Volume: 3
Issue: 2
July, 2021

ISSN 2581-8325

INDIAN JOURNAL OF EDUCATIONAL TECHNOLOGY

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

Indian Journal of Educational Technology

Volume 3, Issue 2, July 2021

About the Journal

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

Notes to Contributors

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

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Editorial

"The Gods love what is mysterious, and dislike what is evident..."

- Brhadaranvaka Upanisad

Like many other countries, India too witnessed a huge surge in COVID-19 cases in previous months. The so-called second wave of the pandemic brought untold miseries to the affected families. Most of the State Governments were forced to notify lockdowns. Schools and colleges which had started opening physically in some States too were closed down again. Vaccination drive has a long way to go. The third wave of the pandemic looms large upon us. It's been more than a year since the schools, colleges and universities were closed to prevent the spread of pandemic among the young population. Possibility for reopening of the schools and colleges in the short future remains bleak. Technology appears to be the only way to ensure that learning of the children goes uninterrupted. However, technology mediated learning has its own issues to navigate such as digital divide and hazards associated with the long exposure to screens. The fact that children are more comfortable among their peers make technology based learning so forlorn.

In such a context, India continued to make strides towards technology mediated teaching-learning. Under PM eVIDYA program, which was announced in May, 2020, Ministry of Education (MoE), Government of India has undertaken several initiatives such as making DIKSHA a state of the art digital platform, telecasting curriculum based television programs on 12 DTH TV channels (one class, one TV channel), broadcasting educational radio programs through 226 Radio Stations including All India Radio stations, Community Radio Stations, Gyanvaani Radio Stations and iRadio, starting hundreds of online courses using SWAYAM platform, more than 2.4 million in-service training of teachers through NISHTHA, Online integrated Continuos Professional Development (CPD) programme through Diksha, etc. For addressing the concerns and issues including psycho-social issues two Interactive Voice Response System (IVRS) were created and extensively used during the pandemic. Efforts were made to provide a resilient and coherent digital education system for the stakehoders through - portals, apps, telecast, braodcast, webcast, online, offline, blended/hybrid approaches and bridge the digital divide. In all these initiatives equality, equity and quality remained the central concern of the government.

Going in-line with the existing educational scenario and digital platform as an important medium of sharing knowledge and discourse, the July 2021 issue of the journal has 21 manuscripts under various categories: research, review, general and opinion article to book review. There are 20 research articles alongwith review, general, opinion articles each and a book review. The themes of all these articles mainly focus on recent research and developments in the field of ET & ICT.

I take this opportunity to thank all the contributors and reviewers of the Indian Journal of Educational Technology for continuing the academic discourse amid COVID-19 pandemic. I also extend my gratitude towards the editorial board members for their guidance, whenever required. I hope the sixth issue of the journal will add another set of research in the knowledge world.

(ABHAY KUMAR)
Editor

Technology Initiative for Reaching Out and Bridging Digital Divide

PMeVidya

A comprehensive initiative which unifies all efforts related to digital/ on-air education to enable multi-modal & synchronous access to education.

PM eVidya focuses on developing multi channel learning continuum

Television	Radio	DIKSHA	Special eContent	Online Courses
One Class, One TV Channel Classes 1 to 12 (12 channels)	**One Class, One Radio Channel** Radio, Community Radio and Podcasts	**One Nation, One Platform** School Educations in States/UTs: eContent & QR coded energized textbooks for all grades	eContent for specially abled DIVYANG (CWSN)	Top 100 Universities to start online courses

DIKSHA, Television and Radio are combined together for a coherent access to knowledge

DIKSHA (Digital Infrastructure for School Education)

DIKSHA is developed on the core principles of open architecture, open access, open licensing, diversity in choice and autonomy. The platform is built on open source technology, made in India and made for India promoting the spirit of Atma Nirbhar Bharat, which incorporates internet scale technologies and enables several use-cases and solutions for teaching and learning.

States/UTs and autonomous bodies under MoE & MoD are onboard

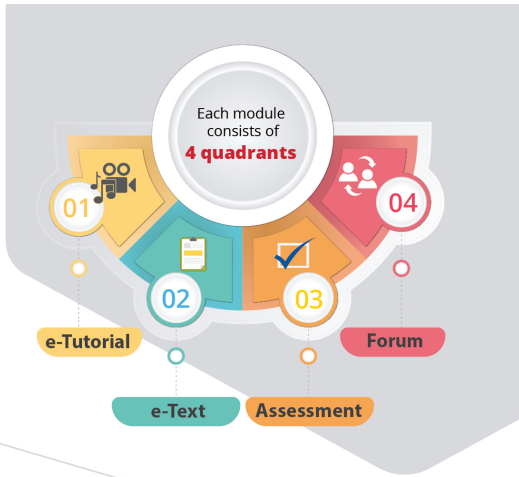
ePathshala.gov.in

The platform addresses the dual challenge of reaching out to diverse clientele groups and bridging the digital divide by offering ebooks & eContent of NCERT in multiple Indian languages and ensuring its free access at all times and at all places through portal and series of mobile apps.

ePathshala | NISHTHA | Augmented Reality | PARAKH | NAS | SSP Mauritius | ePathshala Scanner

SWAYAM (Study Webs of Active learning for Young Aspiring Minds) for School Education & Teacher Education

SWAYAM focusses on the three cardinal principles of educational policy viz. Access, Equity and Quality. SWAYAM - MOOCs seek to enrich students' knowledge and connect teachers and teacher-educators through online mode to facilitate their continuous professional development. The portal is offering various Massive Open Online Courses (MOOCs) for school education for Classes XI-XII and for teachers. There are around 34 courses run by NCERT. Nearly 2.5 lakh participants have already been enrolled in 7 cycles.



निष्ठा NISHTHA Integrated Teacher Training for Change SAMAGRA SHIKSHA ONLINE

National Initiative for School Heads' and Teachers' Holistic Advancement

NISHTHA a capacity building programme aims to build competencies among all the school teachers and principals focusing on major areas like strategies for improving classroom processes, generic Concerns, subject - specific Pedagogies and Systemic Concerns. Under NISHTHA online on DIKSHA, there are 18 courses in 10 Indian languages with over 24 lakh participants from 34 states/UTs and 7 autonomous bodies. The Titles of these 18 courses are :

- Inclusive Education
- EVS Pedagogy
- Developing Personal Social Qualities
- Mathematics Pedagogy
- Integrating Gender
- Language Pedagogy
- Art Integrated Learning
- Science Pedagogy
- School Based Assessment
- Social Sciences Pedagogy
- Health & Well Being
- School Leadership
- Initiatives in School Education
- Pre-School Education
- Integration of ICTs in Teaching learning
- Pre- Vocational Education
- Addressing Covid-19 Challenges
- CSA and POCSO

Major Initiatives during COVID - 19

- Telecast on 12 PMeVIDYA DTH TV Channels
- Energized Textbooks on DIKSHA
- Broadcast on 88 Radio Stations and
- Podcast on iRadio and Jio Saavan
- Live Interaction on alternative Academic Calendar of NCERT
- PRAGYATA Guidelines for Digital Education
- ISL videos eContent for CWSN
- SSP Mobile App for Mauritius
- Cyber Safety and Security Guidelines
- Webinar on ICT in Education for Teachers
- Talk to NCERT (Voice Assistant)
- Manodarpan-IVRS based 24x7 Counselling Support
- SAHYOG DTH TV Support for Counselling Services
- NISHTHA online for Elementary Stage
- School MOOCs on SWAYAM

Online Events and Competitions

- Quizzes
- Essay(creative writing)
- Photography
- Poetry
- Poster and Video making
- ICT Award
- AICEAVF & ICT Mela
- Pariksha Pe Charcha

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Research Article

Rethinking Program Evaluation in Educational Technology

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Abstract

Ideas for rethinking program evaluation in educational technology in order to make informed decisions to reform teaching and learning are explored. The complexity of program evaluation when dealing with complex educational technology systems involving various subject disciplines, grade levels and the degree (e.g., how, where) to which it overlaps and/or integrates with each individual discipline and grade demands more comprehensive approaches to evaluation. A comprehensive evaluation model placed in real-world supportive and contextual factors with insights from classic evaluation methods is suitable for gaining a detailed layout of educational technology programs.

Keywords: Program Evaluation, Educational Technology, Context, Comprehensive, Teaching , Learning

Introduction

Program Evaluation in educational technology is an essential area of inquiry with considerable impact on almost every aspect of education, especially teaching and learning in this twenty-first century. Reforming educational technology remains a priority in the United States, Canada, India, Europe, Australia, and many countries worldwide because of its significant role in developing a technology-literate workforce. An apparent ongoing rush to implement educational technology is evident in almost every sector of education from K-12 to post-secondary levels. However, adequate program evaluation methods suitable for evaluating educational technology are still lacking. This lack of sufficient program evaluation methods originates primarily due to a lack of a clear understanding of educational technology, and a scarcity of strategies to fully integrate educational technology in education. Often, conventional program evaluation methods developed for single discipline evaluations are arbitrarily applied to evaluate educational technology because of a push for educational technology integration in teaching and learning from businesses especially computer and software industries. In this context, further discussion will address how to think about developing program evaluation methods for educational technology. Before proceeding further, it is necessary to define operationally the terms program evaluation and educational technology in the context of this paper..

Program Evaluation

Program evaluation is a complex, but systematic method of gathering and analyzing qualitative and quantitative

information (data) to determine the value (efficiency and effectiveness) of a group of related educational activities aimed at achieving the intended educational outcome (CDC Program Evaluation, 2018, Stufflebeam and Shinkfield, 2007, Weiss, 1997; Fitzpatrick, Sanders, and Worthen, 2004; Altschuld and Kumar, 2002). Often mistakenly used interchangeably with classroom testing, the term evaluation is defined and used in many different ways in education. In earlier days, quantitative methods were dominant in the evaluation scene. However, as Weiss (1993) said, compared to previous days, "evaluations are making effective use of a wider array of methods and techniques. Perhaps the most notable difference from earlier days is the more frequent use of qualitative methods of study. Evaluators today engage in intensive interviewing, observation, review of documents, and other such techniques. They often spend enough time on-site to observe changes in the environment, program, and participants and to develop insights about conditions associated with beneficial change. They have more to say about "how" of programs and the "why" of consequences" (p. 108). The earlier days Weiss was referring to was a period when the "effectiveness of social science in general, and evaluation in particular, for guiding the improvement of anti-poverty policies and programs" during the "war on poverty" in the sixties and seventies in the United States (p. 107). In this twenty-first century, what we as a society across the world encounter is somewhat similar in nature, not hunger, but an apathy for education.

Educational Technology

Educational technology refers to a family of technological (software, hardware and associated technologies) tools mostly based on computer technology devoted to promoting more engaging, interactive and individualized learning experiences. Laptops, desktops, multimedia, interactive media, the Internet, World Wide Web, whiteboards, iCloud, videoconferencing, cellphones, iPads, virtual/augmented reality, robotics, artificial intelligence, and software systems are examples of educational technology (International Society of Technology in Education, ISTE, 2021; Lazaro, 2020). The ISTE has created standards for students, educators and education leaders. As Handal and Herrington (2003) argued, how to use educational technology in teaching and learning should be one of the highest priorities in its implementation.

Following discussion will explore ways to think about program evaluation in helping stakeholders of education understand educational technology in order to make informed decisions to improve in teaching and learning.

Program Evaluation in Educational Technology

As a primer to exploring program evaluation in educational technology, an understanding of the ways in which educational environments (e.g., classrooms) implementing educational technology differ from traditional educational environments is necessary. The goal for using educational technology in classrooms is to emphasize student-centered

approaches to higher order thinking and problem solving skills with real-world connections (Tata Trusts, 2019). On the other hand, traditional classrooms tend to be textbook-centered and teacher-centered, where lower level (e.g., memory recall) skills are often the focus. Since there are considerable differences between educational technology classrooms and traditional classroom environments it is obvious that there is a need for developing program evaluation methods tailored to educational technology with respect to teaching and learning, and it is not an easy task. Because, if not carefully developed and implemented, a program evaluation plan purposed for evaluating educational technology programs might be skewed to evaluating the technology and not the educational processes of teaching and learning and thereby considerably deviating from evaluating the education program that is implementing educational technology in its entirety. It should be emphasized that educational technology and program evaluation are complex in their own terms; therefore program evaluation in educational technology is a much more complex and challenging task.

Insights from Classic Program Evaluations

Insights from classic program evaluation models generally suitable for single discipline evaluation might, in sum, help in realizing the challenges in developing evaluation models for complex educational technology environments. The Context, Input, Process, Product (CIPP) model (Stufflebeam, 1983) is suitable for evaluating program components such as the plan, implementation, and outcomes. Pre- and post-tests, survey instruments, and interviews are part of the evaluation methods. The CIPP model is simplified by Shavelson, McDonnell, and Oakes (1989) in their approach to evaluating the state of US science and mathematics education by looking at Input – student backgrounds and teacher quality, Process – the quality of the curriculum and teaching, and Output – achievements and attitudes. According to Odden (1990), some of the limitations of this model are the loosely defined input-process-output connection, absence of process variables, and a lack of socio-demographic indicators that are more valid and reliable. Therefore, while dealing with program evaluation in science education, Altschuld and Kumar (1995) noted that "mere input-output approaches may not be sufficient to determine the success of an educational reform. Rather, process variables and gaining an understanding of the interactions amongst variables are essential for assessing the nature and effectiveness of reforms" in education (p. 14). Also, "carefully evaluating development, studying process variables, evaluating outcomes along the way rather than just at the end of product [project] development, and analyzing supportive and contextual variables generates a comprehensive understanding of the overall effectiveness of science education programs and, to a degree, the interface between levels" (p. 13). This is the rationale for the contextual program evaluation model for science education developed by Altschuld and

Kumar (1995) and field-tested (Kumar and Altschuld, 1999).

