were conducted during the happiness curriculum.

❖ **Item 5** was designed to ask teachers the response received from students while practicing the various activities related to happiness both in the offline and online modes of classes. The analysis of the data collected from the respondents revealing the student responses to the Happiness classes is depicted in Figure 8.

Figure-8: Responses of students towards happiness classes both in offline and online mode
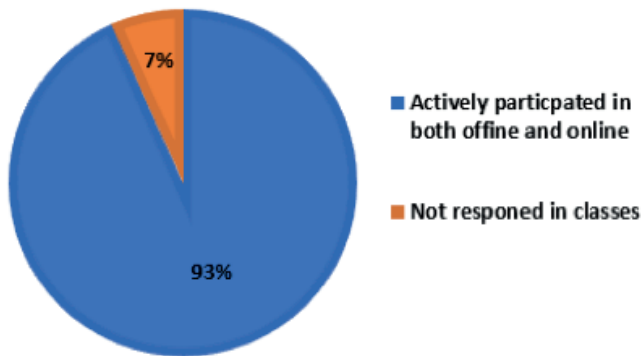
- 93 per cent of the respondents answered that students actively participated in Happiness classes in both offline and online mode.

- 7 per cent of the respondents answered that no responses were received in the Happiness classes.

Interpretation & Discussion

The analysis of the data revealed that the majority [93 per cent] of the teachers answered that positive responses were received in the Happiness classes from the students. The responses are very encouraging, indicative of the connectivity and strengthened relationship amongst students as well as between teacher and students. The majority of the responses pointed towards the eagerness of the students for the happiness class and their readiness to share their feelings. They opined that a lot of positive changes were noticed in the students and students seem less aggressive. A very small segment of the respondent (7 per cent) opined that there were no responses from students for the activities conducted. The analysis clearly indicates that activities conducted during happiness classes have a wide scope of positive impact on the students, achieving its intended objective.

❖ **Item 6** was designed to enquire from the teachers about the differences they have noticed in conducting happiness classes during pandemic, the collected data showed the per cent of respondents on various statements as depicted in Figure 9.

Figure-9: Percentages showing the differences in conducting Happiness classes during the research scenario
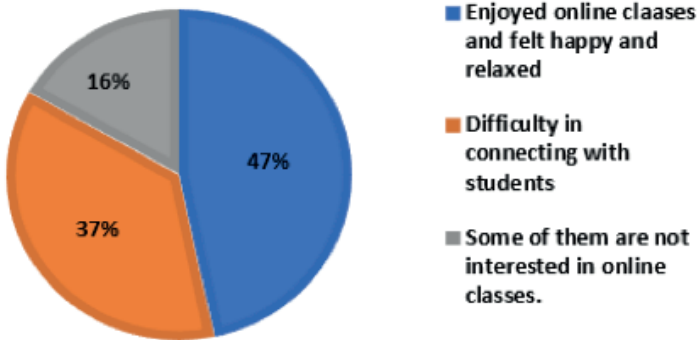
- 47 per cent of the Respondents stated that children enjoyed online Happiness classes

- 37 per cent of the Respondents stated that some students faced difficulty in joining the classes

- 16 per cent of the Respondents stated that some of them are not interested in online classes

Interpretation & Discussion

The data showed that most of the respondents (47 per cent) stated that children enjoyed online classes and these classes helped the student in overcoming the stress and made them feel happy and relaxed. Around 37 per cent of the respondents stated that some students faced difficulty in joining the classes due to some technical error or connectivity issues. Therefore, due to the ease of access to offline classes they were not inclined to online mode of happiness classes. Another segment of respondents (16 per cent) stated that some of them are not interested in online classes due to several problems at their end.

❖ **Item 7** was designed to ask the teachers about the challenges faced by them while conducting the happiness class in situation, the data collected revealed the percentage of respondents depicted in Figure 10:

Figure-10: Percentage of respondents stating the challenges faced by them
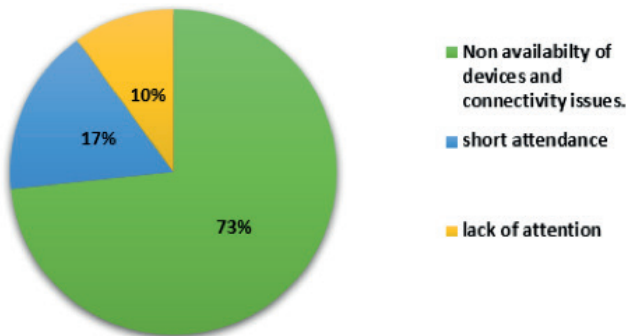
- 73 per cent of the Respondents had the opinion that most of the students have the problem of non-availability of devices at their home and connectivity issues

- 17 per cent of respondents had the opinion that short attendance was also a challenge

- 10 per cent of respondents had the opinion that some students did not pay attention

Interpretation & Discussion

73 per cent of respondents opined that most of the students have the problem of non-availability of devices at their home and connectivity issues like no data recharge or limited data. Another 17 per cent of respondents had the opinion that short attendance was also

a challenge as a student often does not have devices to join from home which is the continuing reason for the first-mentioned problem. Around 10 per cent of the respondents also opined that children lacked attention and made it difficult to have a conducive environment to conduct online classes. This brings under the spot the major three issues that were faced by the teacher and consequent need to develop enough resources to overcome these issues.

- ❖ **Item 8** was designed to ask the teachers conducting happiness classes whether classes in the digital mode were more interesting or in the offline mode, the data revealed the percentages of respondents depicted in Figure 11.■

Figure-11: Percentage of Respondents sharing their view about conducting happiness classes
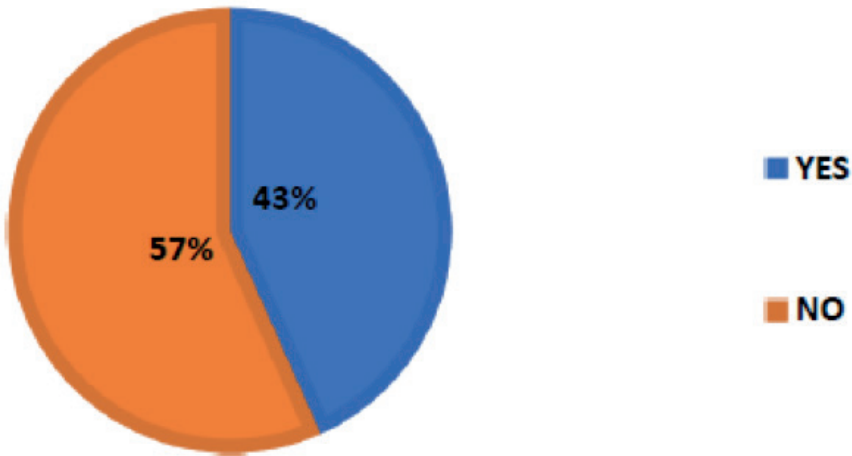
- 57 per cent of the respondents had the opinion that it was not interesting to conduct the classes digitally.

- 43 per cent of the respondents had the opinion that it was interesting to conduct class digitally.

Interpretation & Discussion

The analysis of the data revealed that more than half of the respondents 57 per cent were of the opinion that it was not interesting to conduct the classes digitally due to several problems faced by them as well as students. While the rest of the 43 per cent of respondents

had the opinion that it was interesting to conduct class digitally. This is indicative of the prevalent resistance in conducting online happiness classes as the types of activities would be restricted and ease of conducting them in offline mode.

❖ **Item 9** was designed to ask the teachers their preferred method of happiness classes, the percentage of respondents revealed the following modes of taking classes (Figure 12).

Figure-12: Mode of taking happiness class preferred by teachers
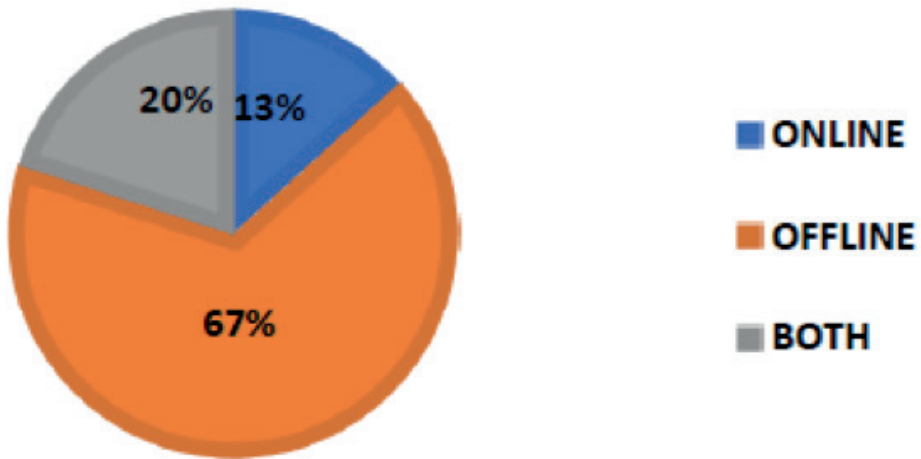
- 67 per cent of the respondents shared their view that they are comfortable in taking classes offline only.

- 20 per cent of the respondents shared their view that they are comfortable in taking classes both online as well as offline.

- 13 per cent of the respondents shared their view that they are comfortable in taking classes both online and offline.

Interpretation & Discussion

The analysis of the data revealed that most of the respondents 67 per cent were of the opinion that they are comfortable taking classes offline as compared to 13 per cent of respondents who were more comfortable conducting online classes. Around 20 per cent of the respondents shared their view that they are comfortable in taking classes

both online as well as offline. The opinions herein are indicative of the inclination of teachers for conducting happiness classes in offline mode as their preferred method.

❖ **Item 10** was designed to ask the teacher about their opinion regarding the changes that should be introduced into the happiness curriculum to keep it up to the date. The data collected revealed that the majority of the respondents were satisfied with the happiness curriculum and its framework. Some Cumulative feedback was increasing the number of stories or activities provided in the curriculum to achieve its objectives

Conclusive Remarks

The Happiness curriculum makes it vital to recognize the relationship between education and happiness in contemporary times in order to

inculcate the latter into the former. Therefore, the researcher herein through the present study intended to identify the effectiveness of the happiness curriculum and its role during the pandemic. On the basis of the analysis done, it can be concluded that the implementation of a happiness curriculum is a good transformation in the traditional schedule of the students as it is free from the limitations of any subject, period, or evaluation criteria. The classes were welcomed by the students and the study shows the positive impact of the classes on the lives of the students. It has proved to be advantageous in multiple ways for the students by shifting its approach from the traditional teaching style. These classes have facilitated making the students more "thoughtful" and "mindful". However, there are certain underlying issues that are needed to be pondered over like:

• Unavailability of the resources to join classes and consequent damage to the mental health of the students in the pandemic situation;

• Due to the lack of physical contact, there is a hesitancy amongst teachers for conducting happiness classes online mode; and

• Need to strengthen teacher training programs for better implementation of Happiness classes and curriculum.

Implications of the Study

Therefore, there is a need to further the positive impacts of the curriculum by paving a way for better implementation of Happiness classes in contemporary times. The students are now coming back to school after a significant period of two years; this will further have deleterious consequences on the mental well-being of children. Ergo, Happiness classes should now be conducted keeping in mind the above-mentioned issues and to the utmost sincerity.

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Cyber-bullying of Children: Impacts and Deterrent Measures in India

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Abstract

With technological advancement, the use of the internet has also impacted the lives of children as they can connect with people around the world through social media platforms, emails, etc., with one click of a button. These also negatively impact their lives as they are vulnerable to more criminal offences. One of such offences against children is cyberbullying or online bullying. It is a form of bullying that intentionally harms the reputation and privacy of any person and threatens and harasses through the electronic medium. However, bullying is a problem that has existed in society since time immemorial. However, cyber bullying is a recent and more severe form of bullying than the traditional physical and verbal bullying; as the impact of such crime lasts long in the lives of children. The paper aims to introduce the concept of cyberbullying, its types, reasons, and psychological effects on children. It also covers the legal provisions available under the Criminal Laws and Information Technology Act for cyberbullying related to protection of children in India. It also discusses cyberbullying laws prevailing in the U.K. and U.S.A. This Article highlights the initiatives and strategies taken by the Government, Schools, etc. to deal with such bullying in India.

Keywords: Cyberbullying, Children, Intention, Criminal law, Cyber law, Strategies, Government, School.

Introduction

TECHNOLOGY has advanced over time, and the internet has significantly impacted every aspect of people's lives, especially that of children. A child is any person below eighteen years of age unless any law stating otherwise applies to a child below eighteen years of age (Article 1, the U.N. Convention on the Rights of the Child). Electronic communications, such as email, social media platforms, etc., have influenced the lives of children. They are the ones who make use of internet sites for sharing thoughts, photos, videos, personal information, etc. Thus, these populations are vulnerable and weaker to crimes in cyberspace. Among the grave crimes against children, bullying ha6s affected a high percentage of them. Bullying is defined as an "*intentional and aggressive behaviour*" that frequently take place against a victim because of a *"real or perceived power imbalance"* between the victim and the bully, and the victim sense *"vulnerable and powerless to defend himself or herself"* (U.N. Special Representative of the Secretary-General on Violence against Children, n.d.). However, with the advent of technology, bullying has emerged as a new form, i.e., Cyber bullying or online bullying. It is a cybercrime which is more dangerous than traditional crime. This kind of bullying is an intentional act

that happens through the internet or electronic device by posting or sending untrue or derogatory information about someone to assassinate one's reputation. In contrast to traditional bullying, the bully chooses to remain anonymous in cyber bullying. It can affect children regardless of age, gender, ability, race, etc. Recently, it has become one of the persuasive problems in India. Therefore, many guidelines/rules/conduct/ethical codes have been framed in India to punish bullies and protect the victims.

Objectives of the study

The objectives of the study are as follows:

1. To study cyber bullying, including the types, effects and causes.

2. To examine the statutory laws in the U.S.A., the U.K., and India concerning cyber crimes especially cyber bullying.

3. To comprehend the initiatives of the Government, schools and parents about cyberbullying.

Research Questions

1. What is the concept of cyber bullying and its effect and causes?

2. What are the statutory laws available in the U.S.A., the U.K. and India to tackle cyber crimes, especially cyber bullying?

3. What are the initiatives of the Government of India, schools and Parents to tackle cyber bullying?

Methodology

The methodology is based on the doctrinal method. The research method includes both descriptive and analytical research methods. The research is intended to analyze cyber bullying and different laws in the U.S.A., the U.K.

and India concerning cybercrimes, mainly to deal with cyber bullying. The data is collected from National Crime Record Bureau (NCRB) to analyze the cybercrimes against children from 2017 to 2020. The different initiatives of the Government of India, schools and parents to deal with cyber bullying are also studied.

Meaning and Concept of Cyber bullying

The term "cyber bullying" was first coined by Bill Belsey. (Shivashankar & Rajan, 2018). He defined it as the use of information and communication technologies by an individual or group of people to behave in a deliberate and hostile manner with the intention to harm others (Shivashankar & Rajan, 2018). Different definitions of cyberbullying are discussed below:

Cyber bullying is "bullying with the use of digital technologies'' inflicted through social platforms, emails, online gaming platforms, and mobiles (UNICEF, 2019). It was first used in 1998 and is defined as *the "anonymous posting of mean-spirited messages"* about someone on electronic platforms (Peled, 2019) It is also defined as *"bullying"* through online devices such as mobile phones, computers and tablets (Stopbullying, 2021). It also means ``willful and repeated harm" through computers, mobiles and other electronic media (Cyberbullying Research Center, 2014). Such bullying uses electronic technology to "*repeatedly and intentionally " threaten*, harass, and embarrass another person (Pacer, 2019). It is when one "repeatedly and intentionally" maltreats or harasses any person through online electronic devices online or cell phones (Patchin, 2019). Cyber bullies are considered to be the people who would harass any person online. Such bullying includes incidents like "harass someone online by shaming, embarrassing, degrading or humiliating them, impersonating

someone online, making threats to physically harm another person, threatening to kill someone, posting or texting something obscene, stalking someone digitally, committing hate crimes based on race, gender, sexual orientation or religion, etc." (Gordon, 2021).

Different types of Cyberbullying

According to (K.Watts, JessycaWagner, BenitoVelasquez, & I.Behrens, 2017), there are seven types of cyber bullying: Flaming, Online harassment, Cyber stalking, Denigration, Masquerading, Trickery and outing, and Exclusion (Peled, 2019). The types of cyber bullying are:

a. Flaming are impudent or obscene messages or posts sent to attack any person. (Blog Securly, 2018)

b. Harassment is any online threatening or derogatory message sent with a wilful intention to attack someone. (Kids Safety Kaspersky, 2015)

c. Cyber stalking is any online monitoring of someone and threatening to send harmful messages to that person. (Peled, 2019)

d. Denigration is any false or derogatory criticism messages about a particular person or others. (Blog Securly, 2018)

e. Masquerading is cyber bullying, where a cyberbully impersonates someone else and sends or posts any harmful or threatening statement about a particular person or others. (Blog Securly, 2018)

f. Outings cyberbullying, where a cyberbully directly reveals private or sensitive information about someone without consent. (Blog Securly, 2018)

g. Trickery is cyberbullying, where a cyberbully uses tricks to befriend an individual and deceive him/her by sharing his/her private or sensitive information. (Blog Securly, 2018)

h. Exclusion is cyberbullying, where someone is left out of an online group intentionally to target that excluded particular someone. (Blog Securly, 2018)

i. Fraping is cyberbullying, where the bully impersonates someone else on an online platform to bully others by posting hurtful messages. (Peled, 2019) (Kids Safety Kaspersky, 2015)

j. Trolling is cyberbullying, where a cyberbully with malicious and harmful intentions posts any inflammatory statement about someone. (Blog Securly, 2018)

Causes of Cyberbullying

Cyberbullies target weaker or more vulnerable people than them. It aims at threatening, harassing or shaming. Many children indulge or fall prey to such cyberbullying because of many reasons, such as -

a. peer pressure of acceptance among their groups;

b. lack of supervision and intervention of the families;

c. the improper school environment;

d. lack of empathy;

e. hunger of power;

f. thought of revenge;

g. intolerance concerning faith, gender, race, colour, etc.; (Note, Padegett, & Roden, 2013)

h. anger and jealousy issues;

i. Relationship problems, etc.

Other additional reasons for cyberbullying include animosity, killing boredom, provocation, etc. (Chandra, 2018).

Effects of cyberbullying on children

Cyberbullying inflicts emotional stress on the victim to face such humiliation on such electronic platforms. Cyberbullying is a traumatic experience that impacts children academically, socially, and emotionally (Punte, 2018). The victims' stress and strain lead them to take drugs, omit going to go school and escaping from home (Schoen & Schoen, 2010). Cyberbullying leads to severe psychological effects like depression, suicidal tendencies and low self-esteem (King, 2019). One of the most crucial importance in the lives of children is peer acceptance. As a result, when such peers don't include them and cyberbully them, these negatively impact the victim, like emotional stress, frustration, anger, and envy (King, 2019). These dynamic effects also affect the victim's social, academic and family relationships. Cyberbullying differs from traditional bullying, but its impact is also more severe and long-lasting. Because in online media, any hurtful comments or blogs remain indefinitely until and unless it is not complaint to the competent authority. Every time the victims see it, they emotionally break down. Furthermore, when such online bullying goes unpunished, it can provoke the victim to take revenge against the cyberbullies, making it worse. Therefore, victims and perpetrators are more likely to commit criminal offences (King, 2019). For this reason, cyberbullying is a hassle with lasting aftermaths for the victim, people involved and society at large.

Legal provisions penalizing Cyberbullying U.S.A. & U.K. and India

1. **Statutory laws in the U.S.A.**: The U.S.A. has enacted many laws on cybercrimes, and nearly all the states within the U.S.A. have passed laws thereon. The suicide of American teenager Megan Taylor Mier in the U.S.A. resulted in the need for Cyberbullying control laws (Merdith, 2010) In the aftermath of the incident, the case of *(United States v. Lori Drew, 2009)* took place, where the court gave the judgment of the acquittal of the accused, as his actions were morally reprehensible in the act of bullying Megan. Moreover, there is no law at the time that specifically prohibited her behaviour and does not justify stretching the intentions and language of the Computer Fraud and Abuse Act of 1986 (CFAA) to convict her of a crime. As. Hence, the bill was proposed under the Megan Meier Cyberbullying Prevention Act (Cyberbullying Prevention Act), H.R. 1966, 111Ith Cong. (2009), but the Act was not passed.

Other laws for cybercrimes in the U.S.A., such as the Computer Fraud and Abuse Act of 1986 (CFAA) (18 U.S.C. § 1030, a cyber-security law to protect computers from fraud), the National Information Infrastructure Protection Act of 1996 (NIIPA) and the Electronic Communication Privacy Act of 1986 (ECPA) (Hosani, Yousef, Shaima, & Farkhund, 2019). In addition, the other laws that protect the victims from online scams and privacy are the Controlling the Assault of Non-Solicited Pornography and Marketing Act of 2003 (CANSPAM) and the Children's Online Privacy Protection Act of 1998 (COPPA), respectively. (Hosani, Yousef, Shaima, & Farkhund, 2019)

The other two major federal laws deal with cyber harassment, including cyberbullying and cyber stalking, viz., the Interstate Communications Act of 2012 and the Interstate Stalking and Prevention Act of 1996. The Interstate Communications Act of 2012 (18

U.S. Code § 875) defined interstate communications as any person who intentionally transmits in interstate or foreign commerce any communication containing any threat to harm a person or property, damage a person's reputation, or kidnap a person. The Interstate Anti-Stalking Punishment and Prevention Act of 1996 (18 U.S. Code § 2261A) defined stalking as anyone who uses any electronic communication technology places anyone in reasonable fear of death or serious injury or causes emotional distress to a person. (Hosani, Yousef, Shaima, & Farkhund, 2019)

2. **Statutory laws in the U.K.**: Bullying is not a specific criminal offence in the U.K. law. The laws applied to cyberbullying are the Protection from Harassment Act, 1997 and the Protection of Freedom Act, 2012. In these two Acts cyber stalking offences have been defined as online monitoring of someone, spying on someone, etc. Different laws that can assist in punishing cyberbullies are the Obscene Publications Act, 1959; the Public Order Act, 1986; the Malicious Communication Act, 1988; the Computer Misuse Act, 1990; Communication Acts, 2003; Crime and Disorder Act, 1998; and Defamation Act, 2013. (Hosani, Yousef, Shaima, & Farkhund, 2019). S. 4 of the Protection from Harassment Act, 1997 states that if the harassment behaviour is conducted on at least two occasions and it is causing fear of violence to a person, then the guilty person under this section may be punished with up to five years imprisonment, a fine, or both. (Hosani, Yousef, Shaima, & Farkhund, 2019). The Education and Inspections Act, 2006 states that schools are responsible for providing a healthy and secure environment and should be against all forms of bullying, including cyberbullying. The above mentioned laws can be applied in cyberbullying and stalking cases in many ways.

3. **Statutory laws in India**: The legislation enacted to govern cybercrime in India is the Information Technology (I.T.) Act, 2000. The provisions of the Indian Penal Code, 1860 (I.P.C.) also penalizes for the cybercrimes. The special act enacted to penalize the crimes against children is the Protection of Children from Sexual Offences (POCSO) Act, 2012.

i. Information Technology Act (I.T. Act), 2000: The provisions of the I.T. Act to punish cyber crimes against children are mentioned below:

Section. 66A of I.T. Act deals with sending offensive messages through the communication services etc. are punishable under this act, and section, which has been struck down by Supreme Court's Order dated 24 March 2015 in the (Shreya Shinghal v. Union of India, 2015). S. 66C of the I.T. Act penalizes any person for theft of another person's identity to misuse or malign. S. 66D of the I.T. Act deals with any impersonation or personation by using computer resources. S. 66E of the I.T. Act states the punishment for Privacy infringement. S. 67 of the I.T. Act states the punishment for publishing or transmitting obscene material in electronic form. S. 67A of the I.T. Act deals with punishment for publishing and transmitting any sexually explicit act material through electronic media. S. 67B of the I.T. Act deals with any depiction of children in any sexually explicit act in an electronic form or publishing or transmitting in any form. S. 72 of the I.T. Act deals with any breach of confidentiality or Privacy in any form using electronic media.

ii. Indian Penal Code (I.P.C.), 1860: The provisions of I.P.C. concerning punishment for the cybercrimes against children are mentioned below:

An amendment to the I.P.C. by the Criminal (Amendment) Act, 2013, has included stalking, sexual harassment and stalking in general through electronic means in Ss. 354A and 354D of I.P.C., respectively. S. 463 of I.P.C. provides the meaning of forgery that includes the false document or electronic record. S.465 of I.P.C. provides the punishment for forgery. S. 469 of I.P.C. deals with the punishment for forgery to harm reputation. S. 471 of I.P.C. deals with using a genuine forged document or electronic record. S. 499 of I.P.C. deals with defamation by sending defamatory messages through electronic means to assassinate someone to harm another person's reputation; S. 500 of I.P.C. deals with the punishment for defamation. S. 503 of I.P.C. deals with criminal intimidation by sending any harmful or threatening messages to anyone through electronic media. S. 506 of I.P.C. deals with the punishment of criminal intimidation, which also includes the intimidation is to cause death or grievous hurt or destruction of property to impute unchastity to a woman. S. 507 of I.P.C. which deals with criminal intimidation through anonymous communication. S. 509 of I.P.C. deals with the punishment for any act to offend the modesty of a woman.

iii. The Protection of Children from Sexual Offences Act (POCSO), 2012: The provisions of the POCSO Act to punish the cybercrimes against children are mentioned below:

S. 11 of the POCSO Act deal with the sexual harassment against children, and S. 12 of the POCSO Act provides the punishment for sexual harassment. S. 13 of the POCSO Act deals with the use of a child for pornographic purposes, and S.14 of POCSO Act provides the punishment for using the child for pornographic purposes.