The guiding principles of the contextual program evaluation model developed by Altschuld and Kumar (1995) based science education program evaluation model with adaptations to educational technology programs follow. Formative evaluation of the development of an educational technology product or program should be the main focus. The evaluation framework should emphasize the process of gaining knowledge and understanding in educational technology. The significance of the context in which educational technology programs and their support system exist should be recognized. The evaluation should take into consideration the interface between the micro and macro levels, and the subject disciplines that are addressed with educational technology, without which much of the program level data may not be interpretable. The model should also take into consideration the current societal press for accountability. Overall, the model emphasizes that the development of the program (and/or product) is placed in real-world supportive and contextual factors. The supportive factors are learning environment, teacher preparation, instructional materials, administrative support, fixed facilities, and community involvement (Exline and Tonelson, 1987). The contextual factors are characteristics of students, parents, the nature of the community, features of the program, specific school, school district, and society (Field and Hill, 1988).

It could be argued that since the context of educational technology itself is rich enough to complement any subject discipline it is aligned with in the teaching and learning process, the context stands to provide invaluable insights into education programs in terms of curriculum, instruction, teachers, students and testing useful for making informed evaluative decisions, and should be an integral part of program evaluation in educational technology (Altschuld and Kumar, 1995; Fitzpatrick, Sanders, and Worthen, 2011; Field and Hill, 1988; Kumar and Altschuld, 2003; Altschuld and Kumar, 2010). In program evaluation, the context refers to the culture, environment or climate in which the program is conceptualized, developed and implemented and a supportive context is essential to program or project success (Kumar and Altschuld, 2003). "If a context is not supportive of change, if policies are not there to foster and reinforce change, if resources in the form of time and training besides finances are not provided, if the environment does not afford the opportunity to try out ideas and to learn from failures, and if other aspects of a conducive, open atmosphere are not present, the probability of institutionalizing successful new programs will be extremely low" (Kumar and Altschuld, 2003, p. 605-606). (See Kumar and Altschuld (2003) and Altschuld and Kumar (1995) for details and discussions about the context based evaluation model.) This is the condition of many well intentioned educational technology programs.

Complexity of Educational Technology and the Complexity of Evaluating Educational Technology Programs

The complexity of educational technology creates a need for more comprehensive approaches to program evaluation methods. Ideally, when distinct disciplines such as science, language, social studies, mathematics, and arts are represented individually or in some combination using educational technology, the resultant teaching and learning process is complex. The role and nature of educational technology will change depending upon the degree (e.g., how, where) to which it overlaps and/or integrates with each individual discipline. Most approaches to program evaluation in educational technology ignore this basic difference in overlaps and integration and end up adapting evaluation methods that are developed for single discipline educational settings. Therefore it is necessary that program evaluation should be made comprehensive enough to include multiple methods and through their use should enable it to capture an in-depth picture of large-scale educational technology programs and projects in teaching and learning. From this perspective, it is worth reviewing how three different approaches to evaluating an interactive multimedia-based science teacher education project in sum provided a comprehensive view of the project, which is impossible to obtain otherwise. This example is used due to the availability of published research and reports on the project in addition to familiarity with the project.

Sample Comprehensive Evaluation

A review of three different approaches used in the evaluation of the project "Improving science education: A collaborative approach to the preparation of elementary school teachers," and the findings from the three different approaches may help to gain an understanding of a comprehensive approach to program evaluation. The reason for using this example is that this project has developed interactive multimedia technology-based cases of effective and ineffective elementary school science teaching strategies suitable for science methods courses taught at Vanderbilt University. As discussed earlier this project integrated educational technology with science and science teaching methods. Science educators from the college of education, science faculty from the college of arts and sciences, and teachers from grades 4-7 from the local school district have collaborated. The three evaluation methods used and their respective findings follow (Kumar and Altschuld, 2003).

1. Traditional evaluation conducted by project staff (Barron et al., 1999)

   Method - Onsite observations, tests, surveys and follow-up interviews.

   Findings – Significant gains in teacher competency (e.g., section of learning experiences and materials which stimulate student curiosity and scientific investigations). student behavior (e.g., student involvement in lesson) and other activities (e.g., hands-on discovery).

2. Traditional evaluation conducted by an external agency (U.S. Congress, Office of Technology Assessment, 1995)

   Method - Observation of science methods class, review of project publications and software and interviews of project investigators.

   Findings – Strong faculty development and research effort, theoretical foundation, incentives for faculty involvement, "expensive infrastructure."

3. Context evaluation conducted by external evaluators (Kumar and Altschuld, 1999)

   Methods - Onsite and in-school observations, document reviews and semi- structured interviews of faculty, staff and administrators on university campus, school administrator interviews, university teacher education students and graduates' interviews.

   Findings - Strong administrative support, technical support, conducive organizational environment, a critical mass of interest by project participants in the project, mutual permeation in science and education departments, methods students perception of project benefits to understanding pedagogy on campus and in teaching situations in schools.

   It is obvious that the findings of the three distinct evaluations summarized above have generated a comprehensive picture of the project with a comprehensive evaluative outcome that is not possible to obtain by a single evaluation alone. Also, this evaluation was for evaluating an undergraduate elementary teacher preparation program involving interactive multimedia technology in science education methods, and should not be applied without needed adaptations to evaluating educational technology programs that involve other subject disciplines in other grade levels.

Final Thoughts

In terms of program evaluation in educational technology, an argument could be made that models for evaluating educational technology in a single discipline like science have limited fit to the spectrum of disciplines in education programs. Obviously when it comes to evaluating educational technology with reference to a wide variety of subject disciplines, there is no one universally accepted model of program evaluation. As factors embedded in the context of the educational setting prescribe the adaptation and implementation of educational innovations, program evaluation of *"educational innovations should involve not only whether change occurred but also issues such as why change did or did not occur as a result of a program and its meaning to the participants. These issues can be addressed by expanding evaluation plans to include the context in which an innovation is embedded" (Altschuld, Kumar, Smith and Goodway, 1999, p. 66).*

Therefore, a compelling need for developing comprehensive program evaluation models quite suitable for context-specific educational technology applications will continue to exist as education reform becomes more innovative with the development of newer technologies. Rethinking existing program evaluation models for educational technology in teaching and learning in science, languages, social studies, mathematics, and computer science, and conceptualizing and developing models for individual educational technology situations has merit, and program evaluation for educational technology remains a fertile field for research and development.

(Acknowledgments: Editorial assistance provided by Jessica McNair, Florida Atlantic University is thankfully acknowledged.)

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Research Article

Whatsapp Enabled English Language Teaching- Improving Speaking Skill through Language Tasks

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Abstract

Technology is a boon in learning a language especially English as a second language. Learning English is a difficult task for most second language learners (SLL). Introducing language tasks in the classroom help learners to develop competitive skill, collaborative learning, coordination, interactive skill, exploration and goal setting. In today's world technology is synonymous with autonomous, collaborative and flexible learning. Technology-based tasks bring color on multiple platforms to narrate, listen and understand the language usage in various playful ways as well as generate ideas and discussion for reflective thinking and writing. This paper explores the use of language tasks through whatsapp that are helpful for learners to develop their speaking skill and shares a few websites and applications for teachers of English to use for teaching purposes.

Keywords: tasks, second language learning, technology, learner-centric, flexibility

Introduction

The dissemination of technology's significance is unstoppable. Technology integrated education has encouraged users to think differently and innovatively. Technology-based language tasks are used by second language teachers in the classroom which echoes the idea of blended learning. Technology-based learning is synonymous with autonomous, collaborative and flexible learning. The paradigm shift in learning is infusing user-friendly technology based tasks. Educators are on the verge of understanding that what students study or how they study or where they study might be overboard or obsolete within a few years. In the fast-paced world, teachers should equip them with e-knowledge, as learners expect new knowledge from them.

Learning English language is a skill and developing the skill of second language learners is challenging as today's learners are techno-enabled users. Approximately, higher education learners in India use mobile phones more than three hours every day for leisure purposes. The addiction to mobile phones should be cashed on by converting their interest into a learning tool for learning English language. This paper has explored the possibility of using whatsapp on mobile phones to teach semi-rural second language learners of a college in Tamil Nadu, India.

Literature Review

There is sufficient literature available pertaining to learning English as a second language and for this paper it is

necessary to understand the literature of learning English through tasks.

David Crystal (David Crystal, 2004, viii) in his book Language and the Internet mentions:

> *An emphasis, which formerly was on technology, has shifted to be on people and purposes. And as the Internet comes increasingly to be viewed from a social perspective, so the role of language becomes central. Indeed, notwithstanding the remarkable technological achievements and the visual panache of screen presentation, what is immediately obvious when engaging in any of the Internet's functions is its linguistic character. If the Internet is a revolution, therefore, it is likely to be a linguistic revolution.*

In today's world, technology is knowledge and it is revolution. Using technology in educational arenas is one of its kinds as every teacher and every student nurtures its presence in the teaching and learning process. Technology has an attractive quotient even techno-cynic has a good say at one point of time. It is always a cognitive booster to teachers and learners due to its multimodal usages in the classroom. Brinton (2001, p. 461) supposed that media tools serve as an important facilitator in the language teaching development because "media materials can lend authenticity to the classroom situation, reinforcing for students the direct relation between the language classroom and the outside world". There are voluminous studies conducted to prove the good use of technology in teaching especially in language teaching and learning processes. Bax (2003, p. 27) expresses:

> *Computer Aided Language Learning (CALL) finally becomes invisible, serving the needs of learners and integrated into every teacher's everyday practice… It will require change in attitudes, in approach and practice amongst teachers and learners; it will require fuller integration into administrative procedures and syllabuses.*

Campbell (2003), Bax (2003), Godwin (2003), Johnson (2004) and Eastman (2005) explained the significance of technological advancement in the learning sector and the collaborative learning atmosphere prevailing among English Second Language Learners (ESLLs). Jackson et.al. (2006) say "students who used the internet more, got higher scores and grades". Chandrasegaran and Kong (2006) justify that argument forums on the internet would improve a learner's challenging skills providentially. Ahmad (2012) statistically proved that English as a second language, learner's reaction towards using media based learning had improved absolutely. Use of technology is extending its tentacles and enables new contexts for learning. In the world of uncertainty technology is very supportive in learning languages. Many online educational games are in the anvil for students to benefit as it creates mobile learning environments (Wong & Looi, 2011). Technology has empowered rural publics, information and rights cultures and democracy (Jeffrey & Doron, 2013). Technology is a platform to encourage education, technology- enabled learning and technology mediated pedagogies

(Yadav, 2015 p.69)

From a traditional classroom to a virtual classroom or from classroom to smart classroom, games based learning is appreciable for the development of an educational landscape (Selwyn, 2003, p. 2). Task assisted learning gives equal specification to both teacher and learner. Such collaborative learning activities uplift the learning qualities of learners according to the cultural and linguistic background (Lama, 2006). This paper focuses on the importance of using tasks in the learning process of English as a second language. The e-game based learning intends to develop both higher order skills and lower order skills (Scrivener, 2007) and teaching practices require collaborative efforts (Holmes, Preston, Shaw, & Buchanan, 2013). Technology provides a lot of opportunities for the personal and professional development of teachers and that was limited before the advent of web2.0 (Carpenter, 2015). Using techno-tools in the classroom makes teachers upgrade their techno-knowledge and they should be convinced that new technology is helpful for their professional development (Holmes et al., 2013). The potential of social media in higher education has been widely recognized (Alberth, Mursalim, Siam, Suardika, & Ino, 2018). Though studies have proved that technology is always considered to be a positive quotient, the ground value point is that users are highly benefited as most of the language tasks and electronic tasks (e-tasks) are motivating and interesting.

Research questions

Communication is very important for learners as they explore to deepen their knowledge and develop their insightful thoughts for their future prospects. Teachers play a predominant role in making them communicate in the classroom but, their academic compulsion to complete their syllabus handicaps them to spend 'extra' time to develop the communicative skills of students. E- tasks help students to develop LSRW skills. Technology has mesmerized adult learners as they are connected on social media wherever and forever. Teachers should convert students' interest as an investment to make them learn English as a language rather than a subject.

Whatsapp is helpful to students in diverse ways. Students are motivated to use any mode of presentation to be shown it to the group or the teacher. The time indicator in the message or video shows the participants' agility. Teachers can create or design interesting topics or relevant discussing questions to make students involve and participate in the online or e-task based learning process. Based on this understanding, the researcher wanted to explore the following research question:

Do participants' level of speaking skills increase through tasks using Whatsapp?

Developing English language learning speaking skill through Whatsapp based tasks

Tasks make learners understand their social responsibility and to monitor their socio-psychological and emotional skills. Tasks evolve by themselves as they make students have good rapport with other students as well as with the

teachers. Tasks help learners to develop life skills along with their communicative skills. For ages, teachers create their own tasks and in this techno world they involve technology to entertain, inspire, learn and teach.

Tasks make students to:

- Get Feedback from teachers and co-learners
- Encourage Collaborative learning
- Have secure environmental learning
- Appreciate autonomous learning
- Reflect on one's grammatical mistakes as well as on co-participants as corrective measures
- Develop LSRW skills and help to explore and observe the learning processes

There is no hard and fast rule to conduct or organize games in the classroom.

How to use whatsapp for language tasks Whatsapp can be downloaded on a smartphone from google store. The contacts on the phone with whatsapp application could get connected and viewed. More than 250 participants can be added to form a whatsapp group. This application is used to send messages, video, audio, photos and it has a voice converter and video caller. This learning tool is all in one. While whatsapping, users can share their files in the group and receive the feedback from the co-participants and the teacher quickly. Whatsapp video calls can be done with four participants at a time. More than 100 participants can get connected for voice calls at a time. Voice to word conversion is an easy task for participants who struggle in text messages. With the help of whatsapp, relevant websites or URL links can be shared to be viewed on a public forum.

Websites and Applications for English language learning

As the researcher mentioned above there are many applications that create ripples by giving live streaming and group meetings, etc. YouTube is a very creative application in which students can create their own video and upload it on their YouTube channel and share it in the group to be viewed by their friends and classmates. Even the same can be done by teachers to make students understand the concepts in learning English as a subject as well as a skill. There are few websites and applications like TESOL Resource Center, British Council's Learn English, DoodleSpell, FluentU, Enguru, Mondly, YouTube Kids etc., that can be used and examined by teachers for their teaching purposes.

Method

The study was conducted in an Arts and Science College in Chengalput district, Tamil Nadu. Total 60 respondents were taken for the study which lasted for four months. All respondents had smartphones with Whatsapp application. The researcher created a whatsapp group named, FUN WITH ENGLISH.

The study was divided into three phases:

1. The first phase was a pre-test to understand the participants' existing knowledge in English language
2. The second phase was the distribution of tasks
3. The third phase was to examine the level of improvement in English learning by conducting a post-test and to validate the research

question

The Respondents

The respondents for this study were second year undergraduate students from the departments of Economics and History (30 students from each department) from an Arts and Science Women's College, Tamil Nadu. The respondents were selected based on their interest in learning the English language. The demographic data of 60 respondents has been presented in Table 2.

Table 2: Demographic data of respondents

Variable	Variable	F	Variable
Gender	Female	60	100
Age	18-20	60	100
Educational level	Under graduate II year	60	100
Duration of learning English as a subject	10-12 years	60	100
Engaged in Whatsapp for learning purpose	Yes No	0 60	0 100
Techno-knowledge in using Whatsapp	Medium High	60 0	100 0
Frequency of using mobile phone	Rarely Sometimes often	0 5 55	0 5 95

Instruments

Pre-test framework, performance of tasks and post–test framework were used to evaluate the research question and for the statistical calculations, SPSS software Version 17 was used.

The pre-test framework

Pre-test was conducted to understand the existing knowledge of the participants in English as a language. Two tests were conducted – paper based test and oral test. Paper based test was conducted to evaluate the grammatical aspects, use of vocabulary, and sentence formation of the participants. The topic 'self-introduction' was sent to the Whatsapp group and instructed the participants to write about themselves. Time was set and within the stipulated time the participants handed over the paper to the researcher.

Oral test was conducted to test the speaking skill of the participants. This test was conducted to evaluate the participants' attitude, confidence, choice of words and grammatical usage. For the oral test, 15 pictures (all the pictures were numbered from 1 to 15) were sent to the Whatsapp group for the participants to narrate and the participants were asked to select the picture by its number. Four participants

were asked to select one picture for narration making it 60 (15 pictures x 4) participants. The researcher selected simple 15 stories to avoid repetition while the participants performed their story. It is an individual task and all the participants narrated the picture in their own way and all the narration was recorded on a smartphone by the researcher. Pre-test was helpful for the researcher to understand the capacity and ability of the respondents and accordingly e-tasks were designed for the participants as given in table-3 and figure-1.

Table-3: e-tasks designed for the participants

Objective	Tested items	Task
Paper based test: To test the writing skill of the participants in English language	Grammatical aspects like Verb, Tense Sentence formation Vocabulary	Self-Introduction
Oral test: To test the speaking skill of the participants	Choice of words, grammatical usage, attitude	Story narration

Sample of story narration included: 1. Boy who cried 'Wolf' 2. The thirsty crow 3. The greedy milk woman 4. The Ant and the Dove

Analysis of Pre-task framework

The participants performed e-tasks on whatsapp individually as well as in group. The purpose of using e-tasks was to give exposure to the participants in using English in various real-life situations. The attitude and motivational factor could be improved because their performance could be seen by them many times and it would lead them to improve themselves. Adding to this, their co-participants and well-wishers could analyze the progress of their positive attitude in learning English. The recorded videos are the testimonials of the participants. The assessment was done and it was categorized as weak, satisfactory, good and excellent.

Table-3: Assessment of the performance

Assessment item	No. of respondents	Percentage	Level
Choice of vocabulary	60	20	weak
Confidence and attitude	60	30	weak
Improvement in speaking	60	30	weak

The researcher felt that the participants' level of using English while performing the tasks was weak but elicited their interest in learning English as a language. A Whatsapp application was used to motivate the participants to

learn English so as to improve their speaking skill.

Distribution of Tasks

The respondents were divided into small groups of three each and all the tasks were performed on Whatsapp video call. All the participants of each group had an opportunity to perform the task individually as well as in a collaborative way. Participants' creativity and speaking skill were developed by performing the given tasks. The researcher used warm-up tasks and later, introduced tasks to the participants.

Warm-up tasks were performed by all the participants as team work. These tasks helped them to accustom with the whatsapp-centric learning and presenting within a stipulated time. Two warm-up tasks were performed by the participants and the researcher only observed them and no score was given for the performance. The given tasks were:

a. Click and explain in three sentences
b. My friend is special because.....– five sentences

Table-4: Options for click and explain in three sentences

Aim	To break the reluctance
Preparation time	2-5 minutes
Resource	Smartphone camera

(some of the participants were reluctant to perform but managed to do the tasks)

This warm up task made participants talk for two minutes about a picture that they clicked with their smartphone. Participants were divided into a group of three each. Each participant was asked to click a photo and asked to explain in three sentences. A Whatsapp video group call was made and the researcher randomly added three participants for the performance. On the group video call three participants along with the researcher were made to perform the task and the response was average.

Table-5: My friend is special because

Aim	To break the reluctance
Preparation time	2-5 minutes
Resource	Smartphone with internet

Another warm up task (table-5) made participants feel better and they could talk on a topic that was very close to their heart. This task too was performed as a team. The researcher connected a Whatsapp video call randomly with three participants and asked them to perform the task. The response was satisfactory.

After the warm-up session, six tasks were introduced to the participants for assessment. All the participants got connected on Whatsapp and these six tasks were performed with the help

of group video calls. The respondents were saved as number 1, 2 3.... and not by their names. The researcher had the list of students with the number so that she could make note of the graph of their performance. The six tasks were:

- E-play with emojis
- Meaning the memes
- Questions please
- Act an advertisement
- Narrate a story –spin the yarn
- Movie review
- E-play with emojis

Emojis are very interesting elements on Whatsapp and most of the users use emojis to express their feelings. It is a psychological assistance as many who never want to express themselves in words always use emojis. Emojis exist in living and nonliving forms like facial expression, weather, fruits, vegetables, figurines, objects, animals.

Table-5: My friend is special because

Aim	To enhance speaking skill To encourage critical thinking
Preparation time	Flexible
Resource	Smartphone with internet

Procedure

- Researchers instructed the participants to copy more than three emojis of their choice to create a story.
- Asked the participants to draw the emojis on a paper and describe the select emojis after due preparation. The researcher instructed them to show the paper while narrating their story on Whatsapp video call.
- Later connected three participants on video call Whatsapp randomly and asked them to narrate the story using emojis.

The interest to speak in English was improved among the participants. The assessment (table-6) was done and it was categorized as weak, satisfactory, good and excellent. The table below shows the assessment components.

Table-6: Assessment of the performance

Assessment items	No. of respondents	Percentage	Level
Choice of vocabulary	60	30	Weak
Confidence and attitude	60	40	Satisfactory
Improvement in speaking	60	40	Satisfactory
Connecting to real life sit-uations	60	60	Good

Meaning the memes

A meme is used or spread on social media with macro images fusing with concept and catchphrase. Most of the memes are created with misspellings and usage of incorrect grammatical aspects.

Table-7: Aspects used in memes exercise

Aim	To enhance speaking skill
Preparation time	Flexible
Resource	Smartphone with internet

Procedure

- Researcher numbered all 20 memes that was collected from Whatsapp messages
- 20 memes with numbers were shared on the Whatsapp group and instructed participants to select one meme of their choice
- Time was given for preparation and whatsapp voice call was connected with random three participants
- Each participant presented her choice of memes by referring to its number

The assessment can be summarised as given in table-8.

Table-6: Assessment of the performance

Assessment items	No. of respondents	Percentage	Level
Choice of vocabulary	60	40	Satisfactory
Confidence and attitude	60	45	satisfactory
Improvement in speak-ing	60	40	Satisfactory
Connecting to real life situations	60	40	Satisfactory

Questions please

In this task the participants were asked to frame questions for no answers. The participants were advised to frame wh-type questions and yes or no type questions (the summarization of the questions can be seen as in table-9). The same teams were formed but, all the participants performed individually and watched their teammates perform on group video call.

Table-9: The summarization for Question Please task

Aim	To enhance speaking skill
Preparation time	Flexible
Resource	Smartphone

Procedure

- The participants were divided into a group of three each
- Instructed each participant to frame 10 questions 5 wh type question and 5 yes or no type questions
- Though performed individually other team members were watching their teammate perform
- Corrective measures were done at the end of each video group call

The assessment of performance can be summarised as given in table-10.

Table-10: Assessment of the performance

Assessment items	No. of respondents	Percentage	Level
Choice of vocabulary	60	50	Good
Confidence and attitude	60	50	Good
Improvement in speaking	60	50	Good
Connecting to real life situations	60	50	Good

Act an advertisement

Using advertisements in teaching English is an interesting way to make learners engage in learning. The respondents were divided into a group of three each. The Names of the products were posted in the group and instructed each team to select a product to create an advertisement and act on whatsapp video call. The idea behind it can be summarised as given in table-11.

Table-11: The idea behind Act an advertisement activity

Aim	To enhance speaking skill To enhance creativity
Preparation time	Flexible
Resource	Smartphone

Procedure

- The class was divided into small group of three
- 20 names of the products-1. Television, 2.mobile phone, 3.cement, 4.noodles, 5.car, 6.bike, 7.computer, 8.furniture, 9.chocolate, 10.hair oil, 11.tiles, 12.soft drinks 13.health drinks 14. Face cream, 15.detergent soap, 16. Washing powder, 17. Dhotis 18. Shirt 19. Saree 20.toys-shared on the whatsapp group
- Each team had to select a product indicating the number and time was set for preparation
- Researcher made a Whatsapp group video call and connected all the three members of a team and the performance duration was given as 5 minutes
- Each member performed her part with the available limited resources

The assessment of performance can be summarised as in table-12.

Table-12: Assessment of the performance

Assessment items	No. of respondents	Percentage	Level
Choice of vocabulary	60	50	Good
Confidence and attitude	60	50	Good
Improvement in speaking	60	50	Good
Connecting to real life situations	60	50	Good

Narrate a story – spin the yarn

Story narration develops one's creativity as well as communicative skill. This task helped the participants to unleash their creativity while narrating their story in free style. The idea behind this activity can be summarised as given in table-13.

Table-13: Idea behind Narrate a story – spin the yarn activity

Aim	To enhance speaking skill To enhance creativity
Preparation time	Flexible
Resource	Smartphone

Procedure

- The participants were divided into small group of three (random)
- Each participant was asked to click two pictures with clarity and post it to the group
- The researcher selected thirty pictures and numbered them
- Each participant was asked to narrate a story using the selected picture
- Though it was an individual performance, each participant presented on Whatsapp group voice call along with other two teammates

Table-12: Assessment of the performance

Assessment items	No. of respondents	Percentage	Level
Choice of vocabulary	60	50	Good
Confidence and attitude	60	70	Excellent
Improvement in speaking	60	60	Excellent
Connecting to real life situations	60	50	Good

Movie review

Today's youth watch movies with an integrated interest to analyze and review it beyond merely watching. Binge watching is an entertaining quotient for many. Reviewing a movie is a challenging task but this made participants comfortable to share their views about their favorite movie. The plan behind this activity can be summarised as given in table-13.

Table-15: The plan behind Movie review activity

Aim	To enhance speaking skill
Preparation time	Flexible
Resource	A movie

Procedure

- The participants were divided into small group of three and were made to select their favorite movie
- Each participant was instructed to review her favorite movie and

was advised to use single tense – present or past or future tense- to review the movie

The assessment results for this activity can be seen in table-16.

Table-16: Assessment of the performance

Assessment items	No. of respondents	Percentage	Level
Choice of vocabulary	60	50	Good
Confidence and attitude	60	70	Excellent
Improvement in speaking	60	65	Excellent
Connecting to real life situations	60	50	Good

Data Analysis of tasks

All the respondents learnt English as a subject till class X and their medium of instruction was English in class XI, XII and at the college level. As their exposure to English language was limited, the researcher used them for the study to understand how Whatsapp applications could be used to enhance their speaking skill. Whatsapp application is a very common tool used by college-students in Tamil Nadu. Converting the popular platform to teach English language as well as boosting the confidence of semi-rural students in learning English as a skill language was a worthy attempt.

The researcher analyzed all the performances of 60 participants by recording the presentations on her mobile cloud and maintained a reflective diary to understand the progress of participants in learning English language.

The study was conducted to understand the importance of e-tasks using Whatsapp mobile application. The study also helped the researcher to have an insight into the participants' learning behaviour i.e. they could perform well in pairs. Curiosity is the key motto of learning English through techno-enabled tasks. All the respondents were zealous while performing the tasks. Initially, the respondents were showing the high frequency level of memorization of vocabulary. But, later regular practice of using e-games with meta cognitive factors encouraged them to show good interest in English language learning process. All the respondents were in unison to acknowledge that tasks were helpful for them to learn English as a language without any pressure or stress. The Whatsapp group acted as the platform for all the respondents to react and learn from their co-participants. They were made to share their doubts, accept their mistakes, interact, think and create avenues to learn while performing tasks. The researcher observed that the respondents were:

- Learning as well as playing not bothering about others as they perform in a small group
- Interacting with Whatsapp facilitated collaborative learning without inhibitions
- Attempting hands-on for better communication
- Understanding their level of knowledge in performing tasks and tried increasing their level of speaking skill

The post-test framework

In this post-test, the researcher examined the development of the participants' speaking skill in English. As in the pre-test, the researcher used the same 15 stories and the participants narrated the same story as in the pre-test. For the evaluation process, the researcher used the same storyboard. This test was conducted in person similar to that of the pre-test. All the 15 stories were simple and known stories to the participants and the stories boosted their morale too.