National Crime Record Bureau (NCRB) Data on Cyber Crime against children

Every year NCRB publishes data on crimes in India. The Data on cybercrime against children is provided below

Table-1: Crimes against Children (Crime Head-wise & State/UT-wise) – 2017 -2019

| Year	Total Incidence of Cyber Crimes/ Information technology Act*	Total Incidence of POCSO r/w Sec.376,354, 509 IPC [Section 12 of POCSO Act r/w Section 509IPC] **	Incidence of POCSO r/w Sec.376,354, 509 IPC [Section 14 & 15of POCSO Act or POCSO Act]
2017	79	1329	374
2018	117	1686	812
2019	164	1917	1114
2020	842	1672	584

NB:

*Total of A) Publishing or Transmitting of material depicting children in the sexually explicit act and B) Other Cyber Crimes against Children.

**Includes both incidences against boys and girls.

Source: NCRB Data

Chart-1: Crimes against Children (Crime Head-wise & State/UT-wise) – 2017 -2019
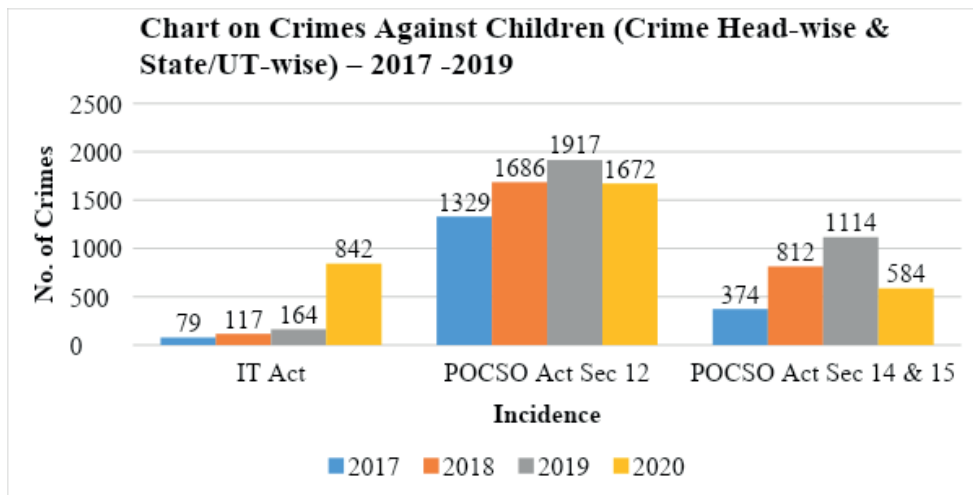
Discussion: Chart 1 represents the crimes against Children in India under the following head, i.e., the I.T. Act, POCSO Act (Sec 12, 14 &15) as per NCRB data. The chart denoting those crimes against children increased from 2017 to 2020. It can be observed that it is high time to take such crimes seriously, and strategies must be taken to combat such crimes.

Table-2: Cyber Crimes against Children (State/UT-wise) 2017-2020

Year	Cyber Blackmailing/ Threatening/ Harassment (Sec.506,503, 384 IPC r/w IT Act	Fake Profile (I.T. Act r/w IPC/ SLL)	Cyber Pornography/ Publishing Obscene Sexual Materials portraying children (Sec.67B of I.T. Act r/w other IPC/ SLL)	Cyber Stalking/ Bullying (Sec 354 D I.P.C. r/w I.T. Act)	Internet Crimes through Online Games etc. (Sec.305 IPC r/w I.T. Act)	Other Cyber Crimes against children	Total*
2017	1	3	7	7	0	70	88
2018	4	3	44	40	0	141	232
2019	3	1	101	45	1	153	305
2020	3	1	738	140	0	220	1102

NB:

* All the cybercrimes included in the table come under the preview of Cyberbullying

Source: NCRB data

Chart-2: Cyber Crimes against Children (State/UT-wise) 2017-2020
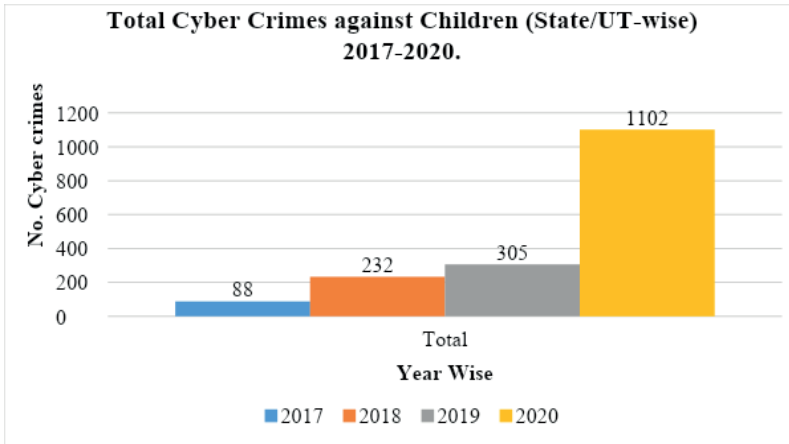
Discussion: Chart 2 represents cybercrimes against children in India as per NCRB data. The chart denotes that the crimes have increased from 2017 to 2020. In 2020, the cybercrimes against children were the highest in India, i.e., 1102.

It can be observed from the above mentioned laws in India that they do not explicitly define cyberbullying. However, the different acts of cyberbullying are penalized under different sections under those above mentioned laws. Cybercrimes against children are analyzed in chart 2 from the data available in the NCRB report, which shows that cases are increasing with time. Therefore, it is high time that guidelines/rules/legislation must be issued and framed by the Government of India for the safety and security of the children. The Government must take the initiative to introduce a chapter on cyberbullying, its impact, and legal provisions in the school books to educate them about the legal consequences. The teachers must teach the school students manners to behave in the cyber world. The educational authorities/ schools must issue guidelines on spreading awareness on cyberbullying. Parents should understand the severe effects of cyberbullying. They should also monitor the children's activities in cyberspace and teach them about the laws and punishments. The N.G.O.s/ private organizations/legal advocates/child psychologists/ law enforcement agencies must take the initiative to teach both parents and children about cyberbullying and create awareness about its ill-effects. It should be underlined that youngsters are experiencing a lot of mental problems as a result of this type of bullying, which causes them to consider suicidal options. Therefore, it is imperative that the Government of India strictly enforce and carry out the laws.

Some incidents and cases of Cyberbullying in the Indian Scenario

In Ritika Sharma's case (name changed), she was a student of a renowned Delhi School. She was stalked by a Facebook friend with whom she shared personal and sensitive information and her number with that online friend. She also unfriended that online friend on Facebook. But later on, it was found that the person used her photo, personal information and number to make a fake profile. The Delhi Police registered the case of cyberbullying. Aftermath, the Delhi Police launched cyber safety awareness in schools and suggested students avoid sharing personal and sensitive information on

online social media sites. (Tomer, 2021) (Shivashankar & Rajan, 2018)

In the Ritu Kohli case filed a complaint to the Delhi Police that a person was using her identity and sharing her number on the website www.mirc.com. The case was registered under S. 509 of I.P.C. This is the first cyber stalking case in India. (Tomer, 2021) (Shivashankar & Rajan, 2018)

In the case (Prakhar Sharma v. The State of Madhya Pradesh, 2018), the guilty was charged under Ss. 66C and 67/67A of the I.T. Act. He downloaded the victim's photo from Facebook and uploaded her pictures with a fake Facebook account. (Bhonsle & Krishnamurthy, 2021)

In the case (Sazzadur Rahman v. The State of Assam and Ors., 2019), the guilty created a fake profile on Facebook of the victim, aged 15 years. The accused also uploaded photos and posted status to degrade the victim's image. The trial court rejected the application of the guilty. Again, an application to quash the trial court order was filed in the Gauhati High Court, which was dismissed. (Bhonsle & Krishnamurthy, 2021)

In the case (Jitendra Singh Grewal v. The State of West Bengal, 2018), the guilty created a fake profile on Facebook and uploaded obscene photos. The guilty were charged under Ss. 354A, 354D, 500, 507and 509 of I.P.C. and S. 67A of the I.T. Act. The Calcutta High Court also rejected his bail application. (Bhonsle & Krishnamurthy, 2021)

In the case (Subham Bansal v. The State (Govt. of NCT Delhi), 2018), the guilty created a fake profile in Facebook in the victim's name and uploaded her mobile number. He was charged under S. 66A of the I.T. Act and S. 609 of I.PC. The Delhi High Court refused his application to drop the charges. (Bhonsle & Krishnamurthy, 2021)

In the case (Hareesh v. State of Kerala, 2020), the guilty created a fake profile on Facebook and uploaded obscene photos. He was charged under S. 354D of I.P.C. and S. 67 and 67E of the I.T. Act. The guilty filed anticipatory bail but was rejected by the Kerala High Court. (Bhonsle & Krishnamurthy, 2021)

In the case of (State of West Bengal v. Animesh Boxi, 2017), Boxi was charged with Sections 354A, 354C, 354D, and 509 of I.P.C. and Sections 66C, 66E and 67/67Aof I.T. Act. He was sentenced to an imprisonment of 5 years with a fine of Rs. 9,000. He was guilty of transmitting pictures of his former girlfriend' images and videos on the internet.

The Mumbai Police registered a cyberbullying case against Pooja Bedi under S.12 of the POCSO Act and Ss. 500, 506 and 509 of I.P.C. in December 2014. She was involved in the incidents of cyberbullying with her daughter against the granddaughter of Ramanand Sagar. However, the police did not register the case under the sections of the I.T. Act, 2000, as amended in 2008. (Sayed, 2014)

Recently, the Delhi Police arrested boys connected with the 'bois locker room' in 2020. This 'bois locker room' was an Instagram group created to share photos of minor girls. (F.P. Staff, 2020)

Initiatives to tackle Cyberbullying in India

The impact of cyberbullying can only end with the efforts of the Government, schools and parents. The initiatives taken in India to tackle cyberbullying are as follows:

1. Initiatives by Government

Different initiatives taken by the Ministry of Women and Child Development, Ministry of Home Affairs (M.H.A.) and University Grant Commission (U.G.C.) are discussed below:

i. Ministry of Women and Child Development

With the rising cases of cybercrime against children as per NCRB data of 2019, some steps were taken to tackle cybercrime against children given by the Ministry of women and Child Development (Government of India, 2021):

a. Section 67B of I.T. Act, 2000 is the legal provision to punish the offender that published or transmitted any material portraying children in the sexually explicit act; and Section 354A and 354D of I.P.C. are the legal provisions adopted to punish for cyber bullying and cyber stalking.

b. "Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules,2021" issued under the I.T. Act, which specifies to brief computer users not to upload, circulate, publish, or transmit any obscene information pornographic material that is or can harm a minor.

c. The Government has also blocked the website of Child Sexual Abuse Material (CSAM) as per the INTERPOL's list received through the Central Bureau of Investigation (C.B.I.).

d. The Government has also directed orders to Internet Service Providers (I.S.P.s) to receive Internet Watch Foundation (IWF), a U.K. list of CSAM websites or web pages and blocked child pornography websites or web pages.

e. All Internet Service Providers (I.S.P.s), under the order of the Department of Telecommunication, must make arrangements to spread awareness among the subscribers about parental control filters.

f. The Central Board of Secondary Education (CBSE) also issued guidelines for safe and effective internet use on 18 August 2017.

g. The Government has also implemented the "Centre for Cyber Crime Prevention against Women and Children (CCPWC)" to check cyber crimes against them.

h. The Government has launched the "National Cyber Crime Reporting Portal", www.cybercrime.gov.in, to report cybercrimes complaints against women and children. To file cybercrime complaints, this portal provides a "1552600" helpline number.

i. The Government has also issued "A handbook for Adolescents/Students on Cyber Safety" to educate children about the cyber world and cybercrimes.

j. The Government has also taken measures to spread awareness about cybercrimes, improve cyber forensic facilities, and provide necessary training to law enforcement agents, etc.

k. The Government has also implemented the "Indian Cyber Crime Coordination Centre (I4C)" scheme.

ii. Ministry of Home Affairs (M.H.A.)

The M.H.A. has issued a handbook, i.e., "A Handbook for Adolescents/ Students on Cyber Safety", especially for children above 13 years or younger to understand the cyber world. (Government of India, 2018). It also helps the children to understand the cyber threats and safeguards to prevent such cybercrimes. It also helps the children to be more responsible and careful while using electronic platforms such as email, etc.

iii. U.G.C. Regulations

U.G.C. has issued regulations, i.e., "U.G.C. Regulation on Curbing the Menace of Ragging in Higher Education Institutions, 2009," for the colleges and universities to follow the anti-ragging regulations (Shalini, 2019). The regulations described above were also initiated to stop bullying.

2. Initiatives by School

Schools must address cyberbullying seriously, as children are more vulnerable to such crime (Beghin, 2020). Such cyberbullying can be managed when knowledge is shared with school staff. In schools, teachers can play the most vital role in managing cyber bully. They should educate the students regarding cyber security to feel safe. They should promote a positive classroom environment and positive relationships with the students (A.S.O. Staff Writers, 2021). They must teach them digital etiquette in using such online platforms. Students have to learn how to be responsible in interacting online. Teachers should educate students on appropriate and resilient behaviour to prevent cyberbullying. School authorities must issue directives regarding training in how to handle cyberbullying complaints of the students. School authorities should organize programs and curricula for cyber safety in school. Also, schools collaborate with the families of the students to keep the students safe from cyber threats. Schools can also offer classes to the parents to spread awareness about cyber safety (Miller, Thompson, & Pomy, 2009).

i. Guidelines by CBSE to deal with Cyberbullying

CBSE issued guidelines for safe and effective internet use in schools and school buses on 18 August 2017 (CBSE Guidelines, 2017). This guideline provides cyber safety awareness to protect students from falling prey to cyber threats like cyberbullying, fraud, etc. The guidelines direct the schools to take measures to inform students of any illegal activities of the I.T. enabled devices. The guidelines also prohibit unsecured and unmonitored use of any electronic device in school.

3. Initiatives by Parents

Positive and constructive parenting practices help to prevent cyber threats like cyberbullying. Positive parenting is important to nurture, empower, and encourage, etc., the child (Hinduja & Patchin, 2022). The aspects of positive parenting help to increase the healthy relationship with the child socially and emotionally. The implications of such positive practices can help to build strong parent and child relationships, and such mechanisms also help to prevent cyberbullying (Hinduja & Patchin, 2022). Parents must be aware of their children's activity on online platforms. Parents should monitor the child's activity on social media websites, online games, etc. (Woda, 2018). With all these efforts, parents can help prevent their children from cyberbullying at home and other places.

Conclusion

Technological advancement comes with a boon and bane. Bane is the evolution of traditional crimes into cybercrimes in the cyber world. Cybercrimes are severe threats to children. Among the cybercrimes, cyberbullying is a significant social problem for children. Cyberbullied children suffer from so many severe psychological issues. Such bullying disturbs the children's everyday lives with stress, anxiety, etc., because they are fragile to handle such online harassment.

The children need proper help and

guidance from their parents to deal with emotional and psychological problems. The parents have to understand their children. They should monitor them and support them to help them face such suffering so that the children don't take a step like suicide. Then comes the role of the school to take appropriate measures to combat such crimes and help the students to handle such cyber threats. Spreading awareness of the cyber world and cyber threats is the first step the school can educate the students. The school teachers must be provided with guidance to tackle cyberbullying claims of the students. Moreover, the nation's lawmakers also play an important role in making stringent laws to punish cyberbullies.

In India, the Parliament has enacted I.T. Act to punish cyber crimes against children. Also, the I.P.C. and POCSO Act include provisions to deal with cybercrimes against children. The Ministry of Women and Children and the Ministry of Home Affairs have issued guidelines for cyberbullying and cybercrime against children. However, as NCRB data shows that cybercrimes against children are increasing from year to year, therefore, we can observe that the laws and regulations which are available at present are not enough to deal with cybercrimes.

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Online Teaching-Learning during the COVID-19 Pandemic: Experiences of Postgraduate Students from Arunachal Pradesh, India

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Abstract

The COVID-19 Pandemic came as a whirlwind that upset all the traditionally-held practices in human interactions in an unprecedented manner. By literally pushing all socio-economic activities behind closed doors, the pandemic led people to think and devise new methods and strategies to survive and continue with all essential activities, including education, in such an hour of distress. In the educational sector, the shutting down of classes in physical mode was substituted with an online mode of teaching and learning but this shift had differences in reception and effectiveness in different parts of the globe depending upon the socio-economic and geographical compositions of different places. Infrastructural issues, technological reach and expertise in utilizing the tools for online teaching-learning on the part of both the instructors/teachers and the learners/students play decisive roles in properly reaping the desired benefits of online educational methods. This paper attempts an analysis of the online learning experiences of the Postgraduate students of Arunachal Pradesh, India during the pandemic to assess the efficacy of the online mode of teaching-learning in the context of the state which forms the extreme northeastern boundary of the Indian nation.

Keywords: COVID-19**,** Online Education, Digital Learning, Learning Experience, E-Learning, Arunachal Pradesh

Introduction

The COVID-19 Pandemic will undoubtedly go down in the annals of human existence as one of the greatest catastrophes that it has witnessed. Though humankind has borne the brunt of other pandemics too in the past, in terms of reach and scale, the COVID-19 Pandemic surpasses all other previous experiences. This is probably due to the fact that given the unprecedented advancements made in science and technology and the gradual interdependence of nations in terms of trade, commerce and exchange of knowledge that has led to the world turning literally into a global village, the events in one part of the globe tend to affect all other parts. The reach and intensity of the Pandemic have been so deep and wide that it has left no sphere of socio-economic life untouched, thereby affecting people from all classes and all walks of life. While analysing the economic impact of

the pandemic upon nations, it is evident that underdeveloped and developing countries have borne the brunt heavily. But as has already been pointed out earlier, the effect of the Pandemic has not remained confined only to the economic sphere but gripped every human activity. Keeping in view this widespread effect, this paper investigates the impact of the pandemic on learners at the Postgraduate level to understand the role and effectiveness of online education consequent upon the shift from the offline to blended and online modes. The sudden change of modes and methods has ushered in a sea-change in the traditional teaching and learning process. Under the emergent situation, the earlier practice of classroom teaching with the physical presence of the learner(s) and the instructor has been replaced by their virtual presence. While this has provided a way out of the chaos and uncertainty caused by COVID-19, it has also had its consequences in various ways upon all the stakeholders involved in the process. How the stakeholders have been affected, accordingly their response to the changed situation varied. This study limits itself to the experiences of postgraduate students within the geographical boundary of Arunachal Pradesh.

Arunachal Pradesh is the easternmost state of the Indian Union and shares international boundaries with China, Bhutan and Myanmar. With a mountainous terrain, the state is home to a sizable tribal population, rich in cultural and linguistic variety. The rugged terrain and the weather pose a huge challenge in terms of network and other connectivity for carrying out smooth online teaching and learning. Also, given that a considerable portion of the state's population is not economically very well off, it is difficult for some parents and students to afford the digital learning requirements. The

study has been undertaken keeping in view the unique socio-economic and geographical location of the region so that the experiences of the students can be used to identify the areas which need strengthening in order to make online education more fruitful in Arunachal Pradesh. The study thus estimates the changes and differences between the offline and the online modes of teaching and learning.

Review of Related Literature

While the COVID-19 Pandemic put a brake on most activities, it provided an opportunity for academicians, psychologists, researchers and medics to probe into the new ways of life that humanity was forced to adopt as the new normal. One of the most investigated areas has been the discussion on the efficacy of the online mode of education. Rahman (2020) investigated students' online learning experience in Assam, India during the pandemic. The study found that the online teaching-learning process is hindered due to issues such as inadequate internet connectivity, expensive data plan costs, a shortage of appropriate devices, and teachers' lack of techno-pedagogic skills. Chakraborty et al. (2020) highlighted the different types of digital tools and platforms used by teachers in universities and other institutes of higher education to meet the challenges posed by the Pandemic. According to the study, students find online education stressful and believe it is hurting their health and social lives. Almost in a similar contextual vein, Mishra et al. (2020) systematically investigated both the pros and cons of online education during the critical period of the COVID-19 pandemic. They pointed out how online teaching was helpful and interesting for a group of students as they could revisit the lectures and videos uploaded by the teachers. On the other hand, the problems were also numerous. This study too points

out unstable internet connectivity as one of the major problems faced by the learners and teachers alike. Besides, there were other issues such as spending approximately five hours per day online and the limit of usable data. The researchers point out that the usual limit of data procured by most learners was 1.5 to 2.0 GB, and once it was consumed, they felt helpless. They concluded that the education sector has suffered in the wake of the COVID-19 pandemic. Policies need to be made so that the means for online education can be made accessible across teachers and learners of various categories.

Joshi et al. (2020) elucidate how the Government of India adopted several appreciable measures to continue education during the pandemic by shifting to the online mode and offering many channels, internet sites and QR enabled lessons/books for learners. This created the impression that academics were not hampered but the problems were deep-rooted. Lack of institutional support, lack of technical support for learners and also for teachers, the cost of availing proper equipment and lack of clarity and direction, all served as obstacles in the proper realization of the objectives. Gopal et al. (2021) made a quantitative study of experiences of students of B.B.A. and M.B.A. programmes and found that factors such as prompt feedback, quality of instructors and the course design contribute significantly towards the positive development of students in online classes. Muthuprasad et al. (2021) analyzed students' perception and preference for online education in India during COVID-19 pandemic. The study found that the perception of the students towards online education was positive and they preferred well-structured content that included video lessons and quizzes but practical problems like connectivity, technical constraints and the inability of teachers

to properly handle technology served as obstacles in the process.

Adnan and Anwar (2020) investigated students' perspectives regarding online teaching-learning in Pakistan and found that internet accessibility and monetary status played significant roles in deciding the response of students to online learning. Their findings showed that online teaching-learning is not as effective as the traditional face-to-face method used in conventional physical classrooms due to the issues already mentioned. Irawan et al. (2020) have ascertained that students in Indonesia started to get bored within a few weeks of online classes. They have also drawn attention to the financial problems faced by parents belonging to low-income groups due to the additional pressure to spend on data packages. Overloading online assignments also increased the amount of stress and anxiety among learners. Hence, they concluded that intensive effort should be taken to ensure students' sound physical and mental health during the post-COVID period. Huck and Zhang (2021) conducted a systematic literature review on the effects of the COVID-19 Pandemic on K-12 education in the context of America and pointed out that both students and teachers struggled with online education. Internet connectivity emerged as one of the major problems since those with lower income found it difficult to arrange for broadband connectivity for online study. Economic disparity, lack of technical know-how, mental stress and the need for more self-discipline were the factors that resulted in a mixed response from learners and teachers. It is important to note here that if a technologically developed nation was plagued with such issues, then a nation like India where the per capita income is quite low must have suffered more in providing and accessing online education during the pandemic when

thousands were left without any source of the income. Hossain (2021) in the study titled "Unequal experience of COVID-induced remote schooling in four developing countries" presented a comparative study of Ethiopia, India, Peru and Vietnam from mid-March 2020 to mid-November 2020. By taking the necessary variables for comparative analysis, Hossain arrives at the conclusion that the experience of remote schooling has not been equal in all four countries. The factors that decided this inequality were variations in income of the families to which the learners belonged; locational (dis) advantage such as being located in rural and urban areas since this was a factor for access to technology and virtual communication; educational qualification of the household heads; gender disparity and belonging or not belonging to disadvantaged communities.

Objectives of the Study

The study aims to shed light on the online learning experience and satisfaction of students at the postgraduate level in Arunachal Pradesh. The following are the main objectives of the study:

- To identify the digital tools and technologies utilised for continuing teaching-learning through online or virtual mode during the COVID-19 pandemic

- To analyse students' perceptions regarding the effectiveness of online teaching and learning

- To assess the impact of online education on the physical, mental and social health of the students

- To identify the practical barriers or challenges encountered during digital and online teaching-learning

- To assess the potential of Online teaching-learning in the future

Methodology

The study adopted a descriptive survey method as per the objectives of the research. Using a structured questionnaire, primary data were collected from postgraduate students of different higher education institutions in Arunachal Pradesh. The design of the questionnaire is based on related literature and existing surveys (e.g. Rahman, 2020; Mishra et al., 2020; Chakraborty et al., 2020). The questionnaire was structured as a Google Form and distributed to students via online digital platforms. Emails were sent to the faculty members of different higher education institutions with a request to circulate the survey link to their students through WhatsApp groups. A total of 206 postgraduate students responded to the survey. The data were collected during the month of August 2021.

Analysis and Discussion

This section summarises the responses gathered through the survey along with descriptive analysis and interpretation of the data.

Table-1: Devices used by Students (N=206)

Device	Percentage to Total N
Laptop/Desktop Computer	24.76 %
Smart Phone	97.09 %
Tablet	3.88 %

Table-1 shows that 97.09 per cent of the students used smartphones for accessing online learning during the COVID-19 pandemic. Laptop and desktop computers are used by 24.76 per cent of the students. As evident, the majority of the learners are using smartphones as they are more affordable than laptop/desktop computers, which are relatively high priced and affording one can be a financial burden, especially in underdeveloped areas where sources of income are limited. Moreover, the convenience of use and lesser data consumption can be other reasons for preferring smartphones. Only 3.88 per cent of the students used tablets. Tablets may be considered a luxury devices since their functionality is similar to that of a smartphone except for their large screen and other sundry details.

Table-2: Types of Internet Connection used by students to attend online classes (N=206)

Internet Connection	Percentage to Total *N*
Broadband	0.00 %
Wi-Fi	1.94 %
Mobile Internet	98.06 %

Table-2 shows the types of internet connections used by the students. When it comes to accessing the internet, the most preferred or the only means for most students is Mobile internet. With internet prices becoming cheaper and the subsequent boom in the number of internet users enabled by companies after the entry of Jio as a telecom service provider, mobile internet is the most common means of accessing the internet. Only 1.94 per cent of students reported using Wi-Fi connections, which reflects the wealth demographics as only wealthy families can afford to install Wi-Fi internet facilities at home. Other internet alternatives like Broadband did not have any users amongst the respondents.