The points examined in the post-test are given in table-17.

Table-17: Points examined in the post-test

Objective	Tested items	Task
Oral test: To test the speaking skill To examine the presentation skill	Choice of words, grammatical usage, attitude	Story narration

The story narration had these stories: The Hare and the Tortoise, 2. The Fox and the Stork 3. The Fox and the Grapes

Analysis of the post-test

The researcher felt that the participants' level of using English got improved and their interest in learning English also got enhanced satisfactorily. The assessment was categorized as: weak, satisfactory, good and excellent. Table-18 shows the assessment components

Table-18: Assessment of the performance

Assessment items	No. of respondents	Percentage	Level
Choice of vocabulary	60	70	Good
Confidence and attitude	60	80	Excellent
Improvement in speaking	60	80	Excellent

Result analysis of pre-test and post-test

In this study, tasks were used to enhance the speaking skill of participants. To evaluate the existing knowledge a pre-test was conducted using story narration. 60 participants were given 6+2 tasks to improve their speaking skills. After this phase, a post-test was conducted using the same storyboard. The post-test task was used to test the speaking skill of the participants and the scores were analyzed for correlation to check whether the participants' scores were increased in the post-test result. The result has been given in table-19, 20, 21and 22.

Table-19: Results of tests

Correlations			
		Pre-test	Post-test
Pretest	Pearson Correlation	1	.354**
	Sig. (2-tailed)		.000
	N	60	60
Posttest	Pearson Correlation	.354**	1
	Sig. (2-tailed)	.000	
	N	60	60
**. Correlation is significant at the 0.01 level (2-tailed).			

Table-20: Results of tests

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	2.0100	60	.81023	.08102
	Posttest	4.4600	60	1.21788	.12179

Table-21: Results of tests

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Pre-test & Post-test	60	.354	.000

Table-22: Results of tests

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest - Posttest	-2.450	1.20080	.12008	-2.68826	-2.21174	-20.403	99	.000

The correlation coefficient strength shows that the pre-test and post-test output are correlated (SPSS software Version 17). The result of the output of the participants is high as it shows that the respondents speaking skill got developed using tasks on Whatsapp application.

Discussion

Language is one of the sources of expression as most of the human beings are e-communicators and the

level of proficiency in engaging effective verbal performance by the speaker is notable and appreciable. Good exposure time to the language improves learners' communicative competence. In a densely populated classroom, evaluating the language skills of each student is not practically possible. Technology integrated tasks are the source of opportunity with positive reflection. These tasks help learners of all levels to update and improve their knowledge for their professional and social inclusive situations.

Conclusion

This paper has explored how Whatsapp based tasks help learners to integrate classroom and virtual learning. In this techno advanced world, learners themselves are good at designing their own e-tasks or as part of a small team of students with similar interest. Teachers should encourage students to familiarize themselves with both the strength and weakness of tasks (e-tasks) and ensure that technology is important in making a good learning atmosphere and improve intervention outcomes. Despite this assurance, students should know that in the absence of technology, it is possible to work collaboratively and innovatively to improve their learning.

Tasks develop competition and collaboration. Competition may be a motivating factor for some of the learners and for some, competition may be a stressful and de-motivational factor. Sometimes competition leads to learners' intention to win the game rather than learning from it. Therefore, collaboration can be built as a prime factor in task based learning. Language tasks enhance subject knowledge and problem solving skills of learners. Teachers who introduce tasks to students should consider a few important points.

Teacher should:

- Consider tasks that support language learning
- Check the level of graphical quality relevant to learners
- Understand the support system provided for students to learn using tasks
- Understand the mechanism of tasks and check the content
- Check the collaboration opportunities for learners that come in the way of developing language skills

There are many task based websites that are in the market purely for commercial purposes. Facilitators should support learners on selecting appropriate tasks for learning in higher education. Teachers can spend 20-30 minutes looking for good websites which offer language games or try to search on websites so that everyday learning becomes interesting to learners as well as for the teachers.

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Research Article

Students' Intention (as a Consumer) to Study through Distance Education Mode Post COVID-19 Crises

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Abstract

The aim of this paper is to assess the intention of students (as a consumer) to study through distance education mode after arousal of a pandemic situation (due to spread of coronavirus all over the world). The research was conducted in India, where responses were sought from current and prospective students. The basic idea was to study the impact of covid-19 crises on the mindset of students, as many of them would be hesitant in travelling miles for a regular college. While searching for the best college/education institution, the behavior of students seems to be similar to the behavior of a consumer. Therefore, students' intention was studied from the perspective of consumer behavior discipline. There were a total 431 students whose responses were included in this study. The smart PLS version 2.0 software has been used for applying mathematical and statistical formulas. The model was constructed from the literature review that consisted of four independent factors (perception, attitude, motivation and personality) and one dependent factor (student/consumer intention). The results showed that perception, attitude and motivation are the main driving force behind a student's intention to take admission in a distance education institution.

Keywords: Student's Intention, Distance Education, COVID-19, Consumer Behaviour

Introduction

COVID-19 is a real villain of our lives. It needs no introduction as it has devastated the lives of more than one billion people around the world. In this whole scenario, humankind is not the only sufferer instead thousands of animals also lost their lives. One of the segments that have been affected is "Students" such that it has created a mental pressure on them. Initially, they did not realize the effects of the pandemic but gradually the consequences shook them.

Nothing can replace teaching–learning process between a teacher and a student. Whether it is online teaching or distance teaching, the guidance of a teacher is always required. The business of tutors and online coaching has flourished after covid-19 crises. Many educational apps were introduced for providing education to students during these crises (Li & Lalani, 2020). The most

affected students were those who got stuck in the middle of new admission or a new session because their new syllabus could not be started due to lockdown in the whole country. There is a difference between online teaching and distance education where online teaching could be a means or a method to complete the syllabus of distance education courses.

Many universities have proclaimed their excellence, but it is the student who can actually analyze and decide what is best for him/her. These students can also be considered as consumers of education as they go to the market, search for various colleges and then decide about their admission (Schiffman, Kanuk, Ramesh, & Wisenblit, 2010). While assessing various colleges, the admission fees and associated costs is one of the factors that influence the final decision of students or consumers (Fidalgo, Thormann, Kulyk, & Lencastre, 2020). Since a student alone is not capable of making accurate decisions, he/she seeks help from their family members and friends.

The scenario has changed, as earlier online teaching was not possible for all the students due to paucity of resources. The students were supposed to collect books/notes and attend weekly classes held at the designated center. But, the technology upgradation has been a boon for both teachers and students (Sheridan & Kelly, 2010) that has led to improvement in communication between teacher and student (Li & Lalani, 2020). A Covid-19 crisis has made academicians think about other modes of teaching, as another pandemic situation may arise anytime without a warning (Li & Lalani, 2020).

Need for the study

child is different therefore their desires and preferences are also different. They make choices that are affected by the choices of many people at their home or neighbourhood. But, there is a need to identify the student centered factors that are responsible for a student's intention to study through distance mode. Apart from basic factors like income, social status and social factors there are many psychological and personal factors that have deep impact over a student's or consumer's preference. The results of this study would help in assessing the student's preferences post COVID-19 crises and would help education institutions to devise their programs to attract students for distance education courses. Usually, students prefer to study from a regular college/university but it is imperative to study the changes in preferences (if any) of students in relation to distance education after COVID-19 crises. Since the crises have mentally affected many people all over the world, it must have impacted the preferences and perception of students towards distance education programs.

Objectives

The objectives of this study are not elaborative, instead are focused on the major area of research which is as follows:-

1. To identify the factors responsible for students' (as consumers) intention to study through distance education mode.
2. To assess the relationship between

"various factors affecting students' (consumers') intention to study through distance education mode" and "actual intention".

Review of literature

Distance learning is a process of acquiring knowledge when a learner and a trainer cannot interact face-to-face, instead they can communicate with the help of various online technologies (Bijeesh, 2013). There is historical importance of such a learning mechanism because it helps even those who cannot travel miles every time (Bozkurt, 2019). The role of distance learning has widened as one can study from lecturers of various countries; assignments and doubts can be cleared through innovative system softwares (Aharony & Ilan, 2016). The distance learning modes are considered less expensive than regular courses due to infrastructural and other cost savings (HMC Architects, 2020). These costs are ultimately borne by students in the form of admission fees, therefore distance courses seem to be more economical.

The concepts of psychology are relevant in studying consumer behavior, which are also relevant for understanding students' behavior. Education has now become a business market where education and knowledge is being sold and students are the consumers/buyers of that knowledge. Analyzing from consumer behavior discipline, the four factors are most important to study one's mind. These factors are Perception, attitude, motivation and personality (Schiffman, Kanuk, Ramesh, & Wisenblit, 2010). The decision of learning through distance or regular mode involves mental exercise and cognitive thinking (Churchill & Surprenant, 1982). Thus, these four factors play an important role in the determination of the same (Schiffman, Kanuk, Ramesh, & Wisenblit, 2010). The explanations of these factors are as follows:-

Perception displays the thought process of an individual. Throughout a time, an individual develops certain assumptions and on the basis of that he/she starts interpreting and perceiving the stimulus (Schiffman, Kanuk, Ramesh, & Wisenblit, 2010).

Attitude displays a direction i.e. whether a person is positive towards something or is negative towards something (Schiffman, Kanuk, Ramesh, & Wisenblit, 2010). It has been seen in past studies that a positive attitude towards an object or person, may influence decisions of an individual.

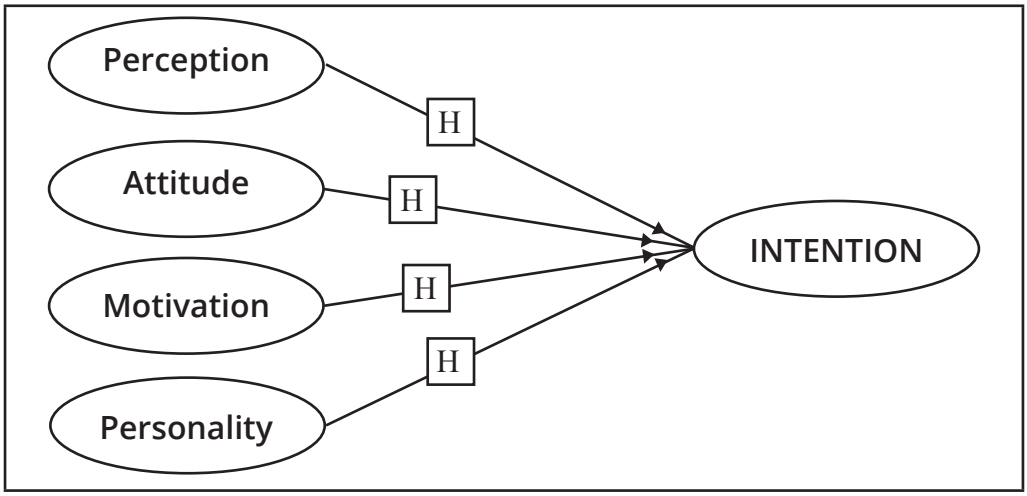
The motivation may be classified into monetary and non-monetary heads (Schiffman, Kanuk, Ramesh, & Wisenblit, 2010). Some individuals are motivated by monetary benefits and some are motivated by non-monetary benefits (Maslow, 1943). Higher the motivation, higher would be the intention to take an action or not to take an action (Ajzen, 1985).

Different individuals have different identities and personalities. Personality traits determine the wholesome personality and character of an individual. A risk taker, brave and adventurous individual does not seek opinions of others to make his/her final decision (Schiffman, Kanuk, Ramesh, & Wisenblit, 2010).

Thus, a model (figure-1) has been constructed to understand students' intention to study through distance

education mode.

Figure-1: Model of students' intention to study through distance education mode



Intention is a desire to do something which has an impact over the final decision. (Ajzen, 1985). A strong intention may lead to an action, but it is not necessary as other factors may intervene to affect one's decision (Hocutt, Chakraborty, & Mowen, 1997).

Hypothesis

H_{01}- There is no significant relationship between students' perception and students' intention to study through distance mode, post COVID-19 crises.

H_{02}- There is no significant relationship between students' attitude and students' intention to study through distance mode, post COVID-19 crises.

H_{03}- There is no significant relationship between students' motivation and students' intention to study through distance mode, post COVID-19 crises.

H_{04}- There is no significant relationship between students' personality and students' intention to study through distance mode, post COVID-19 crises.

Research Methodology

In this study after the construction of the model, factors were measured with the help of scale items that were developed through previous literature findings. The primary data was collected with the help of questionnaire whose details are as follows:

Questionnaire: In totality, 14 statements were included in the survey and these statements were measured on 7-point likert scale (7– Strongly disagree, 6– Disagree, 5– Somewhat disagree, 4 – Neither agree nor disagree, 3 – Somewhat agree, 2 – Agree, 1– Strongly agree).

Sample Size: The sample includes respondents from all over India. However, a convenience sampling method was followed to accumulate the responses. Around 435 responses were received but only 431 were finalized for final study.

Statistical tools applied: Confirmatory factor analysis was done where all the statistical calculations were made using SmartPLS 2.0 version software. The reflective model and structural model assessment was initiated to test the relationships between independent factors and dependent factors. With the help of frequency, percentages, ratios and t-statistics all the data were analyzed intensely.

Table-1 shows scale items for each of the constructs which were included in the research model. The construct "perception" had four items in its scale, "attitude" construct had four items in its scale, "motivation" had two items, "personality" had two items and "intention" had two items in its scale.

Table-1: Scale items for measuring each Construct

Constructs	No.	Statement
Perception (Fidalgo, Thormann, Kulyk, & Lencastre, 2020)	P1	I think that distance learning modes would be in trend after covid-19 crises.
	P2	I think distance learning modes are gaining popularity.
	P3	I think distance education courses are necessary in our country.
	P4	I think there is no harm in completing a degree from a distance education college.
Attitude (Celika & Uzunboylu, 2015)	A1	I have a positive attitude towards distance education courses.
	A2	I feel that more distance education courses would be required in our education system post covid-19 crises.
	A3	Distance education has played a vital role in the education sector.
	A4	In critical situations, distance learning is the best option.
Motivation (Fidalgo, Thormann, Kulyk, & Lencastre, 2020)	M1	Distance learning helps in effectively managing time.
	M2	Distance learning helps in saving costs.
Personality (Schiffman, Kanuk, Ramesh, & Wisenblit, 2010)	PS1	I think rationally before making any decision.
	PS2	I evaluate the pros and cons of every situation.

Intention (Ajzen, 1985)	I1	I will definitely consider distance learning courses for my studies.
	I2	I will recommend others also for distance learning courses.

Source: (Fidalgo, Thormann, Kulyk, & Lencastre, 2020); (Celika & Uzunboylu, 2015); (Schiffman, Kanuk, Ramesh, & Wisenblit, 2010); (Ajzen, 1985)

The purpose of scale items of "perception" was to understand the perception of students cum consumers regarding distance education mode post COVID-19 crises. The aim was to understand current views of students in relation to study via distance mode. The purpose of "attitude" scale items was to identify the attitude of students towards distance mode learning. A positive attitude may lead to higher intention to study via distance mode. The "motivation" scale items were meant to measure motive/benefit that students might seek while enrolling for a distance course. The "personality" construct measures the trait of a person/ student such that an open minded and decisive person might opt for distance learning mode, as his/her decisions are not affected by the views of others. The "intention" construct measures the intention/desire to study via distance mode.

Analysis and results

The table-2 shows frequencies for each of the demographic categories such that only three categories were found relevant for this study. Total number of male respondents was 235 and female respondents were 197.

Table -2: Demographics Summary

Paired Samples Statistics	Frequency	Percentage
Age		
(17-21 yrs)	211	49
(22- 26 yrs)	188	44
(26 yrs & above)	32	07
Gender		
Male	235	55
Female	197	46
Family Monthly Income		
(Rs.10,000- Rs.50,000)	122	28
(Rs. 50,001- Rs. 1,00,000)	180	42
(Rs. 1,00,001& above)	130	30

Source: Primary Data

Model Estimation

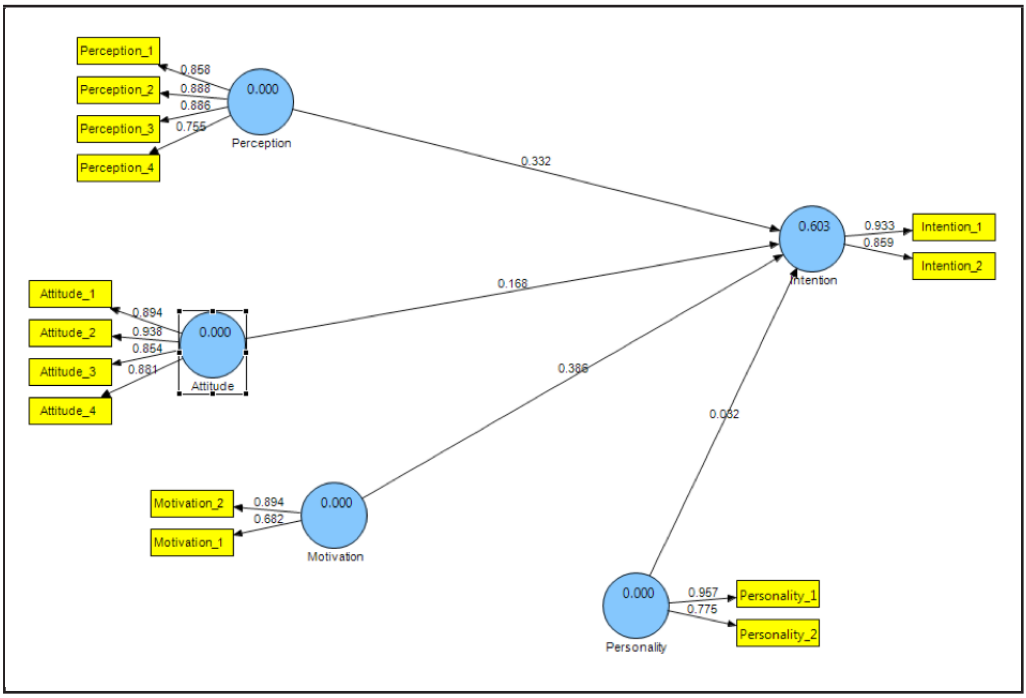
The model estimation involves two kinds of assessment i.e. reflective model estimation and structural model estimation. It is necessary to first conduct reflective model estimation and on the basis of its results, structural model estimation is performed.

Reflective Model Assessment

The smart PLS software provides three dimensions for model testing i.e. Algorithm, Bootstrapping and Blindfolding. The results of the algorithm are required for reflective model assessment and results of bootstrapping, blindfolding are required for structural model assessment.

Figure-2 represents the outcome of the PLS algorithm where four factors are independent (perception, attitude, motivation and personality) and one factor is dependent variable (intention). The value of R2 is 0.60 which shows that explanatory power is high (Wong, 2019). A value below 0.49 signifies a low explanatory power (Hair, Hult, Ringle, & Sarstedt, 2016).

Figure-2: Outcome of PLS algorithm run derived from smart PLS software version 2.0



The internal consistency (Table-3) is confirmed through composite reliability; Individual indicator reliability is confirmed through outer loadings and Discriminant validity is confirmed through Fornell lacker criterion (Wong, 2019).

Table-3: Internal Consistency

Constructs	AVE	Composite Reliability	R Square	Cronbachs Alpha
Attitude	0.80	0.94	-	0.92
Intention	0.80	0.89	0.60	0.76
Motivation	0.63	0.77	-	0.44
Perception	0.72	0.91	-	0.87
Personality	0.76	0.86	-	0.72

Source: Primary Data

The scores of composite reliability for each construct should be above 0.70 to confirm the presence of internal consistency (Hair, Hult, Ringle, & Sarstedt, 2016). The third column of table-3 i.e. composite reliability column shows that the score of each construct is above 0.70, therefore internal consistency is present.

Table-4: Individual Indicator Reliability (Outer Loadings)

	Attitude	Intention	Motivation	Perception	Personality
Attitude_1	0.89				
Attitude_2	0.94				
Attitude_3	0.85				
Attitude_4	0.88				
Intention_1		0.93			
Intention_2		0.86			
Motivation_1			0.68		
Motivation_2			0.89		
Perception_1				0.86	
Perception_2				0.89	
Perception_3				0.89	
Perception_4				0.75	
Personality_1					0.96
Personality_2					0.77

Source: Primary Data

In order to confirm individual indicator reliability, the scores of outer loadings derived from algorithm outcome should be above 0.60 (Hair, Hult, Ringle, & Sarstedt, 2016). Table-4 shows that the outer loading value of each scale item is above 0.60, therefore individual indicator reliability is also present.

Table-5: Discriminant Validity

Construct	Attitude	Intention	Motivation	Perception	Personality
Attitude	0.89				
Intention	0.48	0.90			
Motivation	0.40	0.71	0.80		
Perception	0.40	0.70	0.73	0.85	
Personality	0.70	0.51	0.43	0.60	0.87

Source: Primary Data

Table-5 shows the results of Fornell lacker criterion i.e. the square root of average variance explained (AVE) is compared with other constructs latent variable value (Hair, Hult, Ringle, & Sarstedt, 2016). For example, the square root of attitude's AVE value should be greater than latent variable scores of other constructs in order to meet discriminant validity criteria (Wong, 2019). Table-5 shows that AVE value of each construct is greater than the latent variable value of other constructs (specific row and column), therefore discriminant validity of variables is also confirmed.

Table-6 shows the value of path coefficients, where positive value denotes positive relationship between the independent variable and dependent variable. The path coefficient value lies between 0 to 1, which could be positive or negative (Hair, Hult, Ringle, & Sarstedt, 2016). The highest path coefficient value is 0.386 which means that path "Motivation → Intention" has the strongest relationship.

Table-6: Path coefficient values of all the paths in Model

Path	Path coefficient
Attitude → Intention	0.168
Motivation → Intention	0.386
Perception → Intention	0.332
Personality → Intention	0.032

Source: Primary Data

Multicollinearity

The constructs should not have collinearity among themselves; therefore to check collinearity issue variance inflation value (VIF) is calculated. The VIF value should be less than "5" to prove that there is no collinearity among the constructs (Hair, Hult, Ringle, & Sarstedt, 2016).

Table-7: Multicollinearity check

Factors	Intention	
	Tolerance	VIF
Attitude	.407	2.458
Motivation	.514	1.945
Perception	.465	2.150
Personality	.452	2.213

Source: Primary Data

Table-7 is a summary regarding the result of VIF calculations. All the values are below "5", therefore there is no question of multicollinearity.

Structural Model Assessment

The structural model assessment includes t-statistics calculation for finding significance of relationships, effect size and predictive relevance of the model (Wong, 2019). Table-8 shows the outcome of bootstrapping run, where t-statistics value is being analyzed to conclude about significance of results (Wong, 2019). The significance of relationships was tested at 1% significance level such that t-statistics value should be above 2.57. The t-statistics value of each path is above 2.57 except for path "Personality → Intention", which means that personality does not affect the student's intention to study through distance education mode. Therefore, hypotheses H01, H02, H03 are accepted and hypothesis H04 is rejected. It can be concluded that perception, attitude and motivation of students, determines their intention to enroll in distance learning courses.

Table-6: Path coefficient values of all the paths in Model

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Attitude → Intention	0.168	0.170	0.047	0.047	3.609
Motivation → Intention	0.386	0.387	0.044	0.044	8.825
Perception → Intention	0.332	0.334	0.052	0.052	6.439
Personality → Intention	0.032	0.029	0.054	0.054	0.600

Source: Primary Data

Effect Size (F^2)

The effect size of any construct may be calculated by Cohen's formula (Wong, 2019) which reveals which variable has larger impact on the dependent variable.

$$F^2 = \frac{R^2 \text{ included} - R^2 \text{ excluded}}{1 - R^2 \text{ included}}$$

Table-9 is a summary of effect size of each construct, where "motivation" has the largest effect size and "personality"

has no effect size. Therefore, the result of "personality" hypothesis i.e. H04 is cross verified by both t-statistics and effect size. The "attitude" construct has the lowest effect on a student's decision related to studies.

Table-9: Effect Size (F^2)

Factors	Intention: R^2 excluded	Effect Size Intention	Inference
Attitude	0.588	0.03	Small
Motivation	0.539	0.1525	Large
Perception	0.566	0.085	Medium
Personality	0.6	0	No effect

Source: Primary Data

Predictive relevance (Q2)

Predictive relevance is confirmation of model accuracy which may be calculated using the following formula (Hair, Hult, Ringle, & Sarstedt, 2016):

$$Q^2 = 1 - \frac{Sum\ of\ squared\ prediction\ errors\ (SSE)}{Sum\ of\ squared\ observations\ (SSO)}$$

Table-10 shows the result of blindfolding calculations where cross validity redundancy option provides the value of predictive relevance (Hair, Hult, Ringle, & Sarstedt, 2016). The value of Q2 should be above "0" and a value nearer to "1" is considered best for model accuracy. The Q2 value derived from the calculations is between 0 and 1, therefore model predictive relevancy is good.

Table-10: Cross-Validity Redundancy

Construct	SSO	SSE	1-SSE/SSO
Intention	862	457.819	0.469

Source: Primary Data

Scale Items Statistics

Table-11 shows the mean and standard deviation score for each of the constructs. In likert scale "4" was quoted as "neutral" and "1" was quoted as "strongly agree". This means that factors that have obtained a mean score below "4" are going towards an "agree" continuum. Therefore, it can be concluded that students have developed an intention (post COVID-19 crises) to study via distance mode.

Table-11: Descriptive Statistics

Factors	N	Minimum	Maximum	Mean	Std. Deviation
Perception	431	1.25	5.50	2.8689	.77586
Attitude	431	1.00	5.50	3.0806	.95875
Motivation	431	1.00	5.00	2.9977	.89117
Personality	431	1.00	5.50	2.9559	.90176
Intention	431	1.00	5.00	2.7007	.89753

Source: Primary Data

Hypothesis summary

Table-12 is a short summary of accepted hypotheses. This is clear from the findings that psychological factors i.e. perception, attitude and motivation has an apparent role in development of intention among students to start considering distance education courses post COVID-19 crises.

Table-12: Hypotheses Summary

Hypotheses	Relation path	Result
H_{01}	Attitude → Intention	Supported
H_{02}	Motivation → Intention	Supported
H_{03}	Perception → Intention	Supported
H_{04}	Personality → Intention	Not Supported

Source: Primary Data

Findings

There are many imperative findings of the research. The study shows that there are three independent variables (perception, attitude and motivation) that affect the intention of students to opt for distance learning. This also means that, by changing the perception of students one can build a positive attitude towards distance education. However, the essence of motivation is needed to be combined with perception and attitude to change the mindset of students.