Table-3: Platforms Used for Online Learning (N=206)

Platforms	Percentage to Total *N*
Zoom	22.82 %
Google Meet	97.57 %
Microsoft Teams	0.00 %
Cisco Webex	2.91 %
Google Classroom	57.77 %
Moodle	0.00 %
Blackboard	0.00 %
YouTube	21.84 %
WhatsApp	53.40 %
Facebook	2.91 %
Telegram	4.37 %
Others	35.92 %

Table-3 reveals that the most commonly used virtual platform for online learning is Google Meet (97.57 per cent). Its open and free service (up to 100 participants), usability and very user-friendly interface are the possible reasons for the widespread use and popularity of Google Meet. Google Classroom, another Google-based platform, has been used by 57.77 per cent of the respondents. Interestingly, the data shows that WhatsApp, an online messaging/chat app, is used by a vast section of 53.40 per cent of respondents for online learning. The extensive use of WhatsApp for educational purposes during the Pandemic bears testimony to the fact that such platforms that are free and easy to use can be improvised for purposes beyond the purview of its original use. In fact, WhatsApp groups have functioned as the only convenient platform that has kept the communication channel open between students and teachers during the Pandemic. Teachers found it easy to share notes, videos, and audio/video recordings of their lectures through WhatsApp. Zoom, another virtual platform for conducting video conferencing and group video chat, was also used by a sizable section of 22.82 per cent. Besides, entertainment and video sharing platforms like YouTube also contributed towards learning during the Pandemic as YouTube houses many learning materials, including instructional videos. A few respondents reported the use of Facebook and other platforms such as Cisco Webex, Telegram, etc. The use of other online conferencing and educational platforms such as Microsoft Teams, Moodle, and Blackboard was not reported.

Table-4: E-learning Platforms/Resources Used or Accessed for Online Learning during COVID-19 Pandemic (N=206)

E-Learning Resources/Platforms	Percentage to Total *N*
SWAYAM Online Courses	17.96 %
UGC MOOCs	6.31 %
e-PG Pathshala	17.96 %
SWAYAM PRABHA DTH Channel	0.97 %
National Digital Library	12.14 %
CEC-UGC YouTube Channel	10.68 %
Shodhganga	12.14 %
e-ShodhSindhu	2.43 %
None of the Above	53.40 %

Table 4 shows the e-learning platforms and resources used by the postgraduate students of Arunachal Pradesh during the Pandemic when offline classes were suspended. The data reveals that e-PG Pathshala (17.96 per cent) and SWAYAM Online Courses (17.96 per cent) were slightly more popular compared to Shodhganga (12.14 per cent) and National Digital Library (12.14 per cent) amongst the platforms used for accessing learning and study materials during the Pandemic. The YouTube channel of CEC-UGC has been used by 10.68 per cent of the respondents. Interestingly, more than half of the entire population of the study did not use any of these platforms. The responses highlight the need to generate awareness among the students about

the availability of eContent and learning materials on different platforms. The teachers have to inform the students about the different platforms and demonstrate how to use them.

Table-5: Methods Used by the Teacher in Online Teaching (N=206)

Method	Percentage to Total *N*
Live Lecture with Video	74.27 %
Live Lecture without Video	24.27 %
Live Lecture with PowerPoint Presentation	55.34 %
Recorded Audio Lecture	21.36 %
Recorded Video Lecture	16.02 %
Study/Reading Materials/Articles (PDF or Word File)	62.62 %
Written Assignment	44.17 %
Online Quiz	11.17 %
Live Interaction/Discussion	44.66 %
Discussion through WhatsApp Chat	31.07 %

Table 5 shows the methods that were adopted by teachers for online classes during the Pandemic. It was found that the most common method employed by the teachers was a live lecture with video, i.e. video conferencing mode. Live Lecture with PowerPoint Presentation (55.34 per cent) was another important method for teaching. The data also reveals that teachers provided Study/ Reading Materials/Articles to the students (62.62 per cent). WhatsApp played another important role during the Pandemic for teaching-learning as 44.66 per cent of the students responded by having a discussion through WhatsApp Chat. The study shows that several other methods were used in somewhat equal proportion like Live Lecture without Video, Recorded Audio Lecture, Recorded Video Lecture and Live Interaction/Discussion. Another interesting method employed by the teachers was conducting Online Quiz though only 11.17 per cent of the students reported its use.

Table-6: Total Duration of Online (Live) Classes Conducted in a Day (N=206)

Duration	Percentage to Total *N*
1 Hour	21.36 %
2 Hours	2.43 %
3 Hours	4.85 %
4 Hours	19.90 %
More than 4 Hours	50.49 %
No Live Classes	0.97 %

As live online classes were the standard mode of teaching-learning during the Pandemic, the study attempted to determine the average duration of

online classes conducted during a single day. Table 6 shows that online classes were conducted for 4 and more than 4 hours per day for a vast majority of the respondents. For a sizable section of the students (36 per cent), online live classes were conducted for only 1 hour a day. The data reveals that teachers continued to do remote teaching through online live classes during the Pandemic with variation in the number of hours.

Table-7: Ideal duration of Online (live) classes in a Day (N=206)

Hour (s)	Percentage to Total *N*
1 Hour	22.82 %
2 Hours	5.34 %
3 Hours	30.58 %
4 Hours	30.10 %
More than 4 Hours	8.25 %
No Live Classes	2.91 %

In online education, the duration of live classes conducted in a day is a significant concern. Excessive class hours can lead to excessive screen time that can compromise students' mental and physical health. On the other hand, less hours of live class engagement may also lead students to be nonchalant about their learning. Hence it is imperative to strike the right balance for online classes during a single day. Table 15 shows that students consider 3 to 4 hours duration ideal for online (live) classes.

Table 8-13 shows the responses to statements recorded on a 5-point Likert scale. The statements were related to the teaching-learning process in general, content delivery, teacher-student interaction, assessment, and the impact of online education on physical and emotional health. In the discussion, the two positive categories 'strongly agree' and 'agree' and the two negative categories, 'strongly disagree' and 'disagree' were aggregated for interpretation.

Table-8: General Issues regarding Online Teaching-Learning during Covid-19 (N=206)

Statements	Strongly Disagree	Disagree	Can't Say	Agree	Strongly Agree
Students learn better through face-to-face mode in physical classrooms than through online mode	1.94 %	3.88 %	7.28 %	31.07 %	55.83%
Online teaching-learning is a practicable alternative during the COVID-19 Pandemic	3.88 %	2.91 %	24.76 %	57.28 %	11.17 %

Teachers have continuously striven to improve their skills in online teaching throughout the pandemic	2.91 %	5.34 %	16.50 %	52.91 %	22.33 %
Adequate study materials related to your courses are available online for open and free access	7.28 %	22.82 %	34.47 %	32.52 %	2.91 %
Online learning has provided the opportunity to teach and learn in alternative and innovative ways	4.85 %	15.05 %	21.36 %	53.40 %	5.34 %

As already discussed, the Covid 19 pandemic has resulted in miseries and hardship for people from all walks of life and led to multiple responses to the crisis. Table 8 shows students' perception regarding their experience of learning during the Pandemic through online mode. The majority of the students (86.90 per cent) felt that they learn better through face-to-face mode in physical classrooms compared to the online mode of teaching-learning. Nevertheless, the students also felt that online learning is a practicable alternative (68.45 per cent). Interestingly, 24.76 per cent of the students were not sure about the practicability of online education. Table 8 reveals that the majority of the students (75.24 per cent) feel that their teachers have continuously striven to improve their skills in online teaching throughout the pandemic. As teachers are the backbone of any educational system, it is essential that teachers adjust their teaching techniques and methods as per the situation and changing classroom dynamics. The current shift to online teaching has highlighted the importance of flexibility and adaptability. Students have given mixed responses regarding the availability of open and free access online study materials. Interestingly, a large section of the students (34.47 per cent) expressed that they can't say anything regarding it, which indicates that they are either not aware of the availability of such materials or they could not access them, or they might not have felt the need to do so. Most of the students (58.74 per cent) agreed that the Pandemic had brought opportunities to teach and learn in alternative and innovative ways.

Table-9: Content Delivery and Interaction (N=206)

Statements	Strongly Disagree	Disagree	Can't Say	Agree	Strongly Agree
Slideshow/ PowerPoint Presentation makes an online lecture more effective	0.97 %	5.83 %	9.22 %	65.53 %	18.45 %

There is more interaction between teacher and student in physical classrooms compared to online platforms	2.43 %	5.34 %	8.25 %	27.67 %	56.31 %
Using a digital pen during online teaching makes the lecture effective	1.46 %	6.80 %	40.78 %	43.20 %	7.77 %
If the teacher and students show their faces/ keep the video on, then a lecture becomes more interactive	1.94%	10.19 %	27.18 %	46.60%	14.08%
Comments of students in the chat box during an online lecture make the class more interactive	1.46 %	7.28 %	23.79 %	54.85 %	12.62 %

Table 9 presents the opinion of the students on the effectiveness of the mode of content delivery and interaction in online teaching-learning. The data shows that the majority of the students (83.98 per cent) believe that slideshow or PowerPoint presentation used by the teachers makes an online lecture more effective. Interaction between teachers and students is a vital component of learning. In physical classrooms, interaction happens daily as teachers appear face-to-face with the students and the opportunity to interact increases. Therefore, the data shows that most students (83.98 per cent) feel that students interact more with the teachers in physical classrooms than through online mode. This indicates that face-to-face mode is better in enabling more interaction and communication between teachers and students. However, online classes can also be helpful for students who are relatively shy as they can interact with the teachers through the chat box provided to raise questions during the class, though this section consists of a small portion of the total composition of students (7.77 per cent). The majority of the students (50.97 per cent) consider the use of digital pen in online classes useful. However, it is interesting to note that a considerable section of the students (40.78 per cent) responded that they aren't sure or they cannot assess the benefits of a digital pen. This response indicates the non-use of digital pens by most teachers, as tools like digital pen might not be necessary for all the subjects. Most of the students (60.68 per cent) felt that the interaction could improve if teachers and students showed their faces or kept their videos on during online lectures. The students also felt that communication between teachers and students in the chat box during an online lecture makes the class more interactive.

Table-10: Evaluation and Assessment (N=206)

Statements	Strongly Disagree	Disagree	Can't Say	Agree	Strongly Agree
Online tests are effective in assessing/evaluating the knowledge of students	14.08 %	20.87 %	33.98 %	27.18 %	3.88 %
Continuous assessment and tests support the learning process	2.43 %	4.85 %	12.14 %	60.19 %	20.39 %
Students do their assignments with sincerity and devotion in online mode	21.84 %	24.76 %	34.47 %	16.50 %	2.43 %
Students tend to exercise their critical and creative thinking less during online assignments and tests	1.94 %	10.68 %	18.45 %	47.09 %	21.84 %

Evaluation and assessment in online learning are quite different from a traditional physical classroom set-up. There is a greater probability for students to feel tempted to use unfair means in the online mode. They also may become susceptible to health issues as they have to deal with network-related anxiety etc. Table 10 shows that students are very uncertain about the effectiveness of one over the other as 33.98 per cent of the students did not have any opinion regarding which mode of assessment is effective. 35.3 per cent of the students felt that online tests are not effective in assessing/evaluating the knowledge of students. Students seem to agree that continuous assessments and tests help in the learning process (80.56 per cent). On the question of doing their assignments with more sincerity and devotion in online mode, a large section of the students (46.6 per cent) reported the lack of sincerity, while 34.47 per cent of the students were unsure about it. This shows that online assignments and tasks could not ensure sincere engagement from the students, and teachers also failed to constantly monitor the progress and performance of the students. Further, the majority of the students (68.93 per cent) believe that students are exercising their critical and creative thinking less during online assignments and tests.

Table-11: Health and Social Issues (N=206)

Statements	Strongly Disagree	Disagree	Can't Say	Agree	Strongly Agree
Online education is leading to a phobia related to internet connectivity during live online classes and online tests/examination	1.94 %	4.37 %	22.33 %	49.03 %	22.33 %
Overuse of digital technologies may lead to health problems	1.46 %	6.31 %	17.48 %	47.09 %	27.67 %
More screen time may stress the eyes and ears	0.97 %	2.91 %	4.85 %	47.57 %	43.69 %
More screen time may result in mental stress and affect sleep patterns	0.97 %	4.85 %	16.99 %	48.54 %	28.64 %
Online tests/ examinations creates more anxiety than traditional examination	2.91 %	10.68%	32.04 %	39.32 %	15.05 %
Online education impacts students' social life as they are forced to stay at home	2.91 %	12.14 %	16.02 %	48.06 %	20.87 %
Online education is creating a digital divide among students from different sections of the society	2.43 %	9.22 %	25.73%	45.63%	16.99 %

Students can be susceptible to different issues related to health and other social areas owing to online teaching-learning. Excessive screen time can potentially cause many health problems. Online learning may also lead to students isolating themselves from social interaction in the real world. Hence online learning must be constantly checked to mitigate such issues. As Table 11 shows, the students (71.36 per cent) felt that online teaching-learning has led to a rise in phobia related to internet connectivity during live online classes and online tests. The students (74.76 per cent) felt that overuse of digital technologies may lead to health problems. Almost all the students agreed that spending more time on the screen may stress the eyes and ears. The majority of the students (54.37 per cent) also agreed that online tests/examinations create more anxiety than the traditional mode. The students (68.93 per cent) felt that online teaching-learning impacts the social life of the students. It can also create a gap between students belonging to different economic backgrounds. Most of the students (62.62 per cent) expressed that online teaching-learning is creating a digital divide among students from different sections of society.

Table-12: Satisfaction regarding Multiple Aspects Related to Online Teaching-Learning (N=206)

	Strongly Dissatisfied	Dissatisfied	Can't Say	Satisfied	Strongly Satisfied
Teachers' technical Knowledge	7.28 %	15.05 %	14.56 %	51.94 %	11.17 %
Instructional Methods used by Teachers in online mode	9.71 %	19.90 %	16.02 %	45.63 %	8.74 %
Your technical know-how	8.74 %	21.36 %	21.36 %	44.17 %	4.37%
Training and technical support from the institution	7.77 %	20.39 %	17.48%	46.12 %	8.25 %
Students' engagement in the instructional process	10.68 %	22.82 %	23.79 %	41.26 %	1.46 %
Interaction between Teacher and Students	13.11 %	28.64 %	14.08 %	39.32%	7.28 %

Table 12 highlights the overall satisfaction of the students regarding multiple aspects related to online education. A majority of the students were satisfied with the technical knowledge of the teacher, the technical know-how of the students, the training and technical support provided by the institution, and the involvement of the students. The teaching method used by teachers in online mode and the interaction between teachers and students were also considered to be satisfactory.

Table-13: Barriers to Online Teaching-Learning (N=206)

	Extreme Barrier	Moderate Barrier	Can't Say	Somewhat of a Barrier	Not a Barrier
Network Signal, Connectivity and Internet Speed	59.22 %	23.30 %	2.91 %	11.65 %	2.91 %
Unstable supply of Electricity	27.67 %	40.29 %	9.71 %	13.59 %	8.74 %
High Cost of Internet	35.44 %	27.18 %	9.22 %	20.87 %	11.65 %

Fear and Anxiety related to the Pandemic	26.21	33.50	17.48	15.05	7.77
Multiple Distractions	36.41	28.64	15.05	14.56	5.34
Psychological and Emotional Distress	32.04	26.70	15.53	16.99	8.74

Table 13 highlights the barriers that students faced during online teaching-learning. Though network signal, connectivity, internet speed, electricity etc. are the key requirements of online teaching-learning, they posed the most significant barriers to the students as they faced poor network signal and connectivity, slow internet speed, and unstable electricity supply. This shows that internet connectivity is not up to the mark in the region and erratic electricity supply also causes difficulties for most students. One interesting finding was that internet cost was considered to be an extreme barrier by a majority of the students. This throws light on the poor economic conditions of most of the students. Fear and anxiety related to the Pandemic, multiple distractions and psychological and emotional distress also posed as barriers to teaching-learning in the online mode.

Table-14: Overall Learning Experience in Online Mode (N=206)

Category	Percentage to Total N
Effective	15.05 %
Partially Effective	60.68 %
Not Effective	24.27%

Table 14 shows students' level of satisfaction with the overall learning experience in the online mode. The data reveal that most of the students (60.68 per cent) considered online mode to be partially effective as online learning has both advantages and disadvantages. 24.27 per cent of the students thought it to be not effective, while only 15.05 per cent believed it to be effective. The responses highlight that online learning, despite its potential to be an alternative to physical offline education, still has to address many issues related to overall learning experience.

Table-15: Preferred Mode of Learning in Future (N=206)

Category	Percentage to Total N
Online	4.85 %
Face-to-face	53.40 %
Blended (Both Online and Face-to-face)	41.75 %

Students were also asked to give their opinion on the mode of learning they would prefer in future. As Table 15 shows, most of the students (53.40 per cent) would choose only face-to-face mode of learning. However, an equally large section of the students (41.75 per cent) expressed that they would prefer

Blended mode in future, which shows that the learners acknowledge that the online mode can supplement the physical classroom teaching to make their teaching-learning experience more rewarding. Interestingly, only a small section of the students (4.85 per cent) felt that they would prefer the online mode in future, which shows that students still do not see online learning as an alternative or substitute to the offline mode of learning.

Conclusion

This study undertaken to gauge the learning experiences of post-graduate students of Arunachal Pradesh during the COVID-19 Pandemic in the online mode has brought to light interesting findings. The data analysis shows that while online teaching on digital platforms was chosen to overcome the threats posed by the COVID-19 virus, it also had its share of problems that were rooted in the underdeveloped infrastructural facilities in the region and socio-economic constraints of learners and their parents – a considerable portion of whom belong to low-income group families. At the same time, this study also shows that while the knowledge of the teachers using online tools has been satisfactory, the cost of data and issues related to connectivity have emerged as major hindrances to online education in Arunachal Pradesh. Another area of importance that the study has brought to surface is the concern with physical and psychological health of students engaged in online classes for long hours. The integration of the findings in this study with other related studies conducted in the Northeastern region of India will surely help to locate the key areas on which the policy makers have to focus on to improve online teaching-learning and deliver the goals for which it was put into currency. Given the impetus on online mode in education in different forms and on various platforms, it is desirable that the formulation of policies should be in tandem with the requirements of time and geographical spaces.

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Academia adapting to e-Learning: A survey on Indian engineering educational

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Abstract

The Covid-19 pandemic caught the world off guard with its precipitance and virulence alike. Forced indoors, the human race is learning to stay indoors and work from home. Among the sectors hit hard, education is probably the worst hit as it affects the future. Trying to adapt to the online mode of learning, teachers and students are grappling alike with technology, attention spans, traditions and the like. This paper, based on a survey conducted among engineering students in India, tries to figure out the major problems faced by students in adapting to e-Learning. The responses have been classified based on the area covered in the question and analyzed. The findings, some trivial, some sensitive while some being eye-opening, would certainly contribute to policy framing initiatives of the government and private agencies investing in e-Learning.

Keywords: e-Learning, survey, online learning, blended learning, efficacy, pedagogy, teacher-student interaction

Introduction

Post Covid-19, the world has changed all too drastically. People are now confined indoors to prevent being infected and stop the spread of the deadly virus. Working from home has become the new normal in almost all spheres of human activity. Education is probably the field of work that has been most affected by this paradigm shift as century-old traditions and methods need to be reworked and adjusted. Over the last year and a half, with schools, colleges and universities closed, online education has been the sole mode of learning. While online learning or e-learning as it is popularly known, has been around for some time now, such widespread and large-scale application and use were never expected.

The term e-Learning was coined and first used in 1999 by Elliot Masie (Guttirez n.d), the first attempts at e-Learning date back to 1924 when Sidney Pressey created the Automatic Teacher, the very first electronic learning machine (Sander, 2019). In 1960, Donal L. Bitzer built PLATO, a computer system for online learning (Sander, 2019). The advent of the internet brought about a sea change in the way people communicated and e-Learning was also influenced. While initially it was restricted to only sharing of text and documents to be used as learning material, advances in web technologies soon facilitated online lecture delivery, modular course content and proctored evaluation.

In the Indian context, Distance Education

providers like Indira Gandhi National Open University (IGNOU), B. R. Ambedkar University, Annamalai University and Sikkim Manipal University started in the early 2000s utilizing Information and Communications Technology (ICT) for their courses (Kawatra & Singh, 2006). While such courses are popular, there exist restrictions on the types of courses that can be offered in distance learning (Chamoli, 2020). In recent times, major private players have invested hugely in online learning platforms and such are widely available in packages for all levels of learners starting from the primary. While the popularity of such commercial online platforms is projected to grow at a formidable speed over the next few years (Agarwal, 2021), it must be understood that these are still supplementary tools used to augment the understanding a student gains from his/her classroom experience. In the universities as well, e-Learning was only considered as a supportive framework for students.

The current paper presents the results of a survey conducted among engineering students to assess their reaction towards online learning. It focuses on the online content materials, interaction between students and teachers, advantages and disadvantages of online education and tries to figure out the future of online education and offline education and blended mode of learning vis a vis the perspective of students.

Objectives

The American Psychological Association (APA) defines learning as, "the acquisition of novel information, behaviours, or abilities after practice, observation, or other experiences, as evidenced by a change in behaviour, knowledge, or brain function. Learning involves consciously or unconsciously attending to relevant aspects of incoming information, mentally organizing the information into a coherent cognitive representation, and integrating it with relevant existing knowledge activated from long-term memory" (American Psychological Association (APA), n.d). Presently being advocated as a lifelong iterative phenomenon of learning, unlearning and relearning or up-skilling, psychologists Gagne, Briggs and Wager, classified this into five major categories, namely, physical skills, information, intellectual skills, cognitive strategies, and attitudes (Gagne et al., 1992). Our education institutes, namely schools, colleges and universities are expected to impart these skills, additionally imbibing in the students the ability and right attitude towards lifelong learning. The primary difference between offline and online learning lies, which incidentally is one of the two most powerful influences in the learning environment (Westwood, 2004). In the case of e-Learning or online learning the communication between the teacher and the learner is over a highly constrained medium which often creates barriers to real-time feedback which otherwise is observable to the trained eye. It is therefore justified, that the e-Learning industry has set the major goals for e-Learning (Francis, 2018):

- Enhance the quality of learning and teaching

- Meet the learning style or needs of students

- Improve the efficiency and effectiveness

- Improve user accessibility and time flexibility to engage learners in the learning process

In the current context, when educational institutes have been forced to deliver courses online, the actors involved having been trained and practiced in the contact mode of teaching-learning, the quality of delivery and approach to teaching comes under question. At the

same time, the interest and ability of the learner to learn solely from and in an environment hitherto unknown also need to be followed.

The purpose of this work was to understand the student's reaction to the paradigm shift in learning mode and the outcome of the same. The work, compiled through a survey on a sample size of 315 engineering students of the second (2nd), third (3rd) and fourth (4th) years consisted of a questionnaire covering the following aspects of online learning during the Covid-19 pandemic:

* Content delivery

* Content structure

* Teacher-Student interaction

* Efficacy

* Popular mode of learning

The actual measurement though would be revealed at a later stage when the learners' would be exposed to scenarios in real life and would have to apply the learning made during these testing times. Nevertheless, an educated prediction of sorts is attempted and reported here which can identify the course of action for academics to meet the standards set by the industry and the industry to check the correctness of the standards set.

The authors used convenience sampling through the circulation of the questionnaire via social platforms. A total of 348 responses were collected out of which thirty-three (33) responses were rejected due to incompleteness. Among the three categories, i.e. second, third and fourth-year students, the responses received were 87, 138 and 90, respectively.

Literature Review

Since its inception and years of growth, e-Learning has been evaluated from multiple angles. The comparisons, always being up against the traditional mode of classroom delivery, have been aimed at measuring the efficacy of e-Learning (James, n.d). On one hand, while researchers report that students taking greater numbers of online courses were more likely to engage in quantitative reasoning, while being less likely to engage in collaborative learning, student-faculty interactions, and discussions with diverse others and have less exposure to effective teaching practices and lower quality of interactions, it is also seen that online learning builds self-learning proficiency (Dumford & Miller, 2018). It has also been advocated to follow the middle path, i.e. to use blended mode for a better learning experience (Pineda-Herrero et al., 2011).

Considering the unprecedented situation that the world has been thrown into, the only option that the academic community was left with was e-Learning. In the Indian context, thankfully, the majority of the stakeholders were connected to the internet and therefore at least the most rudimentary education imparting could be continued. It is only to be accepted that neither the teaching community nor the educational institutions were ready for this and it took some time to get used to this new paradigm of lecture delivery. Even the learners at times found it difficult to adjust to a speaking box.

Substantial research has been reported already post the onset of Covid, deliberating into various issues impacting education. While some harp on the widening social divide and the rise in popularity and use of e-Learning platforms (Bacher-Hicks et al., 2021), some have tried to analyze the impact of online learning on the quality of learning (Dhawan, 2020)(Suryaman & Kusnan, 2020).

Multiple surveys have also been conducted among various discipline-specific students. In their work Sarwar et al (Sarwar et al., 2020) conducted a cross-sectional study using an online survey comprising 31 questions posed to a total of 1207 dentistry students across Pakistan. The results brought out the dissatisfaction of the students with almost all aspects of the institutional learning management system and the quality of learning resources available. In a global survey conducted on dermatologists, 38 per cent responded that they did not have the requisite infrastructure in place (Bhargava et al., 2021).

The drawbacks of e-Learning already have been in the knowledge of researchers and the impact has been fathomed, a direct correlation between the efficacy of e-Learning and acceptance of the same under forced circumstances needs to be understood. In the reported literature, engineering graduates' feedback or survey could not be traced. To this end, the current work puts on record the findings of a survey conducted on engineering students in India. Considering the fact that engineering students would be better equipped in handling technology, as would be the teachers, the questions were directed to be more technically aligned. Courses tagged as 'professional', like engineering, medicine, pharmacy, architecture etc, having been banned from being conducted in distance mode, this survey hopefully would be of help to policymakers and business houses alike in planning for the future of education in general and e-Learning in particular.

Data Acquired

The questionnaire for data acquisition, made using Google Forms was floated among engineering students in 2nd, 3rd and 4th years, respectively. Freshmen were excluded from the survey since they have not experienced offline engineering education as yet. The form was kept alive for a week-long period and each student was allowed a single entry only. A total of 315 unique responses were received, comprising 28.6 per cent of responses from 2nd year, 43.8 per cent of responses from 3rd year and 27.6 per cent from 4th year students. The responses represented figuratively are shown in Figures 1 to 7 and discussed in the following sections.