The students were also asked about their suggestions for any modifications that they think are essential for improving the education quality in India. The following suggestions were collated:-

- Since the impact of COVID-19 will take years to stabilize conditions in the world, therefore more options and courses should be made available through distance mode. Along with this, the comparison of regular and distance degrees shall be eliminated because, soon distance learning would be the

future of millions of potential students.

- For online examination, innovative methods shall be adopted to facilitate smooth conduct of tests. The questions shall be framed in such a way that students would require to use their own intelligence. The movement of eye retina, facial expressions and other computer techniques may be employed while conducting examinations online.
- The nomenclature given as distance learning shall be replaced with online learning as it degrades the value of degree.

Conclusion

Quality is important in imparting education to the masses. As compared to other developed nations, the education institutions in India focus less on quality of education. This has compelled students to evaluate various alternatives while seeking colleges. The results of the study clearly show that the behavior of students can be conditioned through psychological factors (perception, motivation and attitude). There is a need to create awareness among everyone that distance learning provides quality education like any other regular learning. Thus this study has contributed in revealing the true scenario and reality of today's time. The educational institutions require an understanding of the needs and demands of students such that students are not lured on pretext of good placements and jobs. The findings of study can help institutions in targeting and attracting students accordingly. The students are the future pillars of any economy and thus they should be educated appropriately.

Limitations

One cannot abstain from the limitations of any research. A wholesome research may not be feasible as different models may reveal different results. The following are few limitations of study:

1. Although the responses were aimed to be collected from all over India, many respondents of different states did not fill the questionnaire. Thus, the sample size was relatively small and not as aimed.
2. There may be a chance that minor factors have been ignored in the study. Those minor factors may be identified and studied in the future.

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Research Article

COVID-19 Scenario of Online Education: A Study Based on Acceptance Level of Online Learning among Students of Gujarat During Lock-down

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Abstract

The pandemic COVID-19 forced all the educational institutions across India to remain shut from mid-March 2020. The sudden lockdown in between the ongoing academic sessions created the opportunity to switch over to online teaching through digital platforms. The e-learning market was estimated to grow even in normal circumstances, but this pandemic has given a great lift to this online learning. Various researches have been done on the usefulness of technology for online teaching but what is the level of acceptance among users i.e., students, should be understood. This study aims at understanding the acceptance level of students for online teaching. For this research data was gathered from 1,057 undergraduate and postgraduate students of Gujarat who had attended online lectures during the lockdown period of pandemic. Structural Equation Modeling (SEM) was used to test the research model and based on analysis strategic options which could be utilized post COVID-19 were suggested. The research identified that students had a favourable attitude towards using online mode of education. Attitude in this research was considered as a result of Perceived Usefulness (PU) and Perception about Complexity of using Internet (PCI). The results highlighted that students perceived online classes as useful to them in terms of improving knowledge, solving doubts related to the subject, saving time as well as scoring good marks. If the technical glitches can be resolved then it can increase the effectiveness. This paper helps in identifying the behavioural intentions of students for accepting online platforms and making strategic decisions for upcoming academic sessions.

Key Words: Online education, E- learning, Technology acceptance model, COVID-19 education, Attitude towards online teaching

Introduction

Online Education – Pre COVID-19 Scenario

The concept of learning online is not at all a new trend. The e-learning market has a history of 21 years by now. This market began in the 1960s when first computerized training courses were developed but owing to various barriers it did not take up then. Later in the 1980s and 1990s various developments in the form of growth of PCs, few companies and educational institutions offering

courses online led to the beginning of a new era of education. The year 2000s saw an explosion in usage of e-learning methods. The revenue from e-learning industry has grown more than 900percent since 2000. The global e-learning market in the year 2015 was worth $107 billion (Global Industry Analysts, Inc., USA). In the year 2019 the adoption of education technology with global edtech investments had reached US$18.66 billion (Metaari Whitepaper). This trend was expected to grow owing to various economic development drives. The statistical figures for online education were very attractive even before COVID-19 as it was projected to reach $350 Billion by 2025. But, COVID-19 has brought a change in the landscape of the education industry.

Education Industry during COVID-19

The educational institutions like schools, colleges, coaching centers and universities were shut down to curb the spread of COVID-19 infections. While these educational institutions at global level were closed during different points of time according to the spread of COVID-19 infections, if the statistical numbers are looked at, there were around 157 Crore students across 191 countries who were impacted (UNESCO report). In Indian context more than 32 Crore students considering all school, college and university level were affected with the restrictions imposed to curb COVID-19 infections. The major areas of concern for colleges and universities during this closure were completion of course, conducting examinations and placing final year students when most of the companies worldwide were cutting down from any form of expenditure. This pandemic forced educational institutions to adopt some safe means of reaching out to the students.

Online Education during COVID-19

The sudden closure of educational institutions was a huge challenge as it was affecting the life of many students and their parents. In response to this unavoidable circumstance, the majority of the educational institutions preferred adopting online mode of teaching. The objective of this unplanned shift was that online teaching could help educational institutions reach their students at their homes. However, in a country like India significant barriers were affecting this sudden shift in the teaching-learning process. The main barrier being the availability of necessary infrastructure to support the online teaching learning process as only 27 percent of households in India have some members with access to the internet (National Sample Survey as part of the Survey on Education (2014). Students who were not having reliable internet access or technology had to struggle to participate in the digital learning process. This barrier was faced across countries as there was a gap between students who actually had required infrastructure/ technology and the number of students who were actually enrolled in different courses (OECD data). Experts from the education industry believe that this unplanned, rapid shift from offline to online teaching with a very minimal time for both faculties and students to "Accept-Adopt-Implement" the change

is going to bring a new hybrid model of education.

Literature review

Online education, as mentioned, has a history of more than a decade owing to which a lot of empirical research both at global and Indian context has been done in the past in this area. This section of the paper highlights crucial findings from those researches.

Vijaya Lakshmi Y., Das Jaishree, Majid Ishfaq (2020) attempted to assess the eLearning readiness of the stakeholders through a questionnaire from a sample of 12 lab administrators, 83 teaching staffs and 153 students belonging to 35 colleges of Gujarat. Results showed that e-learning helps to a lesser extent in maintaining transparency, face-to-face contact and interactivity which hinder students and faculty members' readiness towards e-learning. Authors identified the need to plan for training programmes to increase their e-learning readiness.

Arora Amit Kumar, Srinivasan R. (2020) assessed the adoption rate for virtual classes from 341 teachers of higher education institutions (HEIs) of Ghaziabad region with two sets of respondents: who adopted and not adopted virtual classrooms, respectively. Network issues, lack of training, and lack of awareness were stated to be the major challenges faced by them. Lack of awareness was stated to be the most important reason by those who did not adopt virtual classrooms followed by lack of interest and doubts regarding the usefulness of virtual classes. Less attendance, lack of personal touch, and lack of interaction due to connectivity issues were found to be the significant drawbacks of virtual classes.

Phutela, N. and Dwivedi, S. (2020) employed interpretative phenomenological analysis (IPA) to scrutinize the respondents from Delhi-NCR of India through semi-structured interviews to understand the student's perspectives on the impact of Information and Communications Technology (ICT) in education industry. Drivers for e-learning adoption and inhibitors who restrict the adoption of e-learning were identified.

Aggarwal Ritika (2017) in her research discussed the role of e-learning in the higher educational environment in the digital age and compared the economic costs associated with traditional face-to-face and e-learning methods.

Perceived Usefulness (PU) and Enjoyment were significant factors which contributed towards learners' acceptance behaviour with Web-based Learning System (WLS) while included motivational perspective into the Technology Acceptance Model (Zhang Sheng, Zhao Jue, Tan Weiwei, 2008). In a survey of 400 post graduate students and their attitude towards e-learning was explained by perceived usefulness and intention to use. It was found that 76percent students were significantly positive towards e-learning, 82percent students found e-learning useful and 57percent intended to adopt e-learning (Mehra V. and Omidian F., 2011). E-learning experiences and perceptions of engineering students were investigated at two public Libyan universities and the study demonstrated

that there was a statistically significant correlation between students' attitude towards technology and their levels of access to various technologies. Students who had better access to technology showed that the internet generated stronger positive attitudes (Rhema, A. & Miliszewska, I., 2014). The attitude of teachers towards e-learning was analyzed through the research conducted on 85 teachers of Punjab University with factors related to feeling towards flexibility, performance of computer, self-efficacy, and anxiety towards computer /technology and significant impact of age was seen on teacher's attitude towards computer and e-learning (Suri Gunmala and Sneha Sharma, 2017). The quality, reliability and medium richness are key technological aspects to be considered (Sanders Lopez and Nagelhout, 1995). Convenient remote access, minimal required time for the network to exchange documents and the quality of interface also play an important role (Trevitt, 1995). McIntyre and Wolff (1998, P.257) noted that one of the powers of interactivity in a web environment is the capability to engage by providing rapid, compelling interaction and feedback to students. Engagement is also enhanced by problem-based presentation of educational material. An engaged student is a motivated student (Neorman and Spohrer, 1996).

Davis (1986) developed the Technology Acceptance Model (TAM) which is based on the Theory of Reasoned Action (TRA), to understand the causal relationships among users' internal beliefs, attitudes, and intentions as well as to predict and explain acceptance of computer technology (Davis et al., 1989). This model suggested that the user's actual usage behavior (actual use or AU) is directly affected by behavioral intention (intention to use or IU). In turn, behavioral intention is determined by both the user's attitude and its perception of usefulness. Two key parameters that were capable in influencing user's attitude were identified as perceived usefulness (PU) and perceived ease of use (PEOU), and that these beliefs acted as mediators between external variables (e.g., design features, prior usage and experience, computer self-efficacy, and confidence in technology) and intention to use. Furthermore, TAM explained that PEOU indirectly affects IU through PU (Davis et al., 1989; Venkatesh & Davis, 2000).

Research methodology

Research gap & research question

The statistical data about e-learning or online education industry points out that even before COVID-19, the growth prospects of this industry was high and now that COVID-19 has forced educational institutions across the globe to accept online mode of teaching this industry is expected to grow as it has become a significant aspect of delivering education now. Besides this, from the literature it is understood that a lot of work has been done in this area pertaining to awareness, factors that contribute to acceptance of online education. But now that students have actually used these online platforms during lockdown their perceptions might have changed and new issues/ problems would have come up. It is crucial for the educational system to

know their behavioural intentions of using these online platforms for getting education in future. Any issues that they would be facing with regard to usage of online modes of teaching should also be looked into. This research shall be useful for making strategic decisions for upcoming academic sessions which remains uncertain as of now. Based on this gap the following research question has been addressed in this paper – "What is the acceptance level of online learning among undergraduate and postgraduate students of Gujarat who have attended online lectures during the lockdown period of COVID-19?"

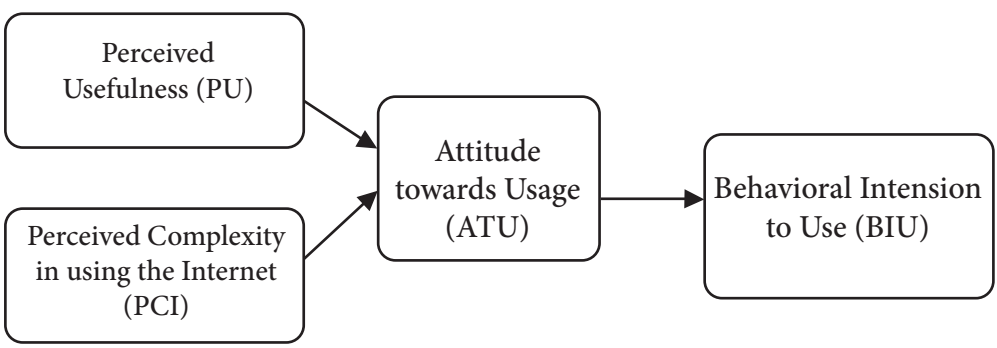
Objectives

1. To study the impact of Perceived Usefulness (PU) on Attitude towards Usage (ATU) of online learning.
2. To examine the impact of Perceived Complexity in using the Internet (PCI) on Attitude Towards Usage (ATU) of online teaching
3. To analyze the impact of Attitude towards Usage (ATU) on Behavioural Intention to Use (BIU) Online learning
4. To propose the education continuity plan for online learning based on the acceptance level among students of Gujarat

Research Model

The objective was to understand the acceptance level of online learning among students. The variables such as, Perceived Usefulness (PU) of online teaching, Perceived Complexity in using the Internet (PCI), students' Attitude towards Usage (ATU) of online teaching and their Behavioural Intention to Use (BIU) Online learning were identified (Fig.-1).

Figure-1: Research Model



Source: Compiled for research

Data Collection

This study employed the quantitative approach. The primary data for study were collected through a survey questionnaire. A 5-point Likert scale was used for the items in the questionnaire. Prior to the distribution of the questionnaire, a pilot study was conducted in order to test the reliability of the instrument. The data were collected from undergraduate

and postgraduate students of Gujarat. Total 1,575 responses were received and 1,057 questionnaires were considered final for this study after removing duplicate and vague entries. Responses of only those students have been included who are currently enrolled in Engineering, Management, Pharmacy, Computer Applications and other courses and have attended online lectures during lockdown period of COVID-19 pandemic. Period of data collection for this research was from 4-11 May, 2020.

Variable Measurement

The main objective of this study was to evaluate the acceptance level of online learning among students of Gujarat during the Lockdown period. The questionnaire comprised of two sections – section 'A' collected respondents' demographic information (Table-1) and section 'B' examined the identified variables - Perceived Usefulness (PU), Perceived Complexity in using the Internet (PCI), Attitude towards Usage (ATU) and Behavioural Intention to Use (BIU) Online learning (Table-2).

Table-1: Demographic Classification

Demography		Frequency
Gender	Male Female	748 309
Age Group	Less than 20 years 20 – 23 years 23- 26 years 26 - 29 More than 29 years	395 617 040 004 001
Educational Qualification	Undergraduate Post-Graduate	863 194
Discipline	Management Engineering Pharmacy Computer Application Any Other	240 777 007 009 024
Attended Online Lectures during Lockdown	Less than 10 10 – 20 20-30 More than 30	465 335 138 119

Source: Data Analysis

Hypothesis

1. H0: There is no significant impact of Perceived Usefulness (PU) of online teaching on Attitude towards Usage (ATU) of online teaching
2. H0: There is no significant impact of Perceived Complexity in using the Internet (PCI) on Attitude towards Usage (ATU) of online teaching
3. H0: There is no significant impact of Attitude towards Usage (ATU) of online teaching on Behavioural Intention to Use Online learning

Table-1: Demographic Classification

Demography	Measured Items
Perceived Usefulness (PU)	PU1: Attending online classes improved my knowledge.
	PU2: Online classes helped me in solving subject related doubts.
	PU3: I can score good marks by attending online lectures.
	PU4: Online classes save my time which can be utilized in other productive activities.
	PU5: Overall, online classes were very useful to me.
Perceived Complexity in using the Internet (PCI)	PCI1: High internet data consumption is a major area of concern.
	PCI2: Poor sound quality / low speed during online lectures always irritates me.
	PCI3: I face the issue of internet connectivity frequently.
	PCI4: Teaching through online platforms is not secured.
	PCI5: It is very expensive to get an internet package for viewing online lectures.
Attitude towards Usage (ATU)	ATU1: I generally have a favourable attitude towards online education.
	ATU2: I believe it is a good idea to use a digital platform for my coursework.
	ATU 3: I like the idea of attending online classes.
	ATU 4: Attending the online sessions provided me a lot of enjoyment.
	ATU 5: It is very boring / frustrating to attend the online classes.

Behavioural Intention to Use (BIU) Online learning	BIU1: I plan to attend online classes more frequently to continue my studies.
	BIU2: I propose replacing classroom teaching with online classes.
	BIU3: I will recommend the online classes to others.
	BIU4: I intend to attend the online lectures in the future.
	BIU5: Now I know the mechanism and usefulness of online lectures; I would prefer to attend the same in the next semester / year.

Data analysis

Data collected through the structured questionnaire was analyzed using software's like SPSS & AMOS 21 while for descriptive analysis Excel was used. SEM was performed on the collected data which included analysis of data at two levels i.e. the measurement model and the second being the structure model.

The Measurement Model

The model used for the study had four measured variables like: Perceived Complexity in using the Internet (PCI), Perceived Usefulness (PU), Attitude towards Usage (ATU) and Behavioural Intention to Use (BIU) Online learning. Each of these latent variables were measured using various indicators. The Measurement Model was used to understand the relationship between these latent variables and indicators. The psychometric properties of the model with regards to reliability & construct validly (which included both Convergent validity and Discriminant validity) were calculated. To test the reliability and validity of measured model calculations were done in Excel using the outputs derived from SPSS & AMOS 21.0 software. (Table- 3 Summary of Reliability & Validity for Measured Model)

- **Cronbach's alpha (Internal Consistency):**
  Using SPSS 21.00 Cronbach's alpha was calculated for the measured model; this value shows the consistency of items in a set in measuring the concept. This value usually ranges between 0 & 1, any value more than 0.70 is considered to be acceptable (Gliem, J. A., & Gliem, R. R., 2003). Cronbach's alpha for all the measured model used in this research were above 0.8 which indicates that items in the set were consistent in measuring the concept. (Table- 3 Summary of Reliability & Validity for Measured Model)
- **Composite Reliability (Internal Consistency Reliability):**
  Composite Reliability (CR), has a more retrospective approach of measuring overall reliability of consistency of framed constructs in terms of equivalence and stability. The acceptable value for composite reliability should be 0.70 or above

(Hair et.al.2010). Composite reliability for the measured model was greater than 0.70 and hence it can be concluded that the construct was having high internal consistency and reliability. (Table-3 Summary of Reliability & Validity for Measured Model)

Table-1: Demographic Classification

Construct	Items	Standardized Loadings	Cronbach's alpha	Composite Reliability CR	Average Variance Extracted AVE
Perceived Complexity in using the Internet	PCI5	0.624	0.822	0.7329	0.133225
	PCI3	0.805			
	PCI2	0.775			
	PCI1	0.73			
Perceived Usefulness (PU)	PU5	0.899	0.922	0.790561	0.1381122
	PU4	0.768			
	PU3	0.86			
	PU2	0.831			
	PU1	0.831			
Attitude towards Usage (ATU)	ATU4	0.826	0.896	0.720944	0.155236
	ATU3	0.891			
	ATU2	0.812			
	ATU1	0.788			
Behavioural Intention to Use (BIU) Online learning	BIU1	0.799	0.91	0.797225	0.139445
	BIU2	0.712			
	BIU3	0.882			
	BIU4	0.863			
	BIU5	0.835			

Source: AMOS 21.00, Excel calculations

Construct Validity: Construct validity was calculated using convergent and discriminant validity for which data from AMOS 21.00 was extracted and excel was used for calculation of average variance extracted (AVE) and correlations which are required for interpreting the validity of the instrument used to collect data.

- Convergent Validity: This subset of construct validity aims at measuring the construct validity of the instrument that has been used to collect the data. Two essential values that are used to check convergent validity are standardized factor loading and

average variance extracted (AVE). The factors loading value of latent to observed variable and AVE values should be above 0.05 to confirm convergent validity (Hair et.al.2010). It was identified that the values of both AVE and standardized factor loading for all latent and observed values were above the acceptable limit, thereby making our construct confirm convergent validity (Table-3 Summary of Reliability & Validity for Measured Model).

- Discriminant Validity: This happens to be the second subset of construct validity with an objective of measuring the distinctiveness of each construct. This can be done by comparing Square roots of AVE with the correlation squared. To obtain discriminant validity, the square root of Average Variances Extracted (AVE) of the individual factors must be higher than the variances of constructs. The same was achieved in this research after doing analysis. (diagonal element in the correlation matrix) (Table-4 Discriminant Validity).

Table-4: Discriminant Validity

	PU	PCI	ATU	BIU
Perceived Usefulness (PU)	0.372	0.017956	0.0719	0.0651
Perceived Complexity in using the Internet (PCI)		0.365	0.0225	0.025921
Attitude towards Usage (ATU)			0.394	0.08208
Behavioural Intention to Use Online learning (BIU)				0.394

***. Correlation is significant at the 0.01 level (2-tailed).*

Source: AMOS 21.00, Excel calculations

The Structure Model

The measured model above helped in understanding that the latent variables used for study had good reliability and validity. Now the structure model of SEM will help in measuring the relationships between the latent and observed variables and testing the hypothesis. Structured model is performed in two parts; in the first section calculations of vital indices are performed to confirm the research model after which the results of hypothesis testing are revealed.

Model Fit Analysis

The verification of the model has been done in this research by using 03 types of fit measures. (Table-5).

Table-5: Goodness-of-fit indices for

structural model

Fit Indices	Recommended Level of Fit	Model Value
Absolute Fit Measures		
x2 (chi-square)		358.67
df (degrees of freedom)		130
Chi-square/df (x2/df)	< 3	2.759
GFI (Goodness of Fit Index)	>0.9	0.926
RMSEA (Root Mean Square Error of Approximation)	<0.08	0.066
Incremental Fit Measures		
AGFI (Adjusted Goodness of Fit Index)	>0.80	0.823
NFI (Normed Fit Index)	>0.90	0.919
CFI (Comparative Fit Index)	>0.90	0.927
IFI (Incremental Fit Index)	>0.90	0.928
RFI (Relative Fit Index)	>0.90	0.905
Parsimony Fit Measures		
PCFI (Parsimony Comparative of Fit Index)	>0.50	0.788
PNFI (Parsimony Normed Fit Index	>0.50	0.781

Source: AMOS 21.0

GFI (Goodness of Fit Index) and RMSEA (Root Mean Square Error of Approximation) values were obtained as 0.926 and 0.066, respectively which were also in the recommended level of GFI >0.9 and RMSEA <0.08.

Among the incremental fit measures, the values of model for each fit were AGFI 0.823> (0.80 recommended level), NFI = 0.919 > (0.90 recommended level), CFI = 0.927 > (0.90 recommended level), IFI = 0.928 > (0.90 recommended level) and RFI = 0.905 > (0.90 recommended level).

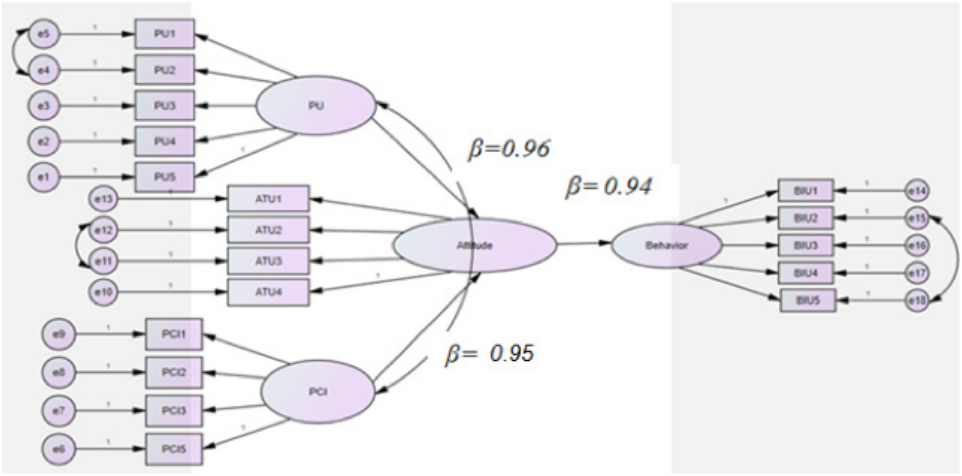
The value of PCFI (Parsimony Comparative of Fit Index) was 0.788 and acceptance level is more than 0.50. Similarly, the value of PNFI (Parsimony Normed Fit Index) was 0.781 against the recommended limit of higher than 0.50. So, both these values are in acceptable range. Thus, the comparison of the fit indices for the model with the recommended fit values suggests the

fact that the hypothesized structural model fits the data well (Table-5 Goodness-of-fit indices for structural model).

Hypothesis Testing

The analysis revealed that there exists relation among all the variables used in the model (Refer Table 6. Hypothesis testing result summary) Perceived Usefulness (PU) & Perceived Complexity in using the Internet (PCI) had an impact on Attitude towards usage of online teaching. Similarly, attitude had an influence on Behavioural Intention to Use Online learning, based on these suggestive measures for education continuity plans were suggested.

Table-5: Goodness-of-fit indices for structural model



Source: AMOS 21.0 Output

Table-6: Hypothesis testing result summary

Path			β	S.E.	C.R.	p	Results
Perceived Usefulness (PU)	→	Attitude	.960	.030	32.515	***	Supported
Perceived Complexity in using the Internet (PCI)	→	Attitude	.950	.0305	31.886	***	Supported
Attitude towards Usage	→	Behavioural Intentions to Use Online learning (BIU)	.948	.031	30.126	***	Supported

β = standardized beta coefficient, S.E. = Standard Error, C.R. = Critical ratio
Source: Data Analysis AMOS 21.0

Suggestive measures for education continuity plan post COVID-19

The research aimed at understanding the acceptance of online teaching among students of Gujarat who had a recent experience of online sessions during lock-down of COVID-19. The rationale of understanding acceptance was to know how far students intend to use online mode of teaching in the near future. Educational institutions now have understood that a hybrid model or an alternative mode of teaching is a necessity. This research can help in identifying stakeholder's perspective. From the research analysis it was observed that there existed a good relation between all the variables that were used for the proposed study. Based on the analysis the following strategic perspectives have been identified (Figure-3 for Research Model).

Students had a favorable attitude towards using online mode of education and they could enjoy this new change that was implemented for their safety. Attitude in this research was considered as a result of Perceived usefulness (PU) and Perception about Complexity of using Internet (PCI). The results highlighted that students perceived online classes as useful to them in terms of improving knowledge, solving doubts related to the subject, saving time as well as scoring good marks.

The variable "Perception about Complexity of Using Internet" was included in the research as in Indian context it is an important factor affecting effectiveness of online teaching as reported by several renowned research agencies. Perceived Complexity in using Internet (PCI) was considered in the research as Indian students lack the basic infrastructure required for smooth transition from offline mode of teaching to online mode. From these variables few problems that were faced by students could be identified and the following strategic alternatives could be suggested:

Table-7: Proposed Strategic Options

Path		Strategic Option
Connectivity Issues, Poor Sound Quality & low speed High Data Consumption	Platform for Online Teaching	• Development of indigenous platforms by Universities
		• Identification of common platform that can be used across university/institution/ subjects
		• Identification of platform that are user-friendly with less data consumption
	Delivering Contents online	• Pre-Planning about contents to be delivered through live online sessions
		• Pre planning about certain contents that can be shared through mails
		• Pre-recorded Videos/presentations/voice overs of faculties
		• Advance preparation for online classes & sharing contents with students
		• Recording online sessions and giving access to students for future reference
	Orienting Students	• Providing training/orientation to students about modes to be used
		• Creating manuals for usage of online tools and sharing with students
	Specifications	• Specification of VAS (data) plans can be shared with students in advance before start of online sessions
		• Specification about basic infrastructure required by the student for adopting online mode

The research identified that students had positive intentions of using online mode of teaching and they were even ready to recommend online mode of teaching to others. While if online mode of teaching can replace actual classroom teaching or not? – Still remains an unanswered question. However, it seems that acceptance for this mode has improved due to this forced shift. If the technical glitches can be resolved from online mode of teaching then it can increase the effectiveness.