The questions were framed and initially tried within a closed group of 40 students. Based on feedback received about clarity and objectivity, the questions were rephrased and all questions were made close-ended.

- **Device Used**

A sizable majority of students depend on mobile phones for attending classes. Out of the total 315 responses, 189 students answered in the affirmative about mobile phones while 39.4 per cent said that they use a laptop or a desktop computer for the purpose. Figure 1.2 shows the pie-chart representation of the data.

- **Platform**

A variety of platforms have been reported to be used. While the most prevalent being Google Meet with 59 per cent usage, Microsoft Teams was the next most used platform with 24.8 per cent of students reporting using it. Other platforms like Zoom, Google Classroom and Skype are also used in lesser numbers. Some students even reported classes being conducted using WhatsApp Conference video calls. Figure 1.3 shows the students' responses.

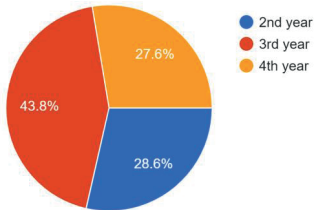## Figure-1: Year of students, devices used, platform, network

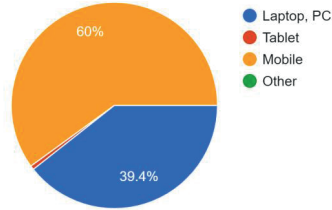**Figure 1.1 - Currently, in which year of Btech do you belong??**
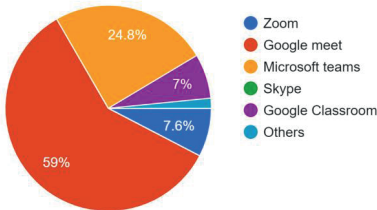

Figure 1.2 - Gadgets for attending online classes

Figure 1.3 - Platform of online classes
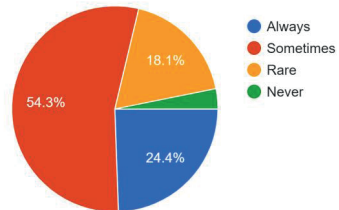

Figure 1.4 - How often do you face network issues during online classes??

• **Network**

As of 2021, India has more than 700 million internet users, comprising 41.129 per cent of its population (Keelery, 2021). However, reliability seems to be a bottleneck as user satisfaction is abysmally low. In the survey, 78.7 per cent of students reported frequent connectivity problems affecting the quality of education. Figure 1.4 shows the response plot as pie-chart.

• **Study and Lecture Material**

About 89.9 per cent of students reported getting content materials in the form of live lectures, presentations or reading materials. However, a majority, i.e. 58.7 per cent do not find the material provided to be sufficient for learning and they need to refer to other resources for their self-learning. The quality of content delivered and provided was found to be of average quality by the majority of the students comprising 42.2 per cent of students. The materials also fell majorly in the poor to average bracket for self-learning for 44.34 per cent students. Further, 43.8 per cent of students felt that not all subjects could be effectively delivered over online mode and some needed the physical presence of the teacher. Figure 2.1, 2.2, 2.3, 2.4 and 2.5 show the responses received from relevant questions in the survey.

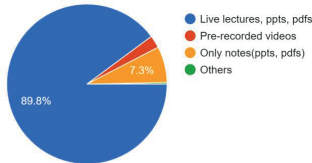## Figure-2: Study and lecture material
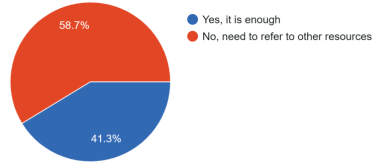
Figure 2.1 - Mode of content

Live lectures, ppts, pdfs — 89.8%
Pre-recorded videos
Only notes(ppts, pdfs) — 7.3%
Others

Figure 2.2 - Are the materials you get from college is enough for self-learning or you need to refer to other resources??
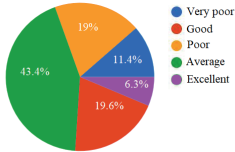
Yes, it is enough — 41.3%
No, need to refer to other resources — 58.7%

Figure 2.3 - Content understanding for students

Very poor — 11.4%
Good — 19.6%
Poor — 19%
Average — 43.4%
Excellent — 6.3%
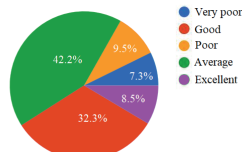
Figure 2.4 - Content materials

Very poor — 7.3%
Good — 32.3%
Poor — 9.5%
Average — 42.2%
Excellent — 8.5%
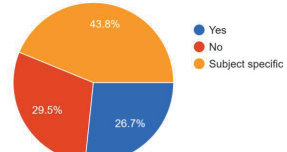
Figure 2.5 - Do you find online classes are helpful for self learning??

Yes — 26.7%
No — 29.5%
Subject specific — 43.8%

• **Content Delivery and Teaching Style:**

A substantial number (62 per cent) of students responded that they are aware of the fact that the teachers are unused to delivering and preparing study materials for a complete online mode of learning. However, an astonishing 51.1 per cent of students replied that they expect teachers to deliver quality comparable in style with those of professional online courses. The majority i.e. 44.7 per cent of students are happy with the syllabus coverage but a majority 43.1 per cent also graded the quality of delivery as average. Figure 3 maps the responses to the relevant questions.

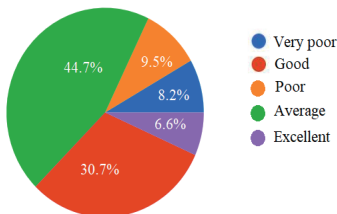## Figure-3: Content delivery and teaching style

Figure 3.1 - Content delivering

Very poor — 8.2%
Good — 30.7%
Poor — 9.5%
Average — 44.7%
Excellent — 6.6%

Figure 3.2 - Teaching style

Very poor — 8.5%
Good — 28.8%
Poor — 11.1%
Average — 43.1%
Excellent — 8.2%
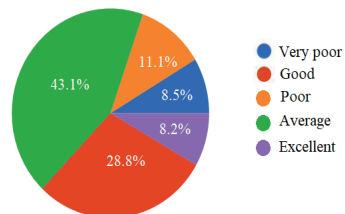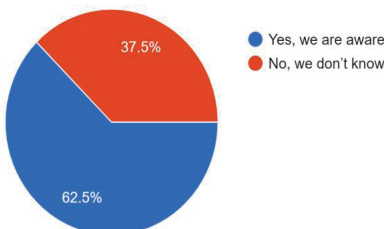
Figure 3.3 - Are you aware whether the teachers are equipped or not to deliver online lectures??
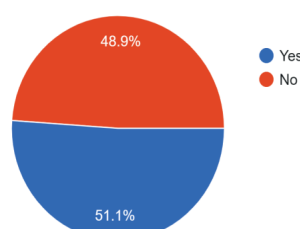
Yes, we are aware — 62.5%
No, we don't know — 37.5%

Figure 3.4 - Are you comparing this new online teaching style with that of professional style of online leactures??

Yes — 51.1%
No — 48.9%

- **Teacher-Student Interaction**

Unmistakably, the student's responses on teacher-student interaction are as expected. Majority of students are in denial in accepting online learning as helping in teacher-student interaction. A majority even found it easier to clear doubts in physical classrooms through questions than in online lecture sessions. Figure 4 shows the response percentages.

Figure-4: What is your reaction?
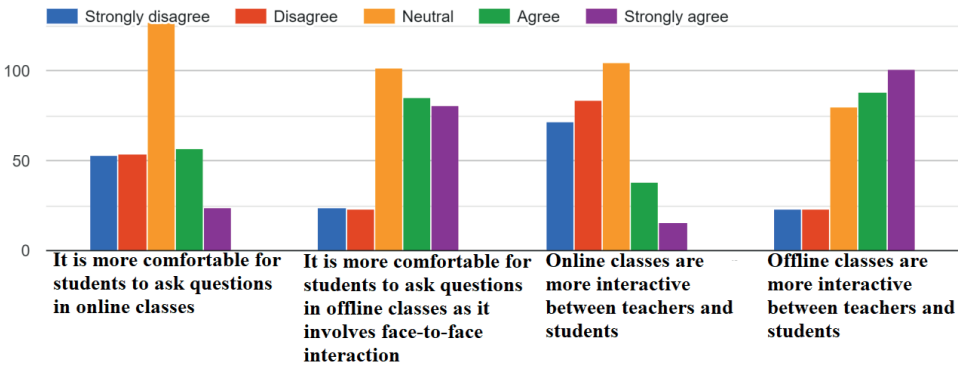
Figure 4 - What is your reaction??

- **Examinations and Results**

The recorded responses do not narrow down any concrete pattern on the number of examinations conducted. Students reported having to appear in more than one examination in a month, while some said that they have a single examination in about five months, which makes up a semester. However, irrespective of the number of examinations needed to appear in, 47 per cent of students said that their results have improved during the pandemic-induced online classes. Close to 36 per cent of students claimed that their results did not undergo any significant change, while 17.5 per cent reported having suffered during online examinations. Figures 5.1 and 5.2 show the student's responses.

Figure-5: Examinations and results
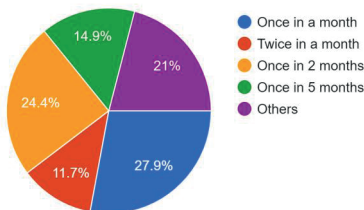
Figure 5.1 - What is the frequency of your online examinations??
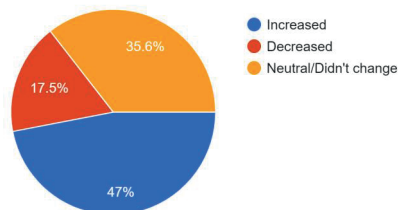
Figure 5.2 - How has your result changed from offline to online classes??

- **Advantages and disadvantages of online education**

Maximum students find the ease of being at home/comfort of home as the main advantage of online education. Interestingly, about 62 per cent of students confessed to being engaged in other activities like chatting, playing games or doing household chores while

having logged in to online classes. In the case of disadvantages, students mainly find network issues during online classes as the main difficulty. Figures 6.1, 6.2 and 6.3 show the results.

Figure-6: Advantages and disadvantages of online education
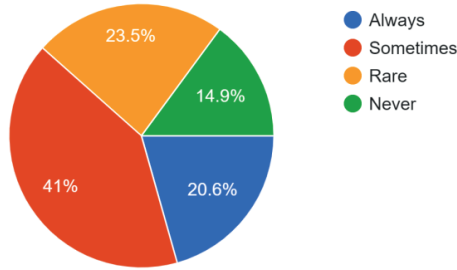
Figure 6.1 - **During online classes, how often do you indulge in some other activities like chatting, household stuffs, etc??**
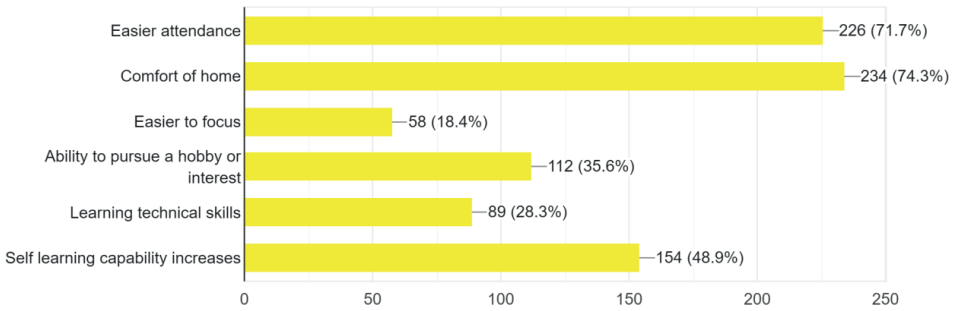
Figure 6.2 - Advantages of online classes
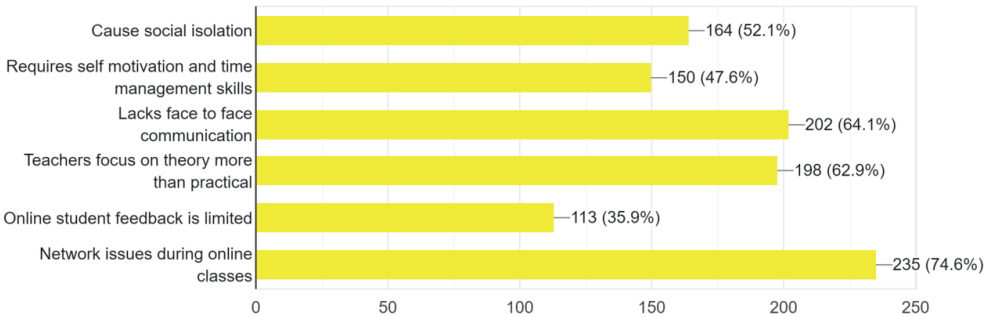
Figure 6.3 - Disadvantages of online classes

• General Opinion

Online learning as the sole mode having been thrust, the students have fared well. However, the majority still prefers offline mode over online learning, with 59.4 per cent of students believing that offline mode will stay for some time.

Being very clear about the advantages and disadvantages, as is shown through response maps in Figures 6.2 and 6.3 respectively, a sizable number of students voted in favour of choice-based online learning, as can be seen in Figure 7.

Figure-7: General opinion
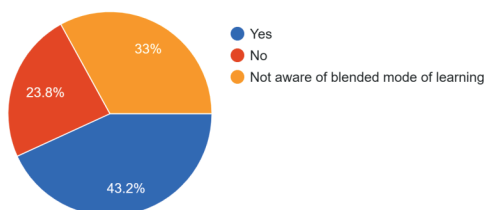
Figure 7.1 - In post covid situation, will you prefer to blended mode of learning??
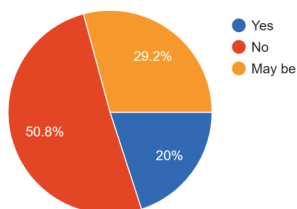
Figure 7.2 - In future, do you think that formal(school / college) education should be stopped and online education should be made choice based??

Figure 7.3 - Which one do you prefer in future??

Analysis of Responses

The results as mentioned in the sections above can be reviewed and analysed in the context of the prevailing scenario in the Indian academic context. The current section tries to bring out the underlying reasons and build upon them to provide valuable insight. The analysis is based on visualisation using graphical tools and information available in the literature.

The penetration of smartphones has grown at a remarkable pace in India. India has the second largest smartphone users globally. As of May 2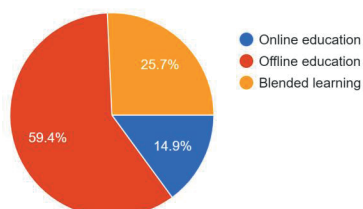021, the penetration rate of smartphones in India reached 42 per cent and was estimated to reach 51 per cent in the financial year 2025, more than doubled from financial year 2016, when only 24 per cent of mobile subscribers were using smartphones (Sun, 2021). After beating the US, recently by crossing 220 million active smartphone users in 2015. Smartphone ownership among young adults, especially college-going students has been consistently elevated (Arora et al., 2016). It therefore, is not a surprise that over 50 per cent of students are using mobile phones for attending online classes. Despite the advantages of mobile phones being the ubiquitous tool for communication, much doubt exists about its use for pedagogically valuable learning settings. It supports spontaneous short study phases and needs game-based course design for effective learning (Kramer & Strohlein, 2006). Under the existing scenario, neither the teachers nor the academic institutes are fully aware of or prepared for incorporating such changes. The problem is further complicated by the fact that a sizable population also uses laptop or desktop computer-based learning. The course delivery would have to suit either set of students both technically, catering to the operating system and display size variances for pedagogy. Ideally, this would need engaging additional manpower for the design of the interface for content delivery. The teacher is not trained for the job and can only do his bit in the content preparation. It is probably only obvious that it is for such reasons that the satisfaction level of the student with respect to the content and its delivery is low. This is substantiated through the results shown in section

4.5. Interestingly enough, students are aware of the problems faced by teachers. Additionally, the teachers, having been trained through the classical classroom teaching approaches themselves and have developed methods and mannerisms suitable for the paradigm would need to be retrained and adapt to the demands of changing times. Even after the restrictions are eased and as students come back to classes, the expectation would have changed and the community might be looking forward to what is popularly known as blended learning.

In the present context, using online learning, the attention span of the average learner has also been affected. Mobile devices and applications, being designed to engage the user's attention (Shirky, 2014), the difficulty level for the teacher increases manifold. Academia therefore needs to invest time and energy into developing a unified strategy for generalised learning methods suitable for classroom, online and blended teaching-learning. As could be assessed from the findings reported in section 4.4, content quality, delivery style and techniques need a major re-look. Also, irrespective of the kind of devices used, about 20 per cent of students (33 of 191 mobile users and 29 of 124 PC users) reported regularly being distracted by other online activities, which is a serious hindrance to learning.

Education, being not only about learning a subject but also social skills and communication, online learning is naturally hindered. Even teacher-to-student communication is constrained, proper subject-based skill imparting would also naturally be hampered. The feeling of belonging to a community, as exists in the case of a class or a fraternity feeling that normally exists among course mates, is missing in online learning. Efforts must be made by teachers and pupils alike to get deeply involved in constructing interaction and collaboration between the instructor and students and among students to create an effective online learning community (Sun & Chen, 2016).

Possibilities look bright with the advent of Augmented Reality and 3-dimensional imaging. Supporting such technologies and taking them to the end user, en masse would require a lot of investment in the infrastructure. In a country as big and geographically diverse as India, this is a challenge. The future of education in general and engineering education, in particular, rests on policies and their implementation both by the government and private sector investors.

A major drawback of the online learning phenomenon lies in the assessment of students' responses. Even more starkly evident during the pandemic, due to the sudden migration to online learning, the results of students have improved by a considerable margin. The primary reason was over-reliance on multiple-choice-based questions, the universities had no choice otherwise. Evaluating text-based answers automatically is a steep task and a method and platform acceptable to all are yet to be developed (Chakraborty et al., 2021). Advantages apart, MCQ-based tests have their own limitations and are seriously restricted in not being able to measure crucial learning outcomes like analysis, evaluation and creation. A better grade does not necessarily mean better learning, the end purpose stands defeated under such conditions.

While having improved grades may be happy news for students, it would certainly not stand in good stead in the long run and harm the interests of all stakeholders.

Conclusion

The Covid-19 pandemic has affected

all of us all too suddenly. With hardly any time to think, people have been sent indoors. Like all other walks of life, education too has been hit. In retrospect, it might be easy to criticise and find faults with the way things were conducted. However, it must be remembered that nobody was ever ready for this and no system can ever be ready for an event that forces so much change.

All odds notwithstanding, the entire academic fraternity has shown steely resolve in coming around and continuing, in ways best possible, the teaching-learning process, so that the future and career prospects of millions of learners are affected minimally. The methods employed might be flawed, but can evolve to be highly effective if properly tuned. In the times to come, when the students return to the classrooms, their expectations would have changed, and it would only be wise to adapt to the demands of changing times, even more so if that leads to improvement. The survey-based study reported herein, can be summarized through the following findings:

1. Students expect

   a) more interactive sessions

   b) better delivery

   c) study materials that suit self-learning

2. Students are aware of the advantages and disadvantages of online learning

3. The internet connectivity has to be more reliable

4. Pedagogy has to be adapted to suit blended learning

5. Teacher training is essential for changing trends in learning

6. Online examinations must be upgraded to enable more rigorous testing of learning outcomes

7. Online learning platforms need standardization

The authors hope that the results and findings would be helpful for researchers, education managers and policymakers in taking forward the teaching-learning system in India, especially in the domain of engineering education.

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The Adoption of Digital Smart Board in Delhi Government Schools: A Student's Perspective

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Abstract

Schools in India have been equipped with Digital Smart Board to enhance learning in classrooms. The classical learning process has undergone some fundamental behavioural modifications because of the increased focus on digital learning. The essence of this study is to examine the acceptance of the Digital Smart Board by students in the classroom. The Technology Acceptance Model (TAM) is utilised in the study to explain students' behaviour towards smart boards in Delhi government schools. A sample of 184 students enrolled in government schools is examined to collect information for smart classrooms using a five-point Likert scale questionnaire. The findings show that the intention to use has a direct relationship with the perceived value of the digital smart boards and their usability, which results in an increased desire to adopt Digital Smart Boards. The outcome indicates that digital education has the potential to modernise education practices in Delhi Government schools.

Keywords: TAM, Smart classrooms, Intention to use, Digital smart boards

Introduction

Literacy has emerged as the most crucial learning goal in modern society. Many people struggle to embrace the idea that the majority of what we do now is technology-aided, especially in digital literacy. Computers have a remarkable impact, notably in education, on improving learning.

The current growth of smart classes could increase the overall knowledge of students. By adopting technology, today's students have attempted to increase their classroom interaction through "smart learning". The use of Information Technology (IT) to assist interaction and learning in classrooms has increased (Martin,ll and F.w.Kellermanns, 2004. Digital tools have a positive impact on the teaching and learning process by creating opportunities to create, share, and collaborate with students.

The connections between students and teachers in traditional classroom settings have become quite constrained. That is why we are embracing technology to improve learning outcomes. With the growth of technology, the education sector is undergoing reformation like never before. The digital tools and content in the native language from different sources have been made available in K-12 Schools.

This study emphasises the effectiveness of one of the technology tools i.e., Digital Smart Board used in Delhi government schools. A huge integrated display with a whiteboard-like form factor is known as a Digital Smart Board (DSB). It is also referred to as Interactive Display Board. A computer that's fast to install and interactive to learn is provided in Delhi government schools. It can convert any

plain white surface into a learnable board for different stages of blended learning needs. It includes pre-loaded, powerful interactive content in line with students' syllabuses and a supportive setting for delivering courses to meet all learning requirements.

Digital Smart Boards have transformed the way the curriculum is styled and delivered. Software is combined with display screen technologies to provide engaging and interactive lessons. The smart boards offer countless options for presenting effective lessons, learning content for Grades 6-12 and assessments as per the NCERT syllabus.

It can connect to the internet for further knowledge and content updates. The plug-and-use gadget is movable across classes and can be set up without the need for a desktop, projector, or other established infrastructure.

TAM [Davis, FD, 1989], is the focus of a current study that seeks to find out the acceptance of the Digital Smart Board among students for learning. It is the most used conceptual model for describing and forecasting information technology adoption behaviour. TAM is well-known and has more than 700 citations in the literature and has strong theoretical and empirical support.

Figure-1: The Principal scheme of the original TAM
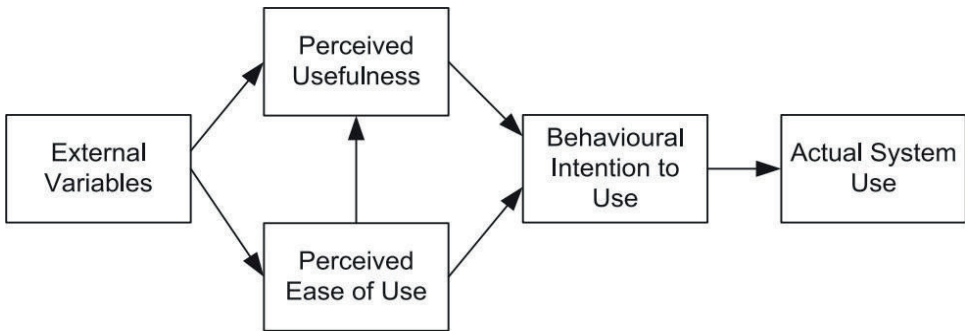
According to Davis. et al. (1989), the factors are described as follows:

1. The term "perceived usefulness" refers to how much a person believes a given technology would improve his or her job performance.

2. The degree to which a person thinks utilising a specific system would be effortless is known as "perceived ease of use".

3. The behaviour Intention refers to the likelihood that an individual intends to use technology or an Information System.

The purpose of this paper was to evaluate the acceptance of the Digital

Smart Board and provide feedback to decision-makers that this technology is a justifiable investment for the Delhi government.

Review of Literature

Education authorities across the globe are adopting technology tools to improve students' learning in the classroom and develop skills for the 21st century global workforce. Extensive research and case study observations from the United Kingdom, USA, and Australia prove that Digital Smart Boards or Interactive Whiteboards increase student engagement and motivation.

Janelle Cox (2019), Technology in Classroom, TeachingHub.com has

emphasised the various advantages of having a Digital Smart Board in the classroom. It enhances the student learning experience as pre-loaded multimedia content can be displayed on a large screen in the classroom. The interactivity feature helps students draw and write directly on the screens using their figures or digital pens. Teachers can use videos, diagrams, and charts on Digital Smart Board to increase student engagement.

According to Ferrari (2012), it is crucial to integrate digital technologies into educational processes because they are advantageous for both teaching and learning and help people develop the fundamental digital skills that are essential for success in modern society.

Abdulsalam Salihu Mustafa, Manuel B. Garcia (2021), TAM is a widely used theory for analysing how consumers react to different kinds of information systems. To understand consumers' intentions to accept online learning, several information systems theories have been incorporated into TAM over time. The Task Technology Fit and Theory of Planned Behaviour are the most integrated and educationally successful theories in TAM, according to the systematic review's conclusions.

The various other pieces of literature reviewed for this paper are:

1. Lee et al., Analysis of TAM's history and prediction of its future trajectory Progress and discoveries of TAM in the period from 1986–2003; identification of future directions.

2. The Horizon Report (Johnson, Adams Becker, Estrada, & Freeman, 2015) underscores that learning must examine educational scenarios, making them more flexible and adapting them to digital technologies.

3. Turner et al., Analysis of TAM in the context of technology usage prediction TAM usage outside the context in which it has been validated requires thoughtful consideration.

Objective of Study

The objective of this study is to understand the acceptance of technology i.e. Digital Smart Board by the students of Delhi Government Schools. The proposed model has three primary constructs. Figure 2 represents the proposed model for acceptance.

The following hypotheses are made based on the relationship between the "intention to use, perceived usefulness, and perceived ease of use" of a digital smart board:

H1: An increase in the perceived usefulness will positively influence the usage of the digital Smart Board.

H2: An increase in the perceived ease of use will positively influence the usage of the digital Smart Board.

H3: There exists a positive relationship between perceived ease of use and users perceived usefulness.

Figure-2: Conceptual Framework
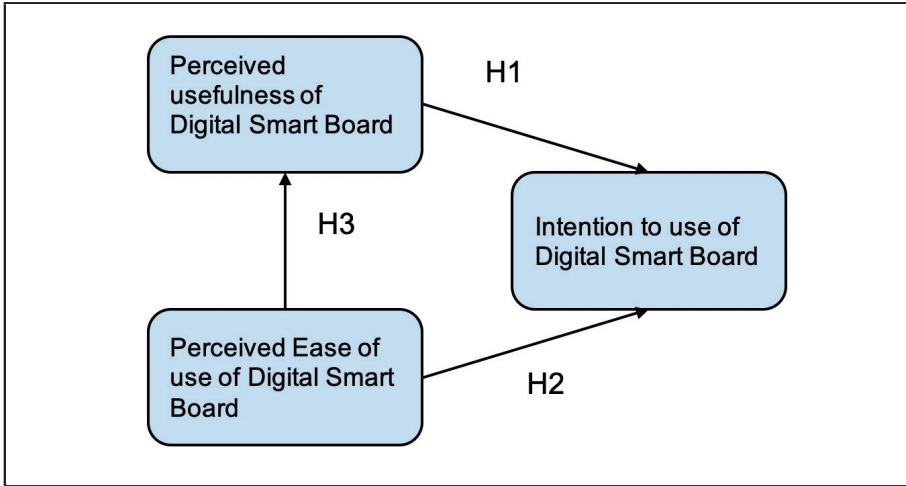
Methodology

A quantitative method is used to measure the factors and establish relationships. The population researched in this study consists of learners in government schools under the Directorate of Education, Delhi

• **Sample Description**

S. No	Item	Description
1	Population	Respondents, i.e., students from various government schools from Grade 6-12
2.	Technique	Simple Random Sample: In this technique, each element in the population has an equal chance of being selected from the sample
3.	Size	Total responses: 184 Valid responses: 158

• **Data Collection Instrument**

We carried out a self-administered survey to evaluate the hypotheses of the suggested model. For the survey, a single cross-sectional design has been used, as per annexure 1. The questionnaire has been divided into three parts; each part corresponds to one construct.

1. Four questions to measure the perceived usefulness of a Digital Smart Board

2. Four questions to measure the perceived ease of use of the Digital Smart Board

3. Three questions to measure the intention of using a Digital Smart Board

A thorough analysis of relevant literature had taken place to create the final questionnaire. The questionnaire includes questions to gauge each indicator's effect. The 5-point Likert scale, which is supported by Berdie (Berdie, DR, 1954), has been used as a

measurement technique in his study. All items use a scale ranging from 1-*Strongly Disagree*, 2-*Disagree*, 3-*Neither Agree nor Disagree*, 4-*Agree* and 5-*Strongly Agree*. The students received a physical distribution of questionnaires, to fill out the form. The completed responses were manually typed into an excel sheet and then run through SPSS 21 for factor analysis and reliability tests.

Data Analysis and Findings

- **Reliability and Validity Analysis**

The study adopts factor analysis to calculate the constructed authenticity by applying KMO (Kaiser Mayer Olkin). The higher the KMO value is appropriate for the factor analysis. The sample adequacy above 0.5 justifies factor analysis.

Table-1: KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.741
Bartlett's Test of Sphericity	Approx. Chi-Square	391.922
	df	55
	Sig.	.000

As per the table above, the KMO value is 0.741, which indicates the sample collected is appropriate and fit for factor analysis and the questionnaire has sufficient construct.

- **Correlation Analysis**

The relationship between independent and dependent variables has been determined using correlation analysis. Samples to be tested are dependent on questions about every construct. The results of the correlation test are shown below.

Table-2: Correlation analysis

Correlations

		pu	peou	iu
pu	Pearson Correlation	1	.287**	.702**
	Sig. (2-tailed)		.000	.000
	N	158	158	158
peou	Pearson Correlation	.287**	1	.700**
	Sig. (2-tailed)	.000		.000
	N	158	158	158
iu	Pearson Correlation	.702**	.700**	1
	Sig. (2-tailed)	.000	.000	
	N	158	158	158

**. Correlation is significant at the 0.01 level (2-tailed).

As Table shows, factors of the Technology Acceptance Model (TAM) are correlated with each other positively as Pearson correlation coefficient ranging from 0.28 to 0.70. The highest correlation is between perceived ease of use of the Digital Smart Board (PEOU) and Intention n to use of Digital Smart Board (IU).

• **Regression analysis**

Regression analysis is conducted to validate the relationship between the dependent and independent variables. The results are shown below:

Table-3: Regression analysis

Independent variable	Dependent variable	Beta	P value
PU of Digital Smart Board	IU of Digital Smart Board	.516	.000
PEOU of Digital Smart Board	IU of Digital Smart Board	.434	.000
PEOU of Digital Smart Board	PU of Digital Smart Board	.243	.000

The results clearly show that there is a positive relationship between the independent and dependent variables at 1 per cent significance level.

Figure-3: Path analysis
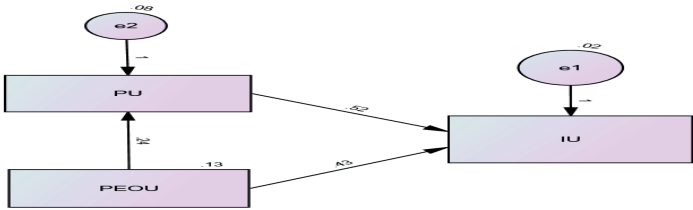
Table-4: Regression Weight

Hypotheses	Relation	Estimate	S.E.	C.R.	P	Result
H1	IU <--- PU	.516	.038	13.484	***	Supported
H2	IU <--- PEOU	.434	.032	13.421	***	Supported
H3	PU <--- PEOU	.243	.065	3.757	***	Supported

The first hypothesis, namely H1, is that perceived usefulness, i.e., PU, will enhance the user's intention to use the Digital Smart Board. The result of the study revealed that PU has a positive influence on IU (β=0.516 & p<0.01) at 1 per cent significance level. This shows that the perceived usefulness of digital smart boards attracts users to use.

Similarly, the second hypothesis, namely H2, is that perceived ease of use will enhance the user's intention to use the Digital Smart Board. The result of the study confirms that PEOU has a significant influence on IU (β=0.434 & p<0.01) at 1 per cent significance level.

Lastly, the Third Hypothesis, Namely H3, is that there exists a positive

relationship between perceived ease of use and the user's perceived usefulness of Digital Smart Board. The result of the study confirms that PEOU has a positive influence on PU (β=0.243 & $p<0.01$) at 1 per cent significance level.

Interpretation and Conclusion

The research has been executed to validate the Technology Acceptance Model (TAM), i.e., establish a relationship between PEOU, PU, and IU towards the usage of the Digital Smart Board in Delhi government schools. As per the data analysis, the intention to use the digital smart board is strongly dependent on the perceived usefulness and perceived ease of use of technology. The perceived usefulness of the technology is not strongly dependent on its perceived Ease of use.

The findings from the surveyed data provide significant evidence in support of the proposed acceptance model of the Digital Smart Board. They are also matching the TAM model of Davis (1996) and the study conducted by Lee (2006). Results showed that students benefited from the Digital Smart Board to improve their knowledge and get interested because of the new teaching pedagogy. We can conclude that the learners are proactive in class because of the engaging content. They feel connected with the lessons taught. The adoption of a Digital Smart Board in Classroom will enhance the learning outcomes. Therefore, the administration of the Delhi Government can integrate this technology for educational purposes. They should conduct more training for educators and promote its usage. The wider use of the Digital Smartboard is recommended in the endeavour to revolutionise the education system in Delhi.

The result of this study provides valuable feedback to the education departments of other states to adopt and integrate Digital Smart Board Technology in their classroom, thereby strengthening the quality of education overall.

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Appendix

Appendix1 Questionnaire Questions

(For Students)

Name: _____

School: _____

Gender: Š Male   Š Female

Instructions: Please indicate your level of agreement with the statements listed below in #1-11.

		Strongly	Disagree	Neutral	Agree	
1.	Digital Smart Boards improves learning in class	Strongly	Disagree	Neutral	Agree	
2.	Learning is faster with digital technology and systems	Strongly	Disagree	Neutral	Agree	
3.	It is easier to learn with the use of the Digital Smart Boards	1	2	3	4	5
4.	Concepts are better understood when taught using Digital Smart Boards	m	m	m	m	m
5.	It is easy to operate Digital Smart Boards.	m	m	m	m	m
6.	The interaction with Digital Smart Boards is clear and understandable	m	m	m	m	m
7.	Digital Smart Boards features are easy to understand and use	m	m	m	m	m
8.	I consider that Digital Smart Boards is easy to use	m	m	m	m	m
9.	I would like to use more of Digital Smart Boards for learning	m	m	m	m	m
10.	I want my school to use more digital devices like Digital Smart Boards for teaching	m	m	m	m	m
11.	It is beneficial to use and learn from Digital Smart Boards	m	m	m	m	mñø

Appendix 2 Frequencies (mode), Constructs and Questions Categorization

Sl. No.	Construct Items	Strongly Disagree % 1	Disagree % 2	Neutral % 3	Agree % 4	Strongly Agree% 5	Code %	Mode %
	Perceived Usefulness							
1	Digital Smart Boards improves learning in class	0	0	0.63	18.9	80.3	U1	5
2	Learning is faster with digital technology and systems	0	0	3.16	70.25	26.58	U2	4
3	It is easier to learn with the use of the Digital Smart Boards	0	0	1.27	23.42	75.32	U3	5
4	Concepts are better understood when taught using Digital Smart Boards	0	0	0	22.78	77.22	U4	5
	Perceived Ease of Use							
5	It is easy to operate Digital Smart Boards	0	0	3.16	42.41	54.43	EU1	5
6	The interaction with Digital Smart Boards is clear and understandable	0	0	3.8	50.63	45.57	EU2	4
7	Digital Smart Boards features are easy to understand and use	0	0	1.9	46.84	51.27	EU3	5

8	I consider that Digital Smart Boards is easy to use	0	0	1.9	39.87	58.23	EU4	5
	Intention to use							
9	I would like to use more of Digital Smart Boards for learning	0	0	0.63	27.85	71.52	IU1	5
10	I want my school to use more digital devices like Digital Smart Boards for teaching	0	0	0.63	25.32	74.05	IU2	5
11	It is beneficial to use and learn from Digital Smart Boards	0	0	0	32.28	67.72	IU3	5

The Experiences of Student-teachers' on VirtualSchool Internship Programme: A Qualitative Study

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Abstract

The internship is the heart of the teacher education programme. Student teachers understand the role of the teacher in the real situation during the school internship. NCTE (2014) has changed the curriculum and increased the duration of the internship programme as many commissions and committees recommend. As we know, Due to the pandemic situation all colleges and schools were closed. So slowly we adopted online teaching. Student teachers also experienced virtual school internships. So researchers studied the experience of the student teacher in a virtual school internship. This qualitative study also explored the benefits and limitations of virtual school internships and recommendations for the virtual school internship programme. The semi-structured in-depth interview was conducted with a small selected group of final year B.Ed. student teachers at the Maharaja Sayajirao University of Baroda. The findings of the research will provide rich insights into virtual experiences which in turn will benefit student teachers, school teachers, and educational institutions.

Keywords: Virtual School Internship, Student-Teachers, Experience

Introduction

The internship is an important element of the teacher education programme. It provides real experience to the student teachers for teaching so that they can develop teaching skills. An internship provides opportunities for the student teachers to link and implement theoretical knowledge in a real classroom. It provides a variety of field experiences under the guidance of a mentor and supervisor. It builds confidence among the pupil-teachers. It enhances the student's knowledge regarding different professional ethics. But due to the Covid-19, all schools and colleges were closed. So, teachers and teacher educators found a new way of teaching. Gradually all familiarized themselves with online teaching and adopted it. So that student teachers got an opportunity for a virtual school internship.

Virtual School Internship

A virtual internship is an example of a computer-based classroom simulation. It offers learning tasks that require students to think and act as professionals and simultaneously familiarize them with the culture and community of (teaching) occupation (Shaffer, 2007).

A virtual internship is a work experience that student teachers can do from home or any other place. Students and teachers communicate with each other through email, Microsoft team, and google meet during the internship. The interns can discuss this with their teachers related to assignments and projects. It is also called a remote

internship where interns are not physically present at the location.

Importance of Virtual School Internship

Through virtual school internships, student teachers can teach students who are enrolled in a different district. They can explore the different types of schools. It can lead to various career opportunities. A virtual school internship builds the skills for remote work. They learn how to use different platforms for teaching and evaluation like Zoom, Google Classroom, and Microsoft Teams. Student teachers can arrange their lecture on Sunday for the doubting session. It also saves time and money. Student teachers can also expand their network virtually.

Objectives of Virtual School Internship

The following are the objectives of the Virtual School Internship:

- To Enhance student teachers' awareness of technology
- Provide an opportunity to student teachers to explore online applications for teaching
- Development of the Techno-pedagogy skills
- Understand the role and duties of the teachers
- Apply theory in a real classroom
- Aware of the Online Assessment

Student teachers can develop communication skills because virtual internships are different from face-to-face. So student teachers will have to master the art of conversation. They learn how to write content and give responses through email. They can also build networks with other educational institutions and understand their culture.

Review of related literature

Cheong, A. (2014) conducted a study on Internship Experience: An In-Depth Interview among Interns at a Business School of a Malaysian Private Higher Learning Institution. The objective of this study was to better understand the experiences that the students went through during their internship and to recommend ways in which the educational institution could further enhance this experience. This in-depth interview study was conducted with a small selected group of final year business students at a private university in Malaysia. The findings were: the interns benefitted from their internship experience. They were able to see 'the bigger picture' and can develop their presentation and people skills. They also learn to be more independent. Overall, the participants were satisfied with the support provided by their immediate supervisors and co-workers and also the assistance was given by the university. Jeske, D. (2019) conducted a study on Virtual internships: Learning opportunities and recommendations. The objective was to study learning opportunities and recommend the successful implementation and organization of virtual internships. The present paper draws on the author's online interviews with 13 internship providers as well as interns and the results of several surveys conducted with virtual interns over the span of several years. The interviewees were located across the USA, the UK, Ireland, Romania and India. Interns need to have the opportunity to develop their skills by also receiving meaningful feedback. Virtual internship schemes require a significant organizational commitment in terms of time, resources (staff and remuneration) and careful recruitment and selection efforts. The managers will need to have the required technical, interpersonal and time management skills to provide interns

with clear deliverables, instructions and constructive as well as frequent feedback to support their learning experience

Theelen, H. (2020) investigated to what extent virtual internships in teacher education were able to reduce Pre-service Teachers' (PSTs) professional anxiety and how virtual internships in blended learning environments were evaluated by PSTs in terms of technological, social and educational affordances. A mixed method design was employed. The questionnaire, focus group interviews and individual interviews were used for data collection. The findings were: A significant decrease was found in PSTs'professional anxiety after having followed Virtual Internship 2. PSTs reported that they obtained a more realistic image of teaching and felt better prepared for teaching in practice. Furthermore, regarding technological affordances, system usability was considered between acceptable and good. Concerning social affordances, PSTs appreciated collaboration within the virtual internships. As an educational affordance, it appeared that learning from videos with authentic classroom events is a good preparation for the professional teaching context. According to the PSTs, the scenarios within virtual internships could be improved in terms of authenticity and personalization by offering more details and background information. The results of this study imply that virtual internships can be useful assets for teacher education.

Rationale

The Acharya Rammurti Committee (1990) in its review of the NPE 1986 observed that an internship model for teacher training should be adopted because the internship model is based on the primary value of actual field experience in a realistic situation, on the development of teaching skills by

practice over a period of time. As we know due to the pandemic situation we adopted online teaching. So student teachers also experienced virtual school internships. They can learn new applications for online teaching and assessment. So the researcher wants to study the experience of the student teacher in a virtual school internship.

Objectives of the study

The objectives of this study were to study the experiences of student teachers who had done the virtual internship.

Research Design

The study utilized qualitative research and specifically thematic analysis to examine the experiences of student teachers who participated in the virtual school internship Program.

Participants

This study drew on the responses of four student teachers (interns) who were experienced virtual school interns. The internship is undertaken in schools of Vadodara, with the interns taking full responsibility for their classes during the four-week term. Each intern is assisted by two support personnel- a mentor and a supervisor. A mentor is a subject teacher appointed by the school and a Supervisor is a university teacher appointed by the Department. Researchers selected student teachers randomly. They were informed about the purpose of the study and that their participation would be entirely voluntary.

Data collection

Researchers sent messages to student teachers related to this study. Student teachers are voluntarily ready for the interview. The researcher took a telephonic interview. It took 45-50 minutes. To ensure the confidentiality of potential participants, I did not

have access to the report at any point throughout or after the study.

Data analysis

Braun and Clarke (2006) provided a six-phase guide I used in my study as a foundation for conducting thematic analysis. This research enables the participants to voice out their internship experience through an in-depth interview. From analyzing the interview transcriptions, a few themes emerged.

The themes describe the participants' experience during the internship at their respective schools. A selected sample of the participants' responses is presented with verbatim quotations. The main themes uncovered from analyzing the data are presented as follows:

Figure-1: Provides a Brief Description of the Themes; A Detailed Discussion of the Themes Follows the Figure
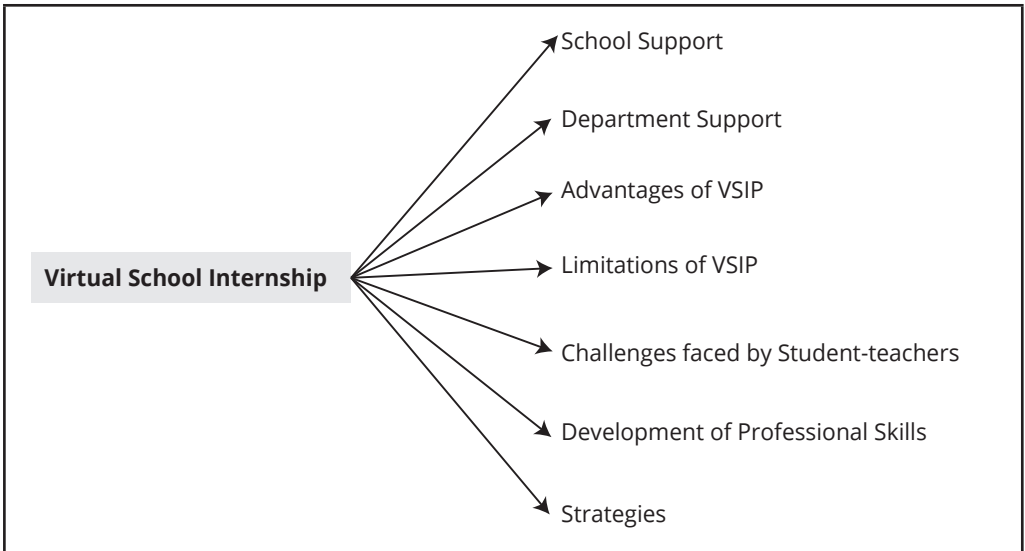
Development of Skills

Students develop skills of techno-pedagogy. They explored different applications for online teaching.

Intern A, developed the following skills:

> "I increased my confidence level and developed presentation skills. I came to know about the different online apps such as quizzes, zoom, and Google meet. I learned to make videos on YouTube".

Intern B, Intern C and Intern D shared similar types of experiences:

> "I came to know about the different online apps such as quizzes apps

and mathematical application geography. I improved my language skill and built up confidence. I built up confidence. In the beginning, I had feared that if I couldn't answer any quarry of students".

Strategies

Intern A, described strategies as follows:

> "I used a probing skill and demonstration method to make an interactive class".

Intern B used different strategies:

> "I taught the first lecture through a simple lecture method and the second lecture through video. After

that, I orally asked questions and realized that they understood the topic. Students in 8th class were more interactive than class 9th students. I made an interactive class through a demo and video".

Intern C who was completed her internship in a government school used following strategies:

"Video on air pollution and a demo were shown to students. I have shown them new videos to make students attend classes regularly. And I also organized a quiz in Google form so students felt it as a game, as a result of that they took interest in class.

Intern D used different strategies as follow:

"I used apps such as eLAB, Colab, padlet, jamboard, quizizz. With the help of these apps, the student's interest and performance were increased. There were few mock students, so I permitted them to respond through the chat box. As a result of that, they began to respond well. I also used 3D video and demonstration strategies. As a result of that, students connect with the study".

Student Support

Intern A described as follows:

"Students regularly attended the class. They gave answers to all the questions but a few students never communicated with me. Only one student gave a response from 11th standard students. They joined the class for the sake of learning and did not learn anything".

Intern B shared her experience:

"They took B.Ed teachers lightly. They did not give a response in the

beginning and left the meeting. And also didn't go on video mode when asked. When I asked a question to "define the particular" in the exam, they wrote "I don't know" as an answer".

Intern D described

"In the beginning, students did not turn on the video but after one month our bond grew so strong that they requested me to teach them regularly. Few students did not answer the questions in the beginning. Probing skill did not work. It seemed time consuming. But they gave a response after being friendly".

Mentor Support

Intern A verbalized the following:

"School teachers joined regularly. But they didn't check the lesson plan regularly and feedback was given only when asked".

Intern B mentioned:

"Mentor was observing lectures but didn't give feedback. As my annual test lessons would be held in upcoming days I messaged him for feedback so that I came to know to improve myself but didn't receive any response from him".

Intern C narrated the following experience:

"Microsoft link was sent from time to time and also added to the whatsapp group. The school teacher joined, observed and gave feedback regularly. Feedback was given on a content basis. Even student teachers can teach through whiteboard and also use lab instruments".

Intern D spoke the following:

"Mentor teacher did not observe any

lecture. I believed that they should give feedback at the end even though they did not observe any lecture. There was no interaction between us".

Department Support

Overall, the participants were satisfied with the support provided by their supervisors and co-workers and also the assistance was given by the university.

Intern A shared following:

"Supervisor joined the meeting for 5-10 minutes because she/he had to observe another student teacher at the same time. He/she gave feedback regularly. He/she said that today you took less content and also told you to use a new tool next time".

Intern B experience with her supervisor is as follows:

"Supervisor gave feedback on a daily basis and properly. The timing was 3 PM to 4 PM for the same".

Here Intern C had shared different experience:

"Supervisor didn't observe and give feedback because her school internship was from 6 p.m. to 8 p.m. and my supervisor was in charge of four schools so they gave general instructions related to teaching".

Intern D expressed his positive view on the support provided by the supervisor. She said, "Supervisor observed lectures daily and also took meetings after class and gave feedback regularly".

Advantages of VSIP

Intern A said the following:

"The School allotted to me was far from my home so due to online

teaching, there is no unnecessary stress to reach school timely".

Intern B told that:

"I can deliver innovative content through online teaching".

Similar sentiments told by Intern C:

"I learned new apps such as Kahoot, Quizzes, Google meet and zoom. If I have done offline teaching, I did not get a chance to learn it".

Intern D mentioned:

"Education can be given through 3D models and animation models. Assessment can be done easily and speedy and with PPT, teachers can use it in a better way for teaching".

Limitations of VSIP

Intern A who interned at grant in aid school, spoke the following:

"Few chapters of mathematics were not taught effectively by her although there are many applications for it. She also mentioned that there are only forty minute lectures for teaching. During that time we have to join and give instructions. So sometimes it creates more distraction and is also time consuming. Due to this sometimes I cannot use achieving closure skills. Sometimes students do not switch on their video so I cannot see their expressions and understand them". Students became quite careless during online class".

Similar sentiments were also shared by Intern B, she mentioned:

"There was a network connectivity issue and 9th standard students did not switch on the video so I cannot see their expression. She also mentioned that "when we join school then we have to teach face-

to-face mode so at that time we have to speak in front of 50-60 students without fear that we missed". I faced network issues in the annual test lessons. I couldn't figure out what students were doing, whether students came to know about the topic and see expressions of students. One can see faces if one uses a laptop for online teaching. But, I was using a mobile so I had to use two mobile phone devices to properly interact. Otherwise I had to change the screen again and again to interact and present the screen which is a time-consuming process.

Another student teacher Intern D verbalized the following:

"Sometimes students did not join the meeting and gave responses. Due to online teaching, the interaction between students and teachers was quite less. Many times, they left the meeting".

Challenges faced by Student-teachers

Student-teachers faced challenges related to networking and related to students' responses. Students did not give answers to questions and sometimes left the meeting. They faced problems related to time management.

Intern A, described the challenges faced by her as follows:

"It was difficult to find a teaching app. It was difficult to take a lecture back-to-back after 40 minutes. I couldn't use blackboard work skill as I was using only one device. I couldn't achieve the closing skill as the lecture was automatically over after 40 minutes".

Intern C shared a different experience

"The timing of the school internship was 6 PM to 8 PM so sometimes TV and other noise disturbed me. Only 10 students joined the meeting because others didn't have mobile or any other instrument to join. Many times, I had to teach repeatedly as their concepts were not clear. As a result of that I couldn't follow the lesson plan accurately".

Intern D narrated her experience

"Few students had network issues. I organized a patriot song competition but students shared funny videos in between. I gave strict warnings to those students but they kept on doing it. So, I left them from the meeting. I did not have data of a total number of students so I did not get an idea about which students did not join the class. School teachers did not respond to us".

Suggestions

In this study, student teachers also provided some suggestions to improve the internship program. After the Internship, student teachers have to prepare an internship report and submit a softcopy online to the university. Intern A commented:

"Offline internship should be conducted in future because we can build up more confidence with it".

"Department should provide laptops. Offline internship should be conducted in future because we can teach through laptops and various other apps". (Intern B)

"Offline internship should be conducted in future because in online teaching only 10 students joined the meeting but in offline teaching 50-60 students can attend. I faced network issues so if the department provided Wi-Fi then I could deliver lectures in a good manner. It is worthless to

do an online internship as Indian education is such that it provides only offline education". (Intern C)

"Online and offline, both internships should be there for future student teachers. Animation can also be shown in online teaching. Generally, only teaching aid and charts can be used in offline teaching. Doubts can be cleared on even Sunday or holidays in online teaching. Schools are time bound but in online teaching, lectures can also be organized after school. The system should be such that the student-teacher can observe the teaching method of other students who belong to different groups. Supervisors should be changed on a rotation basis so that we can receive their feedback also". (Intern D)

Conclusion

In this study generally, the student teachers' responses indicated that they learnt techno- pedagogy skills and benefited from the virtual school internship. Student teachers have said that they explored different applications for online teaching. Supervisors gave proper guidelines and feedback. A few students did not give responses for questions and left the meeting. The student teacher used different strategies for making interactive classes such as animation, 3-D video, and demonstration methods and connected with real life.

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Role of Educational Mobile Game Applications in teaching and learning: A Review of Literature

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Abstract

Mobile learning is a novel way to use mobile devices to access learning content anywhere and anytime. Students are currently using mobile phones at a much younger age. They generally use them for playing games or accessing social media. The purpose of this study is to review the research that investigated the effects of educational mobile game applications on students' learning outcomes. At this time the world is facing a disastrous pandemic that has affected all aspects of life; health and education are the most. A review of papers on mobile learning published between 2010 and 2021 was conducted. We aim to analyze current literature about the impact of mobile games on student achievement and attitudes towards learning. Educational mobile games can stimulate a child's interest in learning and promote and increase language development, critical thinking, emotional development, intelligence, and imagination. Therefore, educational games could be seen as having an essential role in a child's development. We use the keywords "Mobile learning," "Mobile games for education," "M-learning," and "Educational mobile games" to find out the literature regarding this topic. After analyzing the previous studies, we made some conclusions. Mobile games can enhance the level of motivation. To overcome the hazardous effects of mobile games, we should develop age-specific games that must include moral values and personality developmental tasks.

Keywords: Educational game, Mobile learning, Mobile game applications, Teaching

Introduction

Mobile learning (m-learning) is a very prominent multidisciplinary study subject worldwide. It has attracted much interest from scholars across the board that has seen the possibility of using mobile technologies to improve learning. Gardner (1983), in his theory of multiple intelligences, proposed that a person could have various cognitive abilities. He identified eight intelligences that a person can have to help him understand and learn about the world, including spatial, linguistic, logical-mathematical, bodily-kinaesthetic, musical, interpersonal, intrapersonal, and naturalistic intelligences. As a result, one may claim that, as mobile technology can store audio, video, and text files, if incorporated into the learning environment, these tools can reach learners with various learning styles. Games are vital for children to socialise and significantly impact their development. Its purpose is to develop intelligence, senses, emotions, imagination, and creativity (Ni& Yu, 2015). Teaching and learning are no longer limited to traditional classrooms in the twenty-first century. As a result,

novel mobile technology applications are required to make education accessible to anybody, anywhere, at any time, and at a low cost worldwide.

Methodology

An exhaustive search is done on several databases like Google Scholar, PubMed and Cinahl using the keywords s "Mobile learning," "Mobile games for education," "M-learning," and "Educational mobile games". The timeline is set from 2010 to 2021. References with only abstracts, references in languages other than English, or references with matters not related to our topics were excluded from the review. Fourteen articles were selected for the review. A thorough analysis of the articles included in the review brings forth the conclusion that mobile games can enhance the level of motivation. To overcome the hazardous effects of mobile games, we should develop age-specific games that must include moral values and personality developmental tasks.

Theoretical framework

A new generation of kids has played computer games and interacted with mobile phones and other technology devices. They have developed different attitudes and abilities, which may have resulted in a misalignment between their expectations and the learning environment in classrooms (Oblinger, 2004).). Mobile devices are portable and adaptable to students' day-to-day activities; they can be exploited in the education industry (Mulatu et al., 2018). Mobile gadgets make the educational process more flexible and adaptable for students, school schedules, and the need of teachers (Klopfer, Sheldon, Perry, & Chen 2012). According to Marshall McLuhan, anyone who distinguishes between games and learning does not understand either of them. Innovatively developed games, unlike typical contexts such as classrooms, may

produce a favourable environment in which children are more responsive (Shute et al., 2011). The mobile gaming industry will reach around $98 billion in revenue by 2024. Games can thrive in the area of motivation. School education standards may be improved by using cellphones because most people are familiar with digital technology (Papadakis & Kalogiannakis, 2017). Demirbilek revealed that in all countries, most adult educators (76 per cent) expressed their interest in using mobile devices and games in their teaching process. Many characteristics of good learning environments may be found in games, including elements of urgency, complexity, trial and error learning, and scoring points. They also provide rapid feedback and facilitate active learning, experiential learning, and problem-based learning. Teachers always desire to have motivated learners, which is associated with students' desire to participate in activities. According to Malone and Lepper (1987), curiosity, challenge, fantasy, control, cooperation, competitiveness, and recognition are seven variables that drive motivation, and many of them are present in games (Prensky, 2001). In a study by (Golchai et al., 2012), the educational game snakes & ladders were evaluated in anatomy course design. Samples were first-year medical students. All boxes on the board have questions related to trunk anatomy. Skiada et al. (2014) "EasyLexia" developed a mobile application that could foster learning and help children improve some of their fundamental skills, such as reading comprehension, orthographic coding, short-term memory, and mathematical problem-solving. Ni & Yu, 2015 stated that to stimulate children's interest in active learning, mobile games use cognitive development theory as a foundation, make reasonable use of the multimedia features and interactive characteristics of digital mobile platforms, and make image-identification activities more like

games through scene interaction. Su & Cheng, 2015 revealed the implications on motivation and student learning by using a context-aware mobile learning environment. Incorporating mobile and gamification technology into the botanical learning process should result in greater learning outcomes and motivation than non-gamified mobile learning or traditional training. Eder et al., 2016, developed a user-friendly, interactive, and easy-to-understand mobile application for autistic children. The focus of the application is basically on identifying the human body parts. It was concluded that the attention span of autistic children was increased by using this application. (Sutopo & Pamungkas, 2017) developed a multimedia application, particularly a mobile mathematics game. The App includes conceptual maps, tutorials, practice, and testing. In the practice section, they solve the problem of addition, subtraction, multiplication, and division. ChilDiBu is a picture-based program for children with specific educational needs that combine graphic pictures, texts, and audio recordings. It was created to teach the Bulgarian alphabets, numbers up to 20, basic colours, and daily activities (Kraleva, 2017). Edugames4all MicrobeQuest!, a mobile game that aims to teach microbiology and create awareness about important healthcare issues such as hygiene, infection prevention, and responsible antibiotic use among 9 to 12 years old (Molnar & Kostkova, (2018). Herodotou, 2018 shed light on the learning effects of the touch screen mobile game Angry Birds. Knowledge about projectile motion was enhanced among two groups of pre-schoolers (4 and 5 years old) for seven days. Effects were analysed by different pictures (5 questions), questionnaires, and screen recordings. The pre-schoolers showed a significant improvement in their understanding of how force affects them. To promote physical activity and

incite the 6 – 12 years old children to eat the daily breakfast with healthy food, Saad et al., 2018, developed an Arabic-based game named "Grow Healthy." Jian, Mon & Subramaniam, 2020, used the concept of the Edutainment game to impart moral values among children. The mobile application has proved helpful for children to acquire moral education or values in a more engaging and fun way is enormous. Parents agreed to let their child/children use the application. To examine the impact of mobile games, innovative technology, and collaborative learning on students' motivation, a study was done on 250 university students of Tehran. The results explored a significant positive impact on students' motivation. Mobile games also improve flexible learning, problem-solving skills, excitement, and enthusiasm (Mivehchi & Rajabion, 2020). A mobile application called Azbuka is discussed in this review. This is an android application developed in the form of an interactive educational game for mobile touch screen devices and is intended to help young children to learn to write Cyrillic letters. The app has many colours, interesting sounds and familiar objects, which should attract children's attention and raise their curiosity. 20 children were selected as a sample and after using the application More than 80 per cent of the children answered affirmatively that this game is useful and easy to use, and expressed a wish to continue to learn to write the remaining letters. Duh, E. S., Koceska, N., & Koceski, S. (2017).

The reviewed study focuses on teaching mathematics in class 12 by using applications (available on mobiles, laptops, desktops, iPads etc.), namely Phone, Viber, WhatsApp and Messenger so as to provide an appropriate teaching environment. The sample sizes for both scientific and literary branches during the academic year 2019-2020 were 31 and 53, respectively. Pre and

post-tests were administered to check pupils' achievements. Videos were prepared and uploaded to the teaching groups in Viber and Messenger. Mobile applications experimented with have led to the enhancement of the mathematics teaching process outside normal classes and particularly during the COVID-19 lockdown periods and crisis (Hussin, F. K., & Aziz, S. Q, 2021).

How educational game applications can help incline students' interest in science, an educational game application was developed, and conducted user experience testing. A mobile application on Earth and Space Science has been developed for 10–11 year old school students. The project is based on the Rapid Application Development methodology considering the short development time frame (Wan Ahmad, W. F., & Ahmad Harnaini, A. F, 2022).

This study intends to develop an educational game application on the Android platform in order to teach earthquake disaster mitigation and the fundamentals of safety in the face of an earthquake disaster in a more engaging and enjoyable manner. In this educational game, there is a video explaining earthquake simulation and earthquake mitigation, along with a game with three stages: before, during, and after the earthquake. System Feasibility Testing was used to get a direct assessment of the feasibility of the system and the application was included in the excellent category application operation, display, and content of the application variables.

Table-1: Details of Games Used in the Study

S. No.	Name of the author	Aims/objectives of the study	Name of the game	Research design	Sample	Device type	Findings
	Skiada, Soroniati, Gardeli, &Zissis, 2014	To help dyslexic children improve some of their learning disabilities.	EasyLexia	Pilot study	5 students	Android	Students showed progress in their overall game performance over a short time usage
	Eder et al., 2016	Mobile application for autistic children to introduce them from basic parts of human body	FillMeApp	Survey	11 students	Android	The attention span of autistic children was increased by using this application.
	Molnar & Kostkova, (2018)	To teach microbiology and create awareness about important healthcare issues	Edugames4all Microbe-Quest	A pilot study, Survey	19 participants	Not mentioned	The game could teach, but the learning across all learning objectives was not statistically significant.

Kraleva (2017)	A conceptual model of a mobile application for teaching children with intellectual disorders.	ChilDiBu	Pilot project	Not include	Android	
Saad, Al-Maadeed, & AlJa'am, (2018).	Multimedia & video games enhance children's knowledge about healthy food and show the importance of exercising in life.	Grow Healthy	Survey	7 & 8 years old students	Multimedia based tutorials	most of the students intended to change their eating lifestyle after playing the game
Sutopo & Pamungkas, 2017)	Mobile application for self-learning and motivation to learn mathematics among school children.	Mobile mathematics game		19 students	Android	89.5 per cent of students who could solve the problem in the specific time
Herodotou, 2018).	To improve the understanding of projectile motion through the game.	Angry Birds	comparative study	32 students	Android	A significant difference was observed in the low-performing group activity.
Ibrahim, Fatimah & Ahmad, 2015	To promote Malay folk stories to children	M-Folktales		15 students	Android	got the positive impression in user perception
Rizky Maulana, Mujahidah, &Tryanti, 2018	To support EFL (English as a Foreign Language) learning, mainly listening skill	Learn English	Case study	8	Android	The mobile game is beneficial for learners for their English language skills improvement.

	Jian, Mon, & Subaramaniam, 2020	To provide a better understanding of moral values with the help of a mobile App.	Edutainment	Quantitative research	40	Android	Most of the participants strongly agree that App is interesting, easy, kid-friendly, and helpful in teaching moral values.
	Duh, Koceska & Koceski (2017)	To help children to learn writing Cyrillic letters	Azbuka	Experiment + survey method	20 students	Android	time required to draw a letter Using the Android application takes less time for writing the letter by classical method.
	Hussin,& Aziz (2021).	Teaching mathematics by using different mobile applications	Phone, Viber, WhatsApp and Messenger		13+53 students of class 12th	Mobiles, laptops, desk tops, iPadsetc	Average scores for pre and post tests for the scientific branch were 20 % and 63.33 %, respectively; while for the literary branch were 17.5 % and 50.83 %, respectively
	Wan Ahmad, W. F., & Ahmad Harnaini, A. F. (2022).	To create students' interest in science	Earth and Space Science based application	Interview and User experience testing	20 students of 10-11 years old	Smartphones	Experiment motivates students to be more inclined to science.
	Winarni, Purwandari, &Hervianti, (2018)	To provide a learning medium for earthquake disaster mitigation	Application of earthquake disaster mitigation	Usability testing data	Elementary school students	Android	this application was included in the excellent category for application operation, display, and content of the application variables

Discussion

Nowadays, students use mobiles for entertainment or online study through schools, but it should be explored more. Many studies have indicated that mobile games may improve students' learning motivation and make the study material exciting and easy to grasp. Suppose they are equipped with appropriate learning strategies. In that case, those games may significantly affect students' perceived enjoyment, perceived usefulness, perceived ease of use, and behavioural intention to use, compared with the same game without the learning strategy (Mulhem &Almaiah, (2021). Furió et al. compared the knowledge of the water cycle among two groups of students, one learned with the iPhone game method and the other with traditional classroom lessons. Even if the results showed that the iPhone method achieved higher knowledge results than the traditional classroom lesson, no statistically significant differences were found between the iPhone and the classroom group, but the motivational outcomes were found significant among the children who learnt with the iPhone game. Though the iPhone game achieved similar learning results as the traditional classroom lesson, it suggests that this kind of game could be used as a tool in primary schools to reinforce students' lessons (Furió et al., 2015). The results analysed using the MicrobeQuest game showed that the game could teach, but the learning across all learning objectives was not statistically significant. We cannot confirm the hypothesis in one direction because the sample size is so small. Traditional education is more effective for children/ young adults who do not usually play video games. The gaming profile could affect the interest and motivation towards learning a specific type of game (Molnar & Kostkova, 2018). According to a review about the use of mobile technologies in education done at the Futurelab (Naismith, Lonsdale, Vavoula, & Sharples, 2004), mobile wireless devices can be used by school teachers for managing their schedules, reviewing student marks, accessing central school data, attendance reporting, and providing course material. In the global educational setting, mobile technology's use, implementation, and design pose technological and socio-cultural obstacles. Online learning has its limitations; some games prove very violent and aggressive and are not suitable for some age groups. Such mobile games can have a very harsh effect on their minds. As a result of the popularity of mobile games, some anti-social forces have devised dangerous games that cause physical and mental harm to users. Children may use this digital technology in constructive as well as destructive ways. To prevent children from these adverse effects of technology, parents, and teachers should take care of the kind of games or apps they are using. The app developers should make content enriched with moral values for personality development.

Conclusion

From this literature review, we can conclude that due to pandemics in all countries, students and teachers are using m-learning. Most of the studies are based on educational content related to the school curriculum. Apart from this, mobile apps with content enriched with quality of life psychological and philosophical aspects should be developed so that children may have a new attitude toward life. Such applications may counter the adverse impact of un-appropriate digital content. Studies with robust study designs should be conducted to assess the effectiveness of mobile games for personality development and value education.

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Flipped Classroom model to achieve Higher levels of educational objectives of Bloom's Taxonomy

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Abstract

To achieve the aspirational goals of NEP-2020 through the integration of technology for improving the quality of Higher education, teachers must embrace ICT-empowered methodologies for the teaching-learning processes and assessments. Blended Learning using Flipped Classroom model can be used to achieve Higher levels of educational objectives of Bloom's Taxonomy. This strategy, in the context of Indian Higher Education, can be a boost to shift from traditional methodology which is teacher-centred to learner-centric methodology to produce active learners. By using a short video or a MOOC or some other digital resource as self-learning in flexible mode, the face-to-face passive traditional classrooms can be transformed into interactive co-learning environments to develop higher-order skills amongst learners. The 21st century skill-oriented learning environment will lead to holistic development of students.

Keywords: Flipped classroom, blended learning, Bloom's taxonomy, learner-centric, active learning

Introduction

The purpose of education is to empower students for their all-round development, and this is achieved through learning which is the basis of education. With learning, the learner becomes knowledgeable, develops skills, habits, attitude, aptitude and hence a personality. With technological developments taking place around the world, it is not surprising that the process of teaching and learning is also witnessing a big transformation. NEP-2020 has also strongly emphasised the need to integrate ICT into the education system, especially in teaching-learning and assessments (MHRD, 2020).

The available technologies are being embraced in educational innovation to enhance traditional teaching and learning. The "flipped classroom" is a technology-empowered learning model which has the potential to totally change the process of teaching-learning. The widespread corona pandemic and subsequent closure of schools, colleges and universities throughout the world have further brought this interactive learning model to the forefront. (Bakhshi, A.K. 2020)

Globalisation, easier access to technology, and the emergency of COVID-19 have shown that the 21st century skills cannot be provided to learners through the traditional teaching and learning models (Jamil et al., 2022; Shahrill, Noorashid, et al., 2021). Further, the corona pandemic has forced a redesign of the teaching–learning processes towards the adoption of virtual platforms and digital resources (Arora and Srinivasan, 2020).

The flipped classroom reverses the concept of the traditional classroom

by focusing class time on students' understanding through interaction rather than on the passive lecture component and thus aims to promote student learning and achievement.

The flipped classroom model was proposed by Bergmann and Sams, two chemistry teachers at a High School in Colorado, USA (Bergmann & Sams, 2012). In this methodology, online videos of their lectures were provided to the students for self-learning to acquire the basic knowledge of the concept. This was followed by in-class, teacher-guided active engagement of learners to promote in-depth understanding. Methodologies like Flipped learning along with emerging innovative technologies are key tools for the future development and improvement of education leading to the holistic development of students. (Latorre, et. Al, 2021)

In order to measure the educational outcomes of flipped learning, the revised Bloom's Taxonomy of Educational Objectives can be utilised, which has six levels: remember, understand, apply, analyse, evaluate and create. Of these, remembering and understanding can be categorised as Lower Order Thinking Skills (LOTS) while others can be grouped as Higher Order Thinking Skills (HOTS).

In the traditional classroom, there is more emphasis on LOTS inside the class while for HOTS, students are left to work on activities outside the classroom on their own. In contrast, in the flipped classroom model, learning is flipped. Here students, through self-learning at home, can acquire LOTS before the class with the help of a short video or a MOOC or some other digital resource and when they come to the class, they can achieve higher cognitive levels of learning through interaction with other students and teachers present in the class. In this model of learning the role of the teacher is to encourage students to think and discuss and motivate them in solving problems while students play the role of active learners. This model, therefore, unlike the traditional model, focuses more on encouraging thinking, innovation and creativity and not on rote learning (Bakhshi, A.K., 2020b). The flipped model helps to create an active learning environment where teachers can facilitate students' self-learning through reflective (problem-oriented) and reflexive (self-oriented) practices (Hibbert, 2013). The shift from traditional teaching-learning to Blended Learning using Flipped Classroom model can, therefore, be used to achieve higher cognitive levels of learning as per Bloom's Taxonomy. (Fig.1).

Fig-1: Traditional face-to-face model of teaching-learning versus Flipped classroom model in a blended mode in the context of Revised Bloom's Taxonomy of educational objectives
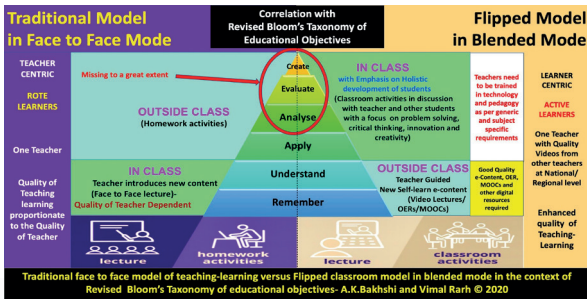
The comparison of the traditional model of teaching-learning with flipped classroom model is given in the table.

Table-1: Comparison between Traditional Model of Teaching-learning with Flipped Classroom Model

Traditional Model of Teaching-Learning	Flipped classroom model
Face to Face mode, no use of ICT	Use of ICT (multimedia in video for easy understanding of concepts through visuals, animations, simulations etc.)
IN CLASS: Teacher introduces new content (Face to Face lecture)- Quality of Teacher Dependent model	OUTSIDE CLASS: Teacher Guided New Self-learn eContent is learnt by students at their own pace in the form of Video Lectures/OERs/MOOCs etc.
OUTSIDE CLASS: Homework activities like problem-solving of Lower Order Thinking Skills; many students face difficulty. Higher Order Thinking skills missing to a great extent	IN CLASS: Emphasis on Holistic development of students. Higher Order Thinking skills are nurtured through classroom activities, discussion with teacher and other students with a focus on problem-solving, critical thinking, innovation and creativity
Teacher-Centric	Learner-Centric
Produces more Rote-Learners	Produces more Active-Learners who have a control over their learning
Teacher as an Information provider	Teacher as a facilitator in Self-learning through reflective and reflexive practices
Face-to-face passive traditional classrooms	Interactive co-learning environment
One Teacher providing all information	One Teacher along with Quality Videos, or MOOCs or OERs from other teachers at National/Regional level
Quality of Teaching-learning is proportional to the Quality of Teacher with limitations of face-to face method.	Enhanced quality of Teaching-Learning
Difficult to nurture 21st Century skills amongst students	21st Century skills can be nurtured for holistic development of students

Challenges for India

In the Indian Higher Education context, the Flipped classroom model is at a very preliminary stage and has not yet been institutionalised. This is evident from the feedback of 73,954 participants from across the country in various training programs conducted at GAD-TLC of the Ministry of Education, SGTB Khalsa College, Delhi University from July 2016 till March 2022 in offline and online modes (NMTT Portal, 2022). The database reveals that though the level of awareness about the blended mode of learning has seeped into the majority of these teachers, however because of the inertia amongst other constraints, the flipped model is being used only by a minuscule proportion of teachers, which according to the database is 148 (≈ 2 per cent). It is therefore evident that greater awareness

needs to be created about the advantages of this blended model.

Learning through flipped classrooms, no doubt, offers immense advantages and that is why it is gaining increasing acceptability throughout the world. The Government of India has already launched last year Rs. 9,000 crore plan to digitise education delivery and popularise flipped learning in the country. However, as with any new approach, there are some inherent challenges involved in flipping a class. One big challenge is the development of high-quality video lectures and other online instructional materials for the students as per their curriculum (Rarh. V, 2018). All this online instructional material should be available in different regional languages. Further, teachers also need to be professionally trained to embrace this new blended approach of interactive teaching and learning to

enable students to acquire HOTS. This has also been strongly emphasised in NEP-2020 (MHRD, 2020).

India has one of the largest systems of education in the world with 15 lakh schools and 50,000 higher educational institutions and to adopt the flipped classrooms model in such a system, teachers at all levels need to be empowered for this new approach. This will be a big challenge as the present teachers themselves have learnt through the traditional talk and chalk method of teaching and learning. Further, the students need to have access to the necessary technologies as well as be motivated to actively take part in this flipped model. Despite these challenges, the flipped classroom model is worth pursuing as it can prove a big game changer in improving students' achievement in terms of acquiring higher order learning skills.

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General Article

Expanding the scope of digital initiatives for transforming 21st century school education

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Abstract

The National Education Policy 2020 (NEP 2020) envisages a wider and more intensive role for use of technology for the purposes of improving teaching-learning and evaluation processes, teachers' preparedness and professional development, enhancing educational access, streamlining educational planning, management and administration including processes related to admissions, attendance, assessments, etc. Technology and innovation are central themes for the implementation of the 2030 agenda of the Sustainable Development Goals (SDGs). Technology can be used effectively to identify barriers and provide accessible solutions to all children particularly, children belonging to marginalized and socio-economically disadvantaged groups. COVID-19 has resulted in the shutting down of schools all across the world and as a result, the landscape of education changed dramatically. With this changing scenario, there is a distinct rise in eContent and e-learning, whereby teaching has been undertaken remotely and on digital platforms. However, the most crucial challenge with regard to the accessibility of these facilities cannot be ignored as the digital divide is seen across countries. In India too, there is a significant gap between those belonging to privileged and disadvantaged backgrounds. Many concentrated efforts for bridging the gap in education during covid 19 pandemic have been undertaken by the Government to ensure accessibility and availability of high-quality eContent for all children and teachers.

Therefore, this paper attempts to capture the International and national scenario regarding challenges of availability and accessibility of digital infrastructure, i.e. ICT/ digital facilities in India's schooling system. Further, the paper also highlights the recent initiatives which have been undertaken for expansion of Digital Education by the Government of India paving the way for a better future.

Keywords: Digital education, NEP 2020, eContent, 21st century skills, COVID 19, accessibility, teaching-learning

Introduction

As per UNDP Digital Strategy for 2022-2025 (https://digitalstrategy.undp.org/documents/Digital-Strategy-2022-2025-ABRIDGED-VERSION.pdf), digital is defined as "an ever-evolving range of technologies (like mobile technologies, artificial intelligence, machine learning, blockchain, Internet of Things, and robotics etc.) that impact nearly all aspects of our life in the world. Similarly, a mindset, which translates into a new way of working that enables people and institutions to innovate with technology" (https://www.un.org/ecosoc/sites/www.un.org.ecosoc/files/files/en/2017doc/Role-of-technology-in-implementing-the-SDGs.pdf). Technology and innovation are crucial factors towards the implementation of the 2030 Agenda and the Sustainable Development

Goals (SDGs) (https://www.un.org/ecosoc/sites/www.un.org.ecosoc/files/files/en/2017doc/Role-of-technology-in-implementing-the-SDGs.pdf). Technology can be used effectively to identify barriers and provide accessible solutions at all levels.

We all know that technological revolution or disruption has become the most prominent feature in the 21st century across the globe impacting day-to-day life of all the sections of society. The reliance on technology and its integration into the lives of human beings have opened infinite opportunities and has also thrown unique challenges on society. India's rise as a leader in information and communication technology and in other cutting-edge domains, such as space has been phenomenal (NEP, 2020). The Government of India's flagship programme 'Digital India Campaign' has enabled the transformation of the entire nation into a digitally empowered society and knowledge economy. While education will continue to play a vital role in this revolution, technology itself will play an imperative role in the improvement of the teaching-learning processes and educational outcomes of the students.

With the changing times and emerging challenges, technology will create numerous opportunities for education. As envisaged in National Education Policy 2020 (NEP 2020), new technologies involving artificial intelligence, machine learning, blockchains, smart boards, handheld computing devices and adaptive computer testing for student development will emerge as the agents of change. Whereas the other forms of educational software and hardware will not just change what students learn in the classroom but in the way, they have been learning, and thus these areas will require extensive research from technological as well as educational front's perspectives.

Objectives of the paper

The present paper focused on the following objectives:

- To understand and assess the impact of the COVID-19 epidemic on the school education system.

- To identify the challenges being faced by the schools with regard to accessibility of digital infrastructure facilities in the Government school system.

- To analyze and understand various measures taken by the Ministry of Education of India for continuing the learning process by providing various facilities during these challenging circumstances.

Methodology

Data and information presented in this paper are collected from various reports prepared by national and international agencies on the COVID-19 pandemic and based on available literature or secondary sources. The scope of this paper is to evaluate the efforts of India in bridging the digital divide. Information and data have been collected from various authentic websites including the dynamic database of the Ministry of Education i.e. UDISE+ (Unified District Information System for Education Plus). The paper has referred to various initiatives of the Government of India which are compiled from various reference materials and documents of the Ministry of Education. The referred journals and eContents relating to this paper are mentioned in the reference.

International Scenario during Pandemic

A number of recent studies and reports, both globally and in the Indian context have underlined the lack of access to adequate digital infrastructure and the constraints of digital online learning. The COVID-19 pandemic underlined the urgent need to bridge the divide of digital connectivity wherein 2.9 billion people were still found offline (ITU, 2021). During this unprecedented challenge thrown by the pandemic, the lack of affordable and accessible internet and appropriate digital skills, barred many

students, especially those from the socio-economic disadvantageous group (SEDG) who were studying from home. The COVID-19 pandemic disrupted school education in over 190 countries and affected 1.6 billion students (UNESCO, UNICEF, World Bank, and OECD 2021). Simultaneously, schools worldwide were completely closed for an average of four months in 2020 whereas partial school closures are factored in, the equivalent of almost two-thirds of a typical school year was lost (UNESCO, 2021). Around 369 million students worldwide went without school meals at the peak of the pandemic in April 2020 (World Food Programme 2021). This led disadvantaged children to dropout or be at higher risk of doing so (UNESCO, UNICEF, World Bank, and OECD, 2021). For instance, till September 2020, over 300,000 students in Peru (about 15 per cent of the student population) had dropped out of school due to its closures. This high drop-out rate has been attributed to economic instability, in addition to various hardships faced in accessing remote learning programs (Perez, 2020).

Further, a longitudinal study in the United States before and during the pandemic, showed that students using remote learning had lower levels of emotional, social, and academic well-being compared to classmates that attended in-person schooling (Duckworth et al., 2021). School closures have affected girls in becoming more vulnerable to the challenging circumstances of child marriage, gender-based violence and early pregnancy, leaving 5.2 million girls worldwide in primary and secondary school at risk of dropping out of school permanently (UNESCO, 2020). In such tough situations, the vast majority of countries have been offering multiple modes of remote learning. According to the Joint Survey conducted by UNESCO, UNICEF, the World Bank, and OECD, most countries delivered remote learning through online media (91 per cent) and TV (85 per cent), followed by paper-based take-home materials (82 per cent), and mobile phones (70 per cent) (A survey of education ministries conducted by UNESCO, UNICEF, the World Bank, and OECD, henceforth referred to as the Joint Survey. See UNESCO, UNICEF, the World Bank and OECD (2021)). Similarly, the survey also highlights that eighty per cent of governments in the Middle East and North Africa, 93 per cent in Europe and Central Asia, and 97 per cent in Latin America and the Caribbean decided to implement multimodal remote learning programs (UNESCO, UNICEF, the World Bank and OECD (2021)).

National Scenario

The pandemic in India was no different than in other parts of the world. The educational institutions were closed for a longer duration and this has led to learning gaps among children of all age-groups. The major shift to e-learning, during COVID-19 pandemic, has exposed long-standing issues of inequality and the digital divide in India. India has a multi-layered formal education system with 264 million students enrolled in more than 1.5 million schools (UDISE+ 2020-21). The school education sector, particularly the Government schools were in any way struggling with the issue of equitable, inclusive and quality education.

A study conducted by Azim Premji Foundation states that nearly 60 per cent of Indian school children do not have access to online learning opportunities which is further intensified for children with disabilities. Among teachers of children with disabilities in their regular classes, more than 90 per cent found them unable to participate in online classes (Field Research Group at the Azim Premji Foundation undertook a study covering 1,522 teachers (in 1,522 schools) and 398 parents in the public

school system across 26 districts (80,000 children from the most disadvantaged geographies across India) in five states in five states Chhattisgarh, Madhya Pradesh, Karnataka, Uttarakhand and Rajasthan. URL: http://publications. azimpremjifoundation.org/2429/1/ Myths_of_online_education.pdf). The UNICEF report on 'Remote Learning Reachability report' (2020) stated that only 24 per cent of households have access to the internet across the country. The report also stated that the learning gap is likely to widen across families, as children from economically disadvantaged families cannot access remote learning (https://economictimes.indiatimes.com/industry/services/education/just-24-per-cent-of-indian-households-have-internetfacility-to-access-e-education-unicef/articleshow/77784092.cms?from=mdr). According to a similar study conducted by Oxfam India, even among students attending urban private schools where half of their parents reported having problems with the internet signal, speed and the cost of mobile data.

Further, many other surveys and reports also highlight the challenging situation of the availability of eContent. Although a lot of digital content has been generated and transmitted to help children to continue learning from home, there is limited evidence on the extent to which this content is actually reaching children, whether they are engaging with it and the impact it is having on their participation and learning. (UNICEF and UNESCO, 2021)

Status of Digital Infrastructure in Schools in India

The present status of digital infrastructure available in secondary and senior secondary schools of India needs to be addressed on a priority basis for building a more resilient system for the future and to meet the pace of the digitalization process. Unless these core shortcomings are addressed, inequalities will continue to widen. Moreover, the Covid pandemic raised the issue of accessibility of education which can be seen in the below analysis of Graph 1 and Graph 2.

Graph-1: National Scenario of Digital Infrastructure in Secondary and Senior Secondary Schools
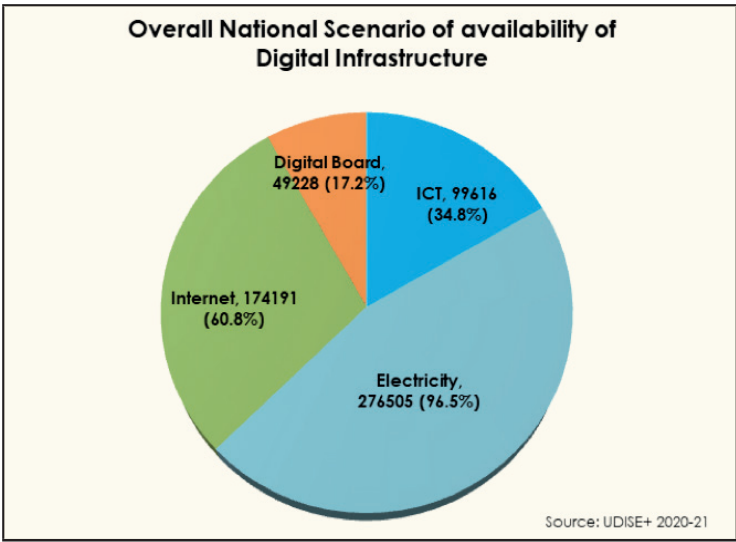
At the national level, the overall status of the availability of digital infrastructure can be observed from the given analysis. As per the database of UDISE+ 2020-21, out of total of 2,86,597 secondary and senior secondary schools, around 99,616 (34.8 per cent) schools have Information and Communication Technology (ICT) facilities, 2,76,505 (96.5 per cent) schools have electricity facility, 1,74,191 (60.8 per cent) schools have Internet facility and around 49,228 (17.2 per cent) schools have digital board facility. It can be observed here that ICT facilities, Internet facilities and digital board facilities need to be facilitated to improvise the functioning of the schools.

Graph-2: Digital Infrastructure status in Government, Government Aided and Private Schools of Secondary and Senior Secondary Schools
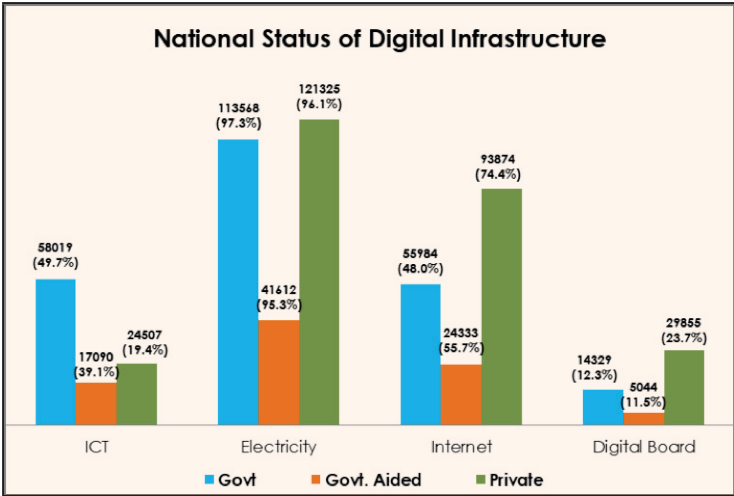
Source: UDISE+ 2020-21

Graph 2 also highlights the management-wise infrastructure in terms of the ICT and digital facilities available at Secondary and Senior Secondary schools which were found to be inadequate.

A detailed State and UT-wise status is given below will provide an insight into the present situation, which will help in preparing a constructive plan of action and will enable equitable access to digital infrastructure (ICT, Internet, Electricity and Digital Board) across the country. The analysis given below will help the implementing stakeholders to prepare for the future by providing basic facilities in the schools.

ICT Facility in Schools: ICT in schools provides lots of opportunities by providing the learners with improved educational content and more effective teaching-learning processes. The availability of ICT in schools improves the learning process through various provisions of more interactive educational materials that increase the learner's motivation and potential for improving the quality and standards of students. Graph 3 highlights the availability of ICT facilities in all States and UTs at the Secondary and Higher Secondary Schools. Many States and UTs need to avail the facilities for better functioning of the schools.

Graph 3 shows the present status in which a large number of States and UTs are having challenging situations in the availability of ICT facilities in schools. Few States and UTs such as Chandigarh

(100 per cent), D&D and D&NH (91.8 per cent), Kerala (86.3 per cent) and Puducherry (82.1 per cent) have better coverage facilities whereas States like Andhra Pradesh (3.3 per cent), Bihar (10.5 per cent), Madhya Pradesh (6.8 per cent) are showing the challenging scenario. This gap analysis has pointed out that all States and UTs must provide 100 per cent ICT facilities in the schools so that the online classroom teaching process can be improved.

Graph-3: State and UT-wise status of ICT facility in Secondary and Higher Secondary Schools
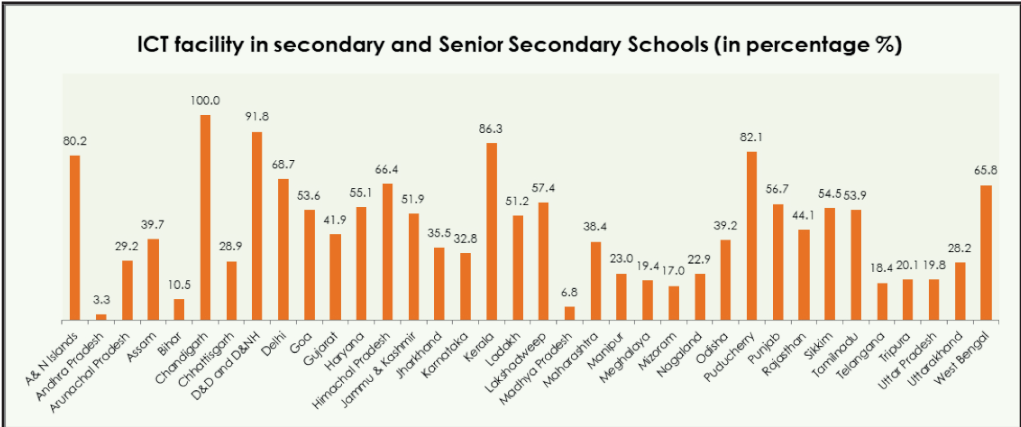
Source: UDISE+ 2020-21

As per UDISE+ 2020-21, around 99,616 (34.8 per cent) Secondary/Sr. Secondary schools have ICT facilities which includes 58,019 (49.7 per cent) Govt. Schools, 17090 (39.1 per cent) Govt. Aided Schools and 24,507 (19.4 per cent) Private Schools. Table 1 given below provides States and UT-wise status of the availability of ICT facility in different management of schools i.e. Govt., Govt. Aided and Private Schools. Table 1 shows the comparative analysis of the availability of ICT facilities in Govt, Govt. Aided and Private Schools highlight the gap anatomy of the availability. This gap analysis is referring to the efforts that need to be undertaken by the States and UTs in order to avail the digital infrastructure facilities. Based on this state-wise analysis, States and UTs may prepare a plan of action to improve the ICT facilities.

Table-1: State and UT-wise status of ICT available in Secondary and Higher Secondary Schools

State/UTs Name	ICT Facility					
	Government		Govt. Aided		Private	
	Schools	in %	Schools	in %	Schools	in %
India	58019	49.7	17090	39.1	24507	19.4
A & N Islands	84	84.0	1	50.0	12	63.2
Andhra Pradesh	493	6.81	0	0.0	0	0.0
Arunachal Pradesh	101	30.9	10	29.4	28	24.3
Assam	2955	62.5	90	7.9	569	17.5
Bihar	635	6.8	17	5.4	580	27.7

Chandigarh	100	100.0	7	100.0	58	100.0
Chhattisgarh	1838	38.1	4	3.6	260	11.1
D&D and D&NH	57	98.3	7	87.5	26	81.3
Delhi	1023	93.4	156	86.2	302	34.3
Goa	45	46.9	222	55.5	15	50.0
Gujarat	902	46.2	3456	67.7	971	17.2
Haryana	3029	88.5	4	25.0	1643	32.5
Himachal Pradesh	2179	76.3	-	-	647	46.1
Jammu & Kashmir	1755	67.9	0	0.0	524	29.0
Jharkhand	1103	38.1	30	16.5	436	32.4
Karnataka	3533	54.0	1636	37.4	1737	17.1
Kerala	1241	95.4	1408	98.0	1512	72.6
Ladakh	66	51.6	0	0.0		
Lakshadweep	14	93.3	-	-	13	40.6
Madhya Pradesh	284	3.0	7	2.6	929	11.3
Maharashtra	859	43.8	7407	44.9	2630	26.6
Manipur	107	23.4	11	12.2	161	24.2
Meghalaya	38	29.0	203	27.7	75	9.8
Mizoram	107	31.8	34	21.7	5	1.4
Nagaland	37	11.7	-	-	141	30.5
Odisha	4019	67.9	194	4.9	426	21.7
Puducherry	139	99.3	20	66.7	157	73.0
Punjab	3737	98.7	321	87.9	1415	25.7
Rajasthan	10643	68.7	-	-	3212	20.2
Sikkim	125	57.3	6	54.5	14	37.8
Tamilnadu	5968	95.5	220	12.2	1288	22.1
Telangana	2679	38.5	1	0.3	0	0.0
Tripura	197	19.6	7	21.2	27	23.7
Uttar Pradesh	582	21.9	1544	30.3	4020	17.3
Uttarakhand	511	21.3	65	16.3	519	47.9
West Bengal	6834	71.1	2	5.1	155	15.9

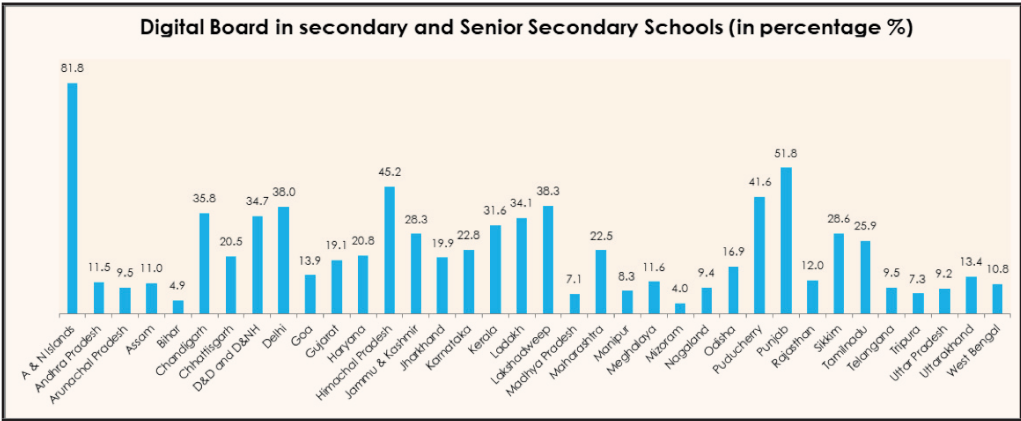*Source: UDISE+ 2020-21*   *(-) No Aided Schools*

Digital Board Facility: Digital board is an interactive screen which displays text, images, videos, etc., and helps students to visualize content better in the teaching process. This also provides students a healthy classroom atmosphere and allows teachers to show the educational content and interact with the students in a more collaborative manner. Graph 4 given below highlights the availability of Digital Board facilities in all States and UTs at Secondary and Higher Secondary Schools.

Graph 4 highlights the availability of Digital Board facilities in all States and UTs at Secondary and Higher Secondary Schools. The below analysis highlights that very few States and UTs such as Andaman and Nicobar Islands (81.8 per cent), Punjab (51.8 per cent) and Himachal Pradesh (45.2 per cent) are showing better coverage facilities whereas other States and UTs are showing a severe challenging scenario. A lot of effort is required to be put in place for providing digital boards in the schools by the States and UTs so that students can avail the benefit of online learning.

Graph-4: State and UT-wise status of Digital Board facility in Secondary and Higher Secondary Schools

Source: UDISE+ 2020-21

As per UDISE+ 2020-21, around 49,228 (17.2 per cent) Secondary/Sr. Secondary schools have Digital Board facility which includes 14,329 (12.3 per cent) Govt. Schools, 5,044 (11.5 per cent) Govt. Aided Schools and 29,855 (23.7 per cent) Private Schools. Table 2 given below provides States and UT-wise status of the availability of Digital Board facility in different management of schools i.e. Govt., Govt. Aided and Private Schools. States and UTs need to provide such facilities in the classrooms so that online learning cannot be hampered. This will help children with good quality e contents for better classroom learning processes.

Table-2: State and UT wise status of Digital Board facility available in Secondary and Higher Secondary Schools

State/UTs Name	Digital Board Facility					
	Government		Aided		Private	
	Schools	in %	Schools	in %	Schools	in %
India	14329	12.3	5044	11.5	29855	23.7

A & N Islands	92	92.0	0	0.0	7	36.8
Andhra Pradesh	561	7.8	16	2.8	1161	15.8
Arunachal Pradesh	15	4.6	4	11.8	26	22.6
Assam	647	13.7	24	2.1	333	10.2
Bihar	92	1.0	6	1.9	475	22.7
Chandigarh	18	18.0	3	42.9	38	65.5
Chhattisgarh	709	14.7	15	13.6	768	32.8
D&D and D&NH	19	32.8	0	0.0	15	46.9
Delhi	300	27.4	17	9.4	503	57.1
Goa	4	4.2	60	15.0	9	30.0
Gujarat	283	14.5	710	13.9	1438	25.5
Haryana	582	17.0	1	6.3	1180	23.4
Himachal Pradesh	1519	53.2	-	-	406	29.0
Jammu & Kashmir	938	36.3	0	0.0	307	17.0
Jharkhand	539	18.6	13	7.1	329	24.4
Karnataka	733	11.2	480	11.0	3586	35.4
Kerala	370	28.4	193	13.4	960	46.1
Ladakh	44	34.4	0	0.0	-	-
Lakshadweep	10	66.7	-	-	8	25.0
Madhya Pradesh	204	2.2	6	2.2	1068	13.0
Maharashtra	467	23.8	2861	17.3	3063	30.9
Manipur	17	3.7	1	1.1	83	12.5
Meghalaya	18	13.7	124	16.9	47	6.2
Mizoram	13	3.9	7	4.5	14	3.8
Nagaland	9	2.8	-	-	64	13.9
Odisha	1618	27.3	75	1.9	306	15.6
Puducherry	63	45.0	9	30.0	88	40.9
Punjab	117	3.1	6	1.6	4878	88.7
Rajasthan	1705	11.0	-	-	2079	13.0
Sikkim	51	23.4	2	18.2	23	62.2
Tamilnadu	1010	16.2	248	13.8	2340	40.2
Telangana	401	5.8	14	4.9	966	13.2
Tripura	53	5.3	1	3.0	30	26.3
Uttar Pradesh	180	6.8	134	2.6	2530	10.9
Uttarakhand	128	5.3	6	1.5	386	35.6
West Bengal	800	8.3	8	20.5	341	34.9

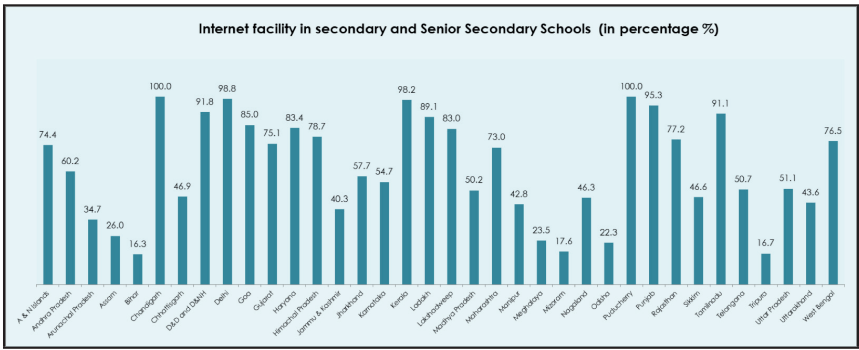*Source: UDISE+ 2020-21*   *(-) No Aided*

Schools Internet Facility: Using the Internet in the classroom actually gets students more excited about learning which helps students get the chance to directly engage with information rather than passively listen to lectures.

Graph 5 given below highlights the availability of Internet facilities in all States and UTs at the Secondary and Higher Secondary Schools. This situation affects the overall digital learning in the classrooms which need basic facilities like the internet. Few States and UTs such as Chandigarh (100 per cent),

Puducherry (100 per cent), Delhi (98.8 per cent), Kerala (98.2 per cent) and Punjab (95.3 per cent) have shown far better facilities in comparison to States and UTs like Assam (26 per cent), Bihar (16.3 per cent), Tripura (16.7 per cent), Odisha (22.3 per cent), Mizoram (17.6 per cent) and Meghalaya (23.5 per cent), where the challenges of availing minimum facilities still exist. Besides having ICT and other facilities, the internet is one of the essential requirements for providing opportunities to continue the classroom learning process.

Graph-5: State and UT-wise status of Internet facility in Secondary and Higher Secondary Schools

Source: UDISE+ 2020-21

As per UDISE+ 2020-21, around 1,74,191 Secondary/Sr. Secondary (60.8 per cent) schools have internet facilities which includes 55,984 (48.0 per cent) Govt. Schools, 24,333 (55.7 per cent) Govt. Aided Schools and 93,874 (74.4 per cent) Private Schools. Table 3 given below provides States and UT-wise status of the availability of Internet facilities in

different management of schools i.e. Govt., Govt. Aided and Private Schools. This issue of the availability of internet facilities in Govt. Aided and Private schools hamper the online learning facility for students which required attention due to Covid 19 pandemic. States and UTs need to put more resources in order to cover all schools.

Table-3: State and UT-wise status of Internet facility available in Secondary and Higher Secondary Schools

State/UTs Name	Internet Facility					
	Government		Aided		Private	
	Schools	in %	Schools	in %	Schools	in %
India	**55984**	**48.0**	**24333**	**55.7**	**93874**	**74.4**
A & N Islands	71	71.0	2	100.0	17	89.5

| Andhra Pradesh | 3128 | 43.2 | 253 | 43.6 | 5752 | 78.3 |
Arunachal Pradesh	65	19.9	21	61.8	79	68.7
Assam	1011	21.4	82	7.2	1278	39.3
Bihar	805	8.6	30	9.5	1089	52.0
Chandigarh	100	100.0	7	100.0	58	100.0
Chhattisgarh	1652	34.2	59	53.6	1697	72.5
D&D and D&NH	51	87.9	7	87.5	32	100.0
Delhi	1083	98.9	172	95.0	876	99.4
Goa	67	69.8	351	87.8	29	96.7
Gujarat	698	35.8	3642	71.3	5197	92.0
Haryana	2480	72.4	13	81.3	4584	90.8
Himachal Pradesh	2081	72.8	-	-	1269	90.5
Jammu & Kashmir	562	21.7	0	0.0	1206	66.8
Jharkhand	1481	51.2	99	54.4	970	72.1
Karnataka	1754	26.8	1838	42.0	7920	78.1
Kerala	1276	98.1	1424	99.1	2036	97.7
Ladakh	114	89.1	1	100.0		
Lakshadweep	15	100.0	-	-	24	75.0
Madhya Pradesh	2393	25.4	154	56.2	6445	78.6
Maharashtra	908	46.3	11137	67.5	8672	87.6
Manipur	46	10.0	9	10.0	464	69.8
Meghalaya	27	20.6	216	29.5	139	18.2
Mizoram	48	14.3	28	17.8	75	20.6
Nagaland	45	14.2	-	-	315	68.2
Odisha	1335	22.6	374	9.4	932	47.5
Puducherry	140	100.0	30	100.0	215	100.0
Punjab	3774	99.7	365	100.0	5062	92.0
Rajasthan	11897	76.8	-	-	12351	77.5
Sikkim	86	39.4	6	54.5	32	86.5
Tamilnadu	5733	91.7	1511	84.0	5382	92.5
Telangana	2324	33.4	102	35.7	4951	67.7
Tripura	104	10.4	13	39.4	75	65.8
Uttar Pradesh	592	22.3	2193	43.1	13068	56.2
Uttarakhand	624	26.0	168	42.0	903	83.4
West Bengal	7414	77.2	26	66.7	680	69.7

Source: UDISE+ 2020-21   *(-) No Aided Schools*

Electricity facility in Schools: There is no doubt about the fact that electricity is the most basic requirement for digital education, like laptops, desktops, or even smartphones and Digital Boards need the power to work. So if the schools are not completely electrified, that is one of the biggest challenges of digital education.

Graph 6 given below highlights the availability of Electricity facilities in all States and UTs at the Secondary and Higher Secondary Schools. This also gives us the scope to achieve 100 per cent electricity in all schools of India.

Graph-6: State and UT-wise status of Electricity facility in Secondary and Higher Secondary Schools
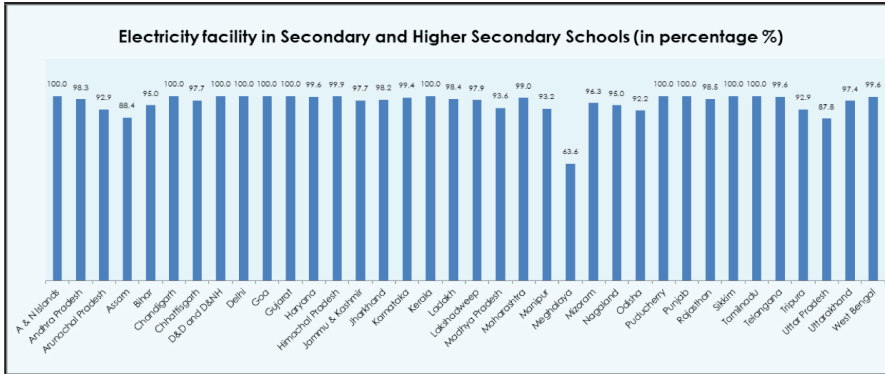
Source: UDISE+ 2020-21

As per UDISE+ 2020-21, around 2,76,505 (96.5 per cent) Secondary/Sr. Secondary schools have an Electricity facility which includes 1,13,568 (97.3 per cent) Govt. Schools, 41,612 (95.3 per cent) Govt. Aided Schools and 1,21,325 (96.1 per cent) Private Schools. Table 4 given below provides States and UT-wise status of the electricity facility in different management of schools i.e. Govt., Govt. Aided and Private Schools. It is visible from this table that by covering a few more schools the country would achieve 100 per cent electricity in all Govt, Aided and Private Schools.

Table-4: State and UT-wise status of electricity facility available in Secondary and Higher Secondary Schools

State/UTs Name	Electricity Facility					
	Government		Aided		Private	
	Schools	in %	Schools	in %	Schools	in %
India	**113568**	**97.3**	**41612**	**95.3**	**121325**	**96.1**
A & N Islands	100	100.0	2	100.0	19	100.0
Andhra Pradesh	7020	97.0	575	99.1	7304	99.5
Arunachal Pradesh	297	90.8	34	100.0	111	96.5
Assam	4675	98.9	579	51.0	2803	86.2
Bihar	8887	94.8	281	88.9	2035	97.2
Chandigarh	100	100.0	7	100.0	58	100.0

Chhattisgarh	4668	96.8	110	100.0	2331	99.6
D&D and D&NH	58	100.0	8	100.0	32	100.0
Delhi	1095	100.0	181	100.0	881	100.0
Goa	96	100.0	400	100.0	30	100.0
Gujarat	1952	100.0	5107	100.0	5646	100.0
Haryana	3416	99.8	16	100.0	5026	99.5
Himachal Pradesh	2854	99.9	-	-	1402	100.0
Jammu & Kashmir	2514	97.2	1	100.0	1778	98.5
Jharkhand	2872	99.2	172	94.5	1299	96.5
Karnataka	6500	99.4	4375	99.9	10050	99.1
Kerala	1301	100.0	1437	100.0	2083	100.0
Ladakh	126	98.4	1	100.0		
Lakshadweep	15	100.0	-	-	31	96.9
Madhya Pradesh	8601	91.2	253	92.3	7901	96.4
Maharashtra	1950	99.5	16327	98.9	9818	99.2
Manipur	418	91.3	63	70.0	649	97.6
Meghalaya	82	62.6	508	69.3	444	58.3
Mizoram	325	96.7	152	96.8	348	95.6
Nagaland	290	91.8	-	-	449	97.2
Odisha	5670	95.8	3473	87.6	1777	90.6
Puducherry	140	100.0	30	100.0	215	100.0
Punjab	3786	100.0	365	100.0	5501	100.0
Rajasthan	15457	99.8	-	-	15491	97.2
Sikkim	218	100.0	11	100.0	37	100.0
Tamilnadu	6251	100.0	1798	100.0	5817	100.0
Telangana	6923	99.5	272	95.1	7294	99.8
Tripura	926	92.3	32	97.0	110	96.5
Uttar Pradesh	2060	77.5	4616	90.7	20537	88.3
Uttarakhand	2326	96.8	387	96.8	1074	99.2
West Bengal	9599	99.9	39	100.0	944	96.7

Source: UDISE+ 2020-21   *(-) No Aided Schools*

Initiatives undertaken for the Expansion of Digital Education

In India, school closures have affected millions of children from pre-primary to secondary levels of schooling. The major shift from face-to-face to online learning has put the spotlight on the vast inequalities within the education system between and within states. In view of the above situation and to ensure that no child is left behind, it was clear that only online education will not be able to provide universal access and cannot be taken up as the single and possible option. COVID-19 has created an opportunity for governments to deal with such situations and also to revamp the system by taking necessary actions and providing needful resources. The

successful strategy to cope with the prevalent pandemic situation has to be multifaceted and multimodal.

India also saw huge migration in the first wave of the pandemic. People in huge numbers migrated to their hometown, so the states and UTs were given clear and comprehensive directions (Guidelines for children of Migrant labourers issued on 27th July 2020 by Ministry of Education) that children of migrant labourers may be admitted to the nearby schools and they may not be asked for any documents. In order to complement efforts undertaken for online education, a lot of supplementary teaching-learning material in the form of worksheets/workbooks/storybooks etc. was provided to children of all grades. Teachers also visited students in small groups and provided them with guidance. Some of the important initiatives are listed below:

I. Enhancing and Strengthening the Scope of ICT under Samagra Shiksha

Samagra Shiksha, the largest Centrally Sponsored Scheme for School Education in India not only provides support for ICT and smart classrooms to both Govt. and Govt. Aided schools in all states and UTs but also has provisions for making quality eContents for students and teachers. The scheme also provides financial support to States and UTs for developing quality eContents under DIKSHA. Technology will be able to create lifelong learners who can figure out what concepts children need to learn, unlearn and relearn at various stages of life to live sustainably in a green, regenerative future. Acknowledging this, the Government of India is committed to ensure learning for all, with equity, to cover all students at all levels of education and in all geographical locations, even in the remotest parts of the country so that digital learning is no longer the luxury of the few people.

Further, the NEP 2020 calls for investment in digital infrastructure, online teaching platforms and tools, virtual labs, digital repositories, online assessments, technology and pedagogy for online teaching-learning. Subsequently, the policy also stresses the promotion of multilingualism and the power of language in teaching and learning through innovative and experiential methods, including gamification and apps, by weaving in the cultural aspects of the languages - such as films, theatre, storytelling, poetry, and music - and by drawing connections with various relevant subjects and with real-life practices. In this context and beyond, technology will be the imminent part of education as it gives practical experience for the future, provides an audio-visual experience, makes studying less boring, a treasure trove of unlimited information, gives additional tools to teachers, and builds more interactive and instills collaborative spirits towards learning practices.

II. PM eVIDYA

A comprehensive initiative, PM e-VIDYA (https://pmevidya.education. gov.in) was launched to amalgamate and synchronize all efforts related to digital/online/on-air education to enable coherent multi-mode access to education.

- **DIKSHA (Digital Infrastructure for Knowledge Sharing)** (https://diksha.gov.in) is the One Nation One Digital Platform for Education and is the largest national initiative by any country that provides free access to quality e-content. The content is crowd sourced for learners and teachers, thereby leveraging the unique talent of several individuals, organizations, and institutions through technology. The content on

DIKSHA is hosted in 36 languages (32 Indian Languages and 4 Foreign Languages), including ISL. DIKSHA is equally promoting and encouraging learning through local/regional languages. DIKSHA is also being transformed into a platform for the coherence of access with TV and radio.

- **One Class One TV Channel:** The pandemic has shown the need for resilience and multidimensional models in education. The benefit of using TV is that it supports distance and remote learning, supports learning in the absence of teachers, aids as a support for teachers and complementary learning to schooling, and provides the education to the most disadvantaged during the crisis, also supports parental/caregiver support with learning especially in early childhood education. Under the One TV Channel Initiative, 12 Swayam Prabha Channels (https://pmevidya. education.gov.in/swayam-prabha-tv.html) are earmarked for school education under the one class, one TV channel initiative and more than 7,000 programs have been developed. To ensure coherent access through multimodal delivery, the broadcasted content is organised by chapter & topics on DIKSHA to ensure asynchronous usage by anyone, anytime, anywhere. Further, as per recent budget announcements, access to TV channels has been expanded substantially to 200 TV channels wherein the 'one class-one TV channel' program of PM eVIDYA will be expanded from 12 to 200 more TV channels. This will enable all states to provide supplementary education in regional languages for classes 1-12.

- **Radio broadcasting/Podcasts** (https://pmevidya.education.gov. in/radio.html) are used for children in remote areas with no means of internet access. More than 3,480 pieces of curriculum-based radio programs have been produced for dissemination on 397 radio stations and also through iRadio 1,229 programs have been disseminated. A Podcast called Shiksha Vani of the CBSE is also being effectively used by learners of grades 9 to 12.

- **For Children with Special Needs (CwSN)** (https://pmevidya. education.gov.in/cwsn.html), 2,970 Indian Sign language (ISL) based content, Mukta Vidya Vani, an audio streaming podcast and Radio Vahini, with 24x7 broadcast and talking books (in Daisy format) for learners with Blindness and Low Vision have been prepared and also a total of 3,424 Audio Books have been developed. In addition, around 10,000 ISL dictionary words have been uploaded on DIKSHA portal.

- **Manodarpan** (https://manodarpan. education.gov.in): To provide Psychosocial Support for the Mental Health & Well-Being of Students during the COVID Outbreak and beyond, the Manodarpan initiative has been launched. Manodarpan Cell was set up in the National Council of Educational Research and Training (NCERT) and orientation of counsellors associated with the Manodarpan Helpline was organized. Guidelines for the counsellors to provide psycho-social support to callers on the Manodarpan Helpline were shared. NCERT has taken various steps to reach out to school students and their primary stakeholders (parents and teachers) for helping

them to maintain their mental and emotional well-being during the present times of COVID-19 pandemic. To help school students across the country share their concerns and seek help to deal with stress, anxiety and related mental health concerns during and after COVID-19, 'Counselling Services for School Children' was started in May 2020 by NCERT on phone/email through its trained counsellors. This service was provided free of charge by trained counsellors across different regions of the country.

- **National Digital Education Architecture (NDEAR)** (https://www.ndear.gov.in): NDEAR blueprint for school education is prepared in a way that NDEAR shall act as a super-connector for all players and requirements of the school education ecosystem, from teaching-learning to assessment, tracking of individual progress, to areas related to administration, governance and monitoring process. NDEAR blueprint focuses on facilitating towards achieving the goals as laid down by NEP 2020, through a digital infrastructure for embracing innovations in the education ecosystem, ensuring greater autonomy and equal participation of all the relevant stakeholders. Making NDEAR functional will help in the wider reach of great innovations and solutions by States to be leveraged by others as solutions and ideas that have worked in a particular State would be reusable and reconfigurable by another State. Further, student and school registries undertaken by the States for tracking enrolment and learning levels of every individual child would provide real time dynamic data to design appropriate interventions.

- **Emphasis on blended teacher training programmes: NISHTHA**

The Department of School Education and Literacy (DoSE&L) launched the National Initiative for School Heads and Teachers for Holistic Advancement (NISHTHA), a National Mission in 2019 to improve learning outcomes at the Elementary level through an Integrated Teacher Training Programme. NISHTHA (https://itpd.ncert.gov.in) is a unique effort led by the NCERT under the aegis of Samagra Shiksha where an inclusive approach was adapted to augment the capacities of teachers to bring positive change in the education system. The reason which makes NISHTHA exclusive is that it is an evolving and dynamic training programme and provides abundant flexibility to the states and UTs to incorporate and contextualise local flavour and content.

Initially, NISHTHA was launched to build the capacities of around 40 lakh elementary teachers and Heads of Schools including faculty members of SCERTs, DIETs and Block Resource Coordinators and Cluster Resource Coordinators. Initially, NISHTHA training was conducted in a face-to-face mode by NCERT and around 23,137 Key Resource Persons (KRPs), State Resource Persons (SRPs) and 16,99,931 School Heads and Teachers of elementary schools were trained under NISHTHA in 2019-20 in the pre-lockdown period.

The Covid pandemic posed serious challenges to face-to-face mode training. Also, teachers were required to adapt to online teaching, therefore, all NISHTHA modules were made online and a specific module on Covid-related challenges was added. The modules were also translated into 10 regional languages (Assamese, Bengali,

Bodo, English, Gujarati, Hindi, Kannada, Odia, Telugu and Urdu) and around 24 lakhs elementary school teachers from 27 States and UTs and various autonomous bodies have completed online training in June 2021. The live interactive sessions by the experts from NCERT and a group of key resource persons providing mentoring to teachers have been able to minimise the limitations of online training and kept the element of vibrancy and synergies alive.

Now, the scale and scope of NISHTHA have been expanded and NISHTHA 2.0 has been launched to amplify the competence of Secondary teachers. It has 68 modules including: Curriculum and Inclusive Education; ICT in Teaching, Learning and Assessment; Personal-Social Qualities for Holistic Development of Learners; Art Integrated Learning; Understanding Secondary Stage Learners; Health and WellBeing; School Leadership Development; Vocational Education; Gender Issues in Education; Initiatives in School Education; Toy Based Pedagogy; and School Based Assessment. States can contextualise these modules in line with their state-specific needs. Since the launch on 29 July 2021, it has received responses from 33 States and UTs and various autonomous bodies have already on-boarded the course.

Further, a specialised NISHTHA 3.0 training to train teachers from ECCE to Grade V under the NIPUN Bharat mission with emphasis on foundational literacy and Numeracy has been launched on 7 September 2021. NISHTHA 3.0 aims to cover 25 lakh teachers and has 12 modules including Introduction to FLN Mission; Shifting towards Competency-Based Education;

Understanding the Learner; Transacting 3 months Play Based School Preparation Module for Grade I Children and Balvatika; Foundational Language and Literacy; Foundational Numeracy; Learning Assessment; Involvement of Parents and Community; Integration of ICT in Teaching, Learning and Assessment; Multilingual Education; Toy Based Pedagogy; and School Leadership.

Vision of NEP 2020 for Expansion of Digital Education:

As mentioned in NEP 2020, the scope of technological interventions will be expanded for various purposes of improving the teaching-learning and evaluation processes. Simultaneously, emphasis will be given for supporting teacher preparation, focusing on teacher's professional development, enhancing educational access, and streamlining the process of planning, management, and administration related to admissions, attendance and assessments." (P-57, National Education Policy, 2020)

The role of education will also be to assist in raising awareness about the potentially disruptive effects of technology and will also address related issues. Further, the recent pandemic compelled us to be prepared with alternative modes of quality education and blended learning is the future of the 21st century. The benefits of the availability of online/digital education and existing digital platforms need to be optimised and expanded further to meet the current and future challenges towards improving quality education for all. In this regard, it has become all the more relevant to invest in public digital infrastructure in the education sector that can be used by multiple stakeholders keeping in view India's large scale diversity, complexity and device penetration. This will also ensure

that the technology-based solutions do not become outdated with the rapid advances in technology.

Although the pandemic has receded now and schools have reopened, it has opened the platform for the integration of technology in the day-to-day classroom transaction processes. The physical classes cannot go back to completely traditional methods; therefore, there is a need to expand the digital infrastructure and repository of eContent.

However, persisting disparities in access to ICT facilities for students, teachers and limited digital literacy knowledge especially at the community-level are the critical bottlenecks for ascending digital learning across the country. Another significant challenge is to monitor the implementation of digital learning facilities. Limited information is available on how learners are guided and performed during digital learning. For India to fully implement the policies and programmes and effectively reach the beneficiaries, the focus will also be given to addressing the challenges of operationalization.

Way Forward

In order to reverse the learning loss caused during school closure due to COVID-19 pandemic, and its detrimental effect on school-going children, various steps have been undertaken by the Government of India and States/UTs. The Budget 2022-23 has clearly emphasised that the thrust of education in 2022-23 would be on digital education. The focus for school education would be on starting 200 TV channels, setting-up of 750 virtual labs in science and mathematics, and 75 skilling e-labs for the simulated learning environment by 2022-23. Emphasis will be given on the availability of high-quality eContent in all spoken languages for delivery via the internet, mobile phones, TV, and radio through Digital Teachers (https://www.indiabudget.gov.in/). Further, a competitive mechanism for the development of quality eContent by the teachers will be set-up to empower and equip them with digital tools of teaching and facilitate better learning outcomes.

There is no doubt that the 21st century will be driven by the disruption created by technology, and the divide between 'have and have not' will increase more if a substantial section of the population does not get digital access. Therefore, it must be our priority to eliminate the digital divide through concerted efforts to ensure equity and inclusion.

We can leapfrog in education when we unleash the potential of a billion Indians - to learn and to help each other learn. Education is about learning, and learning should not just be restricted to schools. It should be learning by all, learning for all, learning with all. An approach toward integrating the use of technology with the education system will lead to development. The present initiatives and the collective efforts of the Ministry of Education, its autonomous bodies, all States/UTs, and tech support partners are aimed at fulfilling our vision of making India a Global Knowledge Superpower and restoring India's glory as a great centre of learning with effective implementation of the NEP 2020. A key role in this regard will be played by Artificial Intelligence (AI) systems, which will be designed to work with teachers more effectively, and which in turn will assist in continuous improvement in students' learning outcomes. Perfect use cases are immersive labs, flipped classrooms, gamification of NCERT content, and adaptive and personalised learning.

Coherent Access to eContent is the key to the expansion of the digital universe, a digital repository accessible to all and having a variety of learning

materials including the creation of coursework, learning games & simulations, gamification and content in multiple languages, with clear operating instructions will complement the learning in classrooms. Further, the existing mass media, such as television, radio, and community radio may also be extensively used for telecast and broadcasts. Educational programmes may be developed in multiple languages including sign language and in DAISY format to cater to the varying needs of the student population.

Teachers are also required to be trained to use ICT in the teaching-learning process and on learner-centered pedagogy and how teachers become high-quality online content creators themselves using online teaching platforms and tools. Teachers may also be trained for making online/digital education blended with experiential and activity-based learning.

Technology may also be used for designing assessment frameworks to assess 21st century skills, portfolio, rubrics, standardised assessments, and assessment analytics. In addition to above, it is also crucial to set standards for a blended mode of learning, eContent, appropriate use of technology, and pedagogy for online/digital teaching-learning.

Digital transformation in education has to be inclusive, thoughtfully designed and implemented, to ensure that all processes put students at the centre. We must strive to build a more open, accessible, equitable, inclusive, robust, and transparent education system that is prepared to reap the advantages of technology and promotes a conducive learning environment for each learner.

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Multimedia Learning

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Technological advancements have brought revolutionary changes in the ways of communication. It has enabled the process of meaning-making with multimodality i.e. the use of several modes (media) in a single artefact or instance or communicative event. Multimodality is not entirely a new phenomenon as images in addition to linguistic symbols have been used since time immemorial. However, developments in electronics, information and communication technology (ICT) transformed the traditional modalities of communication into what Bob Goldstein (1966) termed as multimedia. Multimedia is an evolutionary concept, and generically it may refer to the integrated combination of text, still images, video, animation, sound and also interactivity, however, the primary implication of multimedia entails electronic media. The potential of multimedia can be leveraged in every domain of human endeavour involving communication and thereby; in principle, multimedia has become a pervasive phenomenon.

Multimedia learning is a new-age phenomenon where multimedia is used to impart learning of any kind. By definition, multimedia learning is a form of computer-aided instruction that uses two modalities concurrently (Mayer, 2002). The two modalities render two types of learning, visual (through pictures, written text, animations, and videos) and verbal (through spoken narration). Multimedia learning is growing as a popular alternative to classroom-based instruction. With the recent developments in the field of ICT, multimedia learning is not only enriched but also explored for its potential and sustainable implications for instruction and learning.

The volume in review is the third edition of MULTIMEDIA LEARNING by Richard F. Mayer. It is a seminal work on multimedia learning. The first edition of the present book appeared in 2001 and subsequently with the second edition in 2009 and a third edition in 2021. The book is also available as an eBook along with a hard/paperback edition. The book is rightly designated by the author himself as an outcome of labour of love which is evident from the content, coverage and comprehensiveness of the volume.

The book is divided into twenty-two chapters and organised into five sections. The aim of the book is to provide an up-to-date and systematic summary of research studies on multimedia learning, supplemented with complementary evidence from around the globe. The subject matter of the book concerns serving the needs of the professionals working in the fields of psychology, education, computer science, communication, instructional design, and game design. The volume claims to inform two interdisciplinary areas namely learning theory and

education practice.

The Section 1 entitled Introduction to Multimedia Learning divided into five chapters lays the background and foundational principles of multimedia learning. Each chapter is presented with a summary and outline of the contents. The section offers basic details like definitions, key-terms, along with research summaries, multimedia instruction cum assessment, and multimedia design principles.

Section 2 enters into the core of the volume and describes the Principles for Reducing Extraneous Processing in Multimedia Learning. Divided into five chapters, each chapter deals with one principle. Thus, five principles for reducing extraneous processing in multimedia learning namely coherence, signalling, redundancy, spatial contiguity, and temporal contiguity principles have been discussed in detail with appropriate examples. The section primarily addresses the problem of extraneous processing overload.

Section 3 continues with the core principles pertaining to multimedia learning. It deals with the Principles for Managing Essential Processing in Multimedia Learning in three chapters. Essential processing refers to cognitive processing i.e. cognitive aspects of multimedia learning. The three principles of essential processing that help to manage multimedia learning are segmenting, pre-training and modality.

Section 4 entitled Principles for Fostering Generative Processing in Multimedia Learning is spread across 6 chapters, each devoted to one principle. For fostering generative processing after essential processing, four principles namely personalisation, voice, embodiment, and generative activity have been found working while two others i.e. image and immersion principles have not been found working for multimedia instruction-based learning.

The volume ends with Section 5 offering a Conclusion of the present treatise and summarises the fifteen principles of multimedia instruction that are based on empirical evidence and grounded in theory. It also summarises different types of boundary conditions of these principles such as individual difference conditions, instructional content conditions, and instructional context conditions. Further, the chapter briefly recounts the progress in the past and also looks forward to the way ahead where the author refers to two possible directions in the field based on emotional design and motivational design. The book ends with the comments and suggestions related to future research for improving multimedia learning.

The volume entitled Multimedia Learning by Richard E. Mayer, as mentioned earlier, is truly an outcome of labour of love! It is a concise and compact yet comprehensive resource on the subject for students, professionals and researchers alike. Besides the treatment of the subject matter, the book is designed well with a learner-friendly approach. Each chapter carries a list of suggested readings followed by a list of references. The book also contains an author index as well as a subject index easing access to information at a glance.
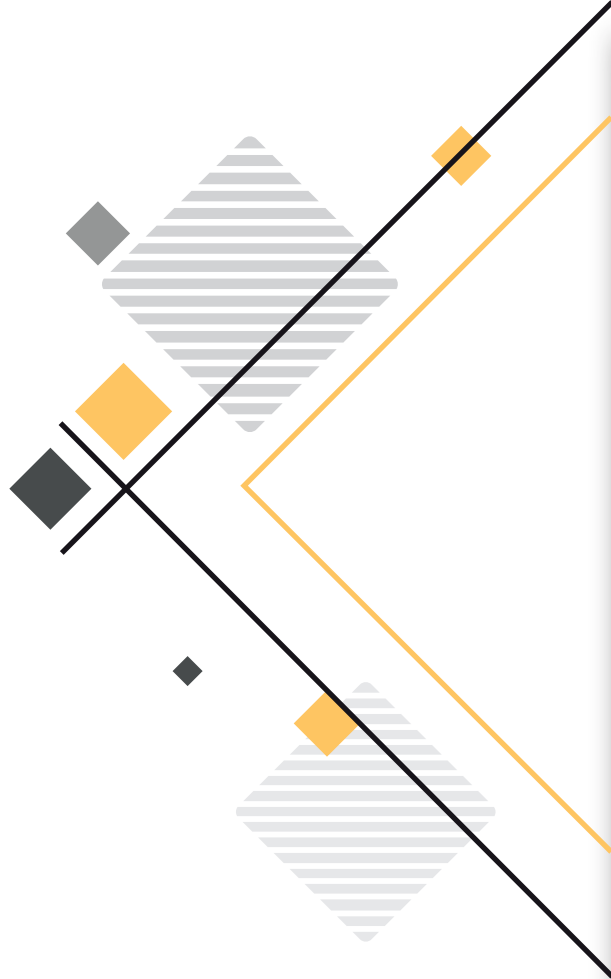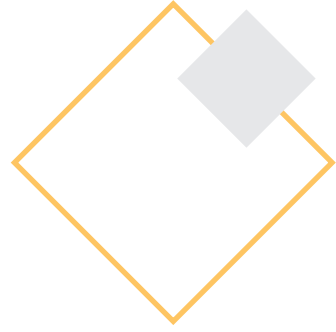
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