Conclusion

This study makes a contribution in explaining the post-COVID19 scenario with the help of suitable statistical tests where the researchers have proposed strategic options for policy makers to prepare the roadmap of Indian education industry. The present study may be helpful for the higher education institutes in India in preparing themselves as a techno savvy institute, providing education in online mode to enhance learning experience

of students at convenient time, recording of online sessions for further use along with enhancing reachability, understanding the mind-set of students towards acceptance of online learning and coming up with the solutions to combat any such crisis in near future with an approach to become self-reliant country.

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Research Article

Readiness towards using Blended Learning Approach for Teachers Preparation

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Abstract

Blended Learning is viewed as an integrated combination of traditional face-to-face learning with web-based online approaches, the combination of media and tools employed in an e-learning environment and amalgamation of a number of pedagogic approaches irrespective of learning technology used. The various learning management systems (LMS) and online learning platforms provide an opportunity to connect learners and teachers and equip teachers to provide assistance for students to engage in collaborative and cooperative learning activities even beyond classrooms. It is believed that collaborative learning leads to better student involvement, better performance and higher productivity. Investigator of this paper is involved in developing a package based on a blended learning approach for teacher's preparation (Internship activities) which will be used in pre-internship activities of pupil teachers. In the present paper, the investigator has explored readiness of various stakeholders of teacher education towards using a blended learning approach for pre-internship activities.

Key Words: Readiness, Blended Learning, Teachers Preparation

Theoretical Background

Blended learning which is mostly termed as open, flexible, hybrid and distributed learning, is a formal education program in which a learner learns, at least in part, through online delivery of content and instructions with some elements of learners control over time, pace and space, and at least with some part of offline or face to face instruction (Graham, 2006). Blended learning is known for integrating instructional modalities, instructional methods and amalgamating online and face-to-face instruction (Rooney, 2003; Orey, 2002; Singh & Reed, 2001; Thomson, 2002; Rosset, 2002). The rapid usage of such advanced educational technologies has resulted in changing perceptions of students, teachers and educational administrators (Whitelock & Jefts, 2003). Rainie (2010) reported that in the 21st century, the teaching and learning has become more effective with wide use of smart devices, internet and low-cost technology. Technological devices have been significantly enhancing the learning of students through online lectures and distance learning effectively.

The students who depend only on

online mode for learning may not be able to understand such content in real context; hence, there is a need to depend on other modes of learning too. In this context, the role of a teacher cannot be ignored. Teachers have to provide a learning platform where various activity-oriented learning environment could be created as well as ample time for assessment and feedback can be provided to know the learning growth of the learners. The teacher's role is to provide hands-on experience in order to comprehend content so that the contextualized knowledge and understanding could be gained by students. All the learning has to be contextualized for meaningful learning and students should gain sensory experiences to make learning real and contextual. Moreover, there are many process skills that can be developed only through direct experience and hands-on activity. It is in this juncture that the technology alone fails to contextualize any content and also fails in developing subject specific skills, especially the process skills. Hence, the role of a teacher cannot be disregarded if any learning has to be meaningful. The concept of 'Blended Learning' brings together the advantages of both online as well as face-to-face learning.

Blended learning can be applied at various levels of learning in school education, higher education and in professional courses etc. where a blend of online and face-to-face learning can be used in a meaningful manner. Learners are important partners in any learning process and therefore, their backgrounds and characteristics affect their ability to effectively carry on with learning. Selim (2007) has listed three main factors that affect blended learning i.e. effectiveness of instructor, technology and students' characteristics. Hence, every student may not be able to use technology in an appropriate manner for appropriate results. The teacher's characteristics include teacher's knowledge, understanding and use of ICT skills, how well the teachers can integrate technology in classroom teaching-learning, along with having ICT skills, Teachers' characteristics also include their technological, pedagogical and content Knowledge (TPCK). These all factors or proficiencies play an important role in determining their attitude towards using ICT. The teacher's knowledge on the recent developments in technology can help them to use blended learning in their classroom teaching. The learners who participate in blended learning should also be aware of using different technology for learning but not to be totally dependent on technology alone. The students' needs to be motivated to learn from the real environment through different perceptual performing activities and gaining real life experiences in order to develop various subject specific skills. Hence, Blending of Online and face- to-face mode of learning can be a more useful pedagogical approach in the 21st century where every teacher has to be trained in using blended learning in their classroom.

Need and Significance of Study

From last one year we have seen a drastic paradigm shift in teaching learning from offline to online mode of education due to COVID-19 pandemic conditions.

Now we all are familiar and are using various online platforms and learning management systems for delivery of content and interacting with learners. In the National Educational Policy, 2020 it is clearly mentioned that while promoting online and digital different learning, the significance of face-to-face in-person learning should be fully recognised. Subsequently, different efficient models of blended learning should be identified for appropriate application in different subjects.

Blended learning is effective, interesting and offers better satisfaction to the learners (Muniyandi, 2016; Chitra & Singaravelu, 2016). Blended Learning is indeed proven to be an efficient measure to develop learning gains among learners to a great extent (Cross et. al., 2014). It is also seen that blended learning has significantly contributed to the learning of a particular subject in blended learning settings.

In the present research, the investigator has explored the readiness of various stakeholders of teacher education towards using a blended learning approach in teacher preparation (Pre -Internship activities). The results of this research will help in developing a package based on blended learning for developing various teaching and managerial skills in pupil teachers.

Objectives of the research

The present problem endeavours for realization of the following objectives:

1. To study the readiness of teacher educators, research scholars and pupil teachers towards using blended learning approach for teachers' preparation.
2. To compare mean readiness scores of male and female participants towards using a blended learning approach for teachers' preparation.
3. To compare the mean readiness score of rural, urban and semi-urban participants towards using a blended learning approach for teachers' preparation.
4. To compare mean readiness scores of teacher educators, research scholars and pupil teachers towards using blended learning approach for teachers' preparation

Methodological Orientation

Research Design

The purpose of this study was to explore the readiness of teacher educators, research scholars and pupil teachers towards using a blended learning approach for teachers' preparation. The research title itself indicates that a descriptive approach of research is best suited for this kind of studies. Therefore, a descriptive survey method has been used for conducting the present research.

Sample and Sampling

Since this research was conducted in the pandemic condition of COVID-19, the investigators decided to collect data through online mode. A total of 490 participants were selected through convenient sampling techniques.

Tool for Data Collection

To assess the readiness of teacher educators, research scholars of education discipline and pupil teachers

towards Blended Learning Approach, a Readiness Scale was developed and standardised with eight dimensions of blended learning generally stated in available literature. The initial draft of Readiness Scale towards Blended Learning Approach was developed and applied on 383 respondents (86 Teacher Educators, 76 Research Scholars of Education Discipline and 221 Pupil Teachers) for standardisation and establishing reliability and validity of the scale. Final draft of the scale has 35 items in total representing 8 dimensions of readiness.

Results and Interpretation

Analysis and interpretation of the results has been done objective wise as follows:

To study the readiness towards using a blended learning approach for teacher's preparation.

After scoring, the scores of all the 35 items were added to obtain the total score of an individual on the scale. The range of the total score was 35-105 as the scale was constructed with 35 items on 3-point Likert Scale. Therefore, the level of readiness was considered from Score of the answers and was classified into 3 levels to the Best's Criteria (1977) which use the range of highest score and lowest score which is further described by levels of readiness.

Table-1: Percentage of Participants against each Level of Readiness towards using Blended Learning Approach for Teachers Preparation

S. N.	Range of Scores	N	Percentage	level of readiness towards Blended Learning Approach
1.	83-105	458	93.46	High
2.	59-82	32	6.54	Average
3.	35-58	00	00	Low
	Total	490	100	

From table-1, it is evident that 93.46percent participants have high readiness towards blended learning approach so, it can be concluded that participants were found to have high readiness towards using a blended learning approach for teacher's preparation.

Table-2: Mean, Standard Deviation and Coefficient of Variation of all the Participants towards using Blended Learning Approach for Teachers Preparation

Criterion Variable	N	Mean	Standard Deviation	Coefficient of Variation
Readiness towards Blended Learning Approach	490	2.73	0.22	8.00%

From table-2, it is evident that the Mean scores of readiness towards blended learning approach was found to be 2.73 and standard deviation was 0.22. The Mean readiness scores of all the respondents towards blended learning approach is (2.73/3)*100=91.00percent favourable with 8.00percent deviation which is quite low. Hence it reflects that participants have high readiness towards using blended learning approach for teachers' preparation. The results also indicate that as a group, the readiness towards blended learning approach was almost irrevocable and favourable. It may, therefore be concluded that all participants of teacher education have high readiness towards using a blended learning approach for teachers' preparation.

Readiness of Male and Female participants towards using Blended Learning Approach for Teachers Preparation

The second objective of the investigation was to compare mean scores of readiness on the basis of Gender towards using Blended Learning Approach for Teachers Preparation. The Investigators selected a total no of 490 participants (236 male and 254 female) associated with teacher education in different capacity with the help of purposive sampling technique. A self-made standardized blended learning approach readiness scale was used to collect data from these participants. For comparing the mean scores of readiness of the male and female participants the researcher decided to use an independent sample t-test, before applying t-test, statistical assumption of normality of the scores of dependent variables was tested with the help of Kolmogorov-Smirnov[a] test.

Table-3: Tests of Normality for Readiness Scores of male and female participants towards using blended learning approach for teachers' preparation

Criterion Variable: Readiness towards Blended Learning Approach							
	Gender	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Readiness Scores towards Blended Learning Approach	Male	.112	236	.000	.938	236	.000
	Female	.133	254	.000	.917	254	.000

From table-3 it is evident that the statistical value of Kolmogorov-Smirnov test of the Readiness Scores of male and female participants towards Blended Learning Approach is 0.112, 0.133 respectively, whose probability of significance at df (236) and df (254) is 0.000 which is less than 0.01, hence significant at 0.01 level of significance. In this perspective the null hypothesis "The given distribution of the readiness scores of male and female participants towards using a blended learning approach for teachers' preparation does not differ significantly from the normal distribution" is rejected.

Therefore, it can be concluded that the assumption of normality of Readiness Scores of male and female participants towards blended learning approach is not satisfied or it can be concluded that readiness scores towards blended learning approach were not normally distributed. Therefore, the data was analysed with the help of Mann Whitney U test (Alternative Non-Parametric Statistics). Further before applying Mann Whitney U test, all the assumptions of this test were also tested. The assumptions related to Mann Whitney U test with the results of test are given below:

Assumption#1- Independence of the Groups

According to this assumption, there should be independence of observation in collecting samples i.e., there should not be any relationship between the observation in each group of the independent variable. It is clear from the observation of independent variable that all the selections of male and female group participants do not affect each other i.e., independent of each other.

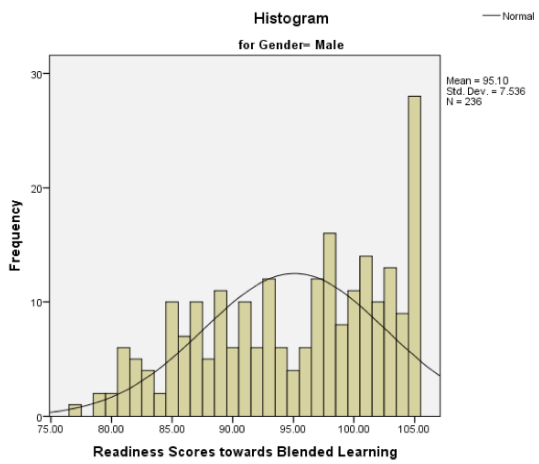
Assumption#2- The scores of dependent variables must be at least on ordinal scale

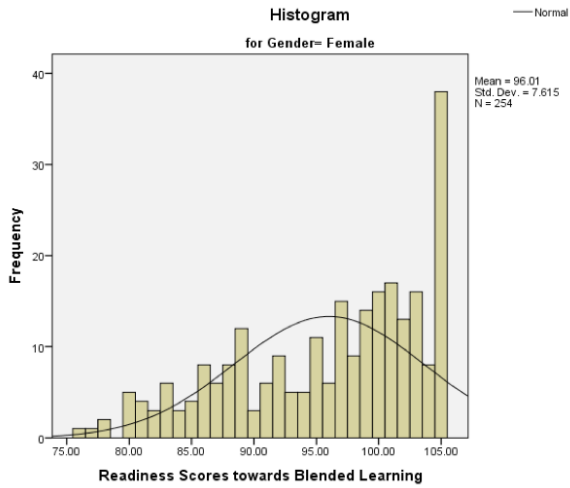
According to this assumption the dependent variable should be measured at least on an ordinal scale. On the basis of observation of the scores of dependent variables, it is clear that these scores are on interval scale.

Assumption#3- Uniformity of distribution of dependent variable at both levels of independent variable

This assumption holds whether the distribution of scores of dependent variables for both the groups of independent variables (Male and Female) has the same shape or a different shape. For testing it, graphical representations (Fig-1) were used.

Figure-1: Readiness Scores of Male and Female Participants towards using blended learning approach for teachers' preparation





Further, from the observation of Histograms of readiness scores of male and female participants it is clear that the density of distribution is located more at the right side of both the graphs along with the tail skewed negatively. Therefore, it is clear that scores of dependent variables at both the groups of dependent variables are negatively skewed in the same manner.

Assumption#4- Equality of variances (Non parametric)

For testing this assumption, Non parametric levene's test for equal variance was used. In non-parametric levene's test, absolute deviation of rank of each score from average rank of group is calculated and then f value is obtained applying ANOVA on distribution of these deviations. If this F value is not significant at the decided level of significance, it is assumed that assumption of equality of variances is satisfied.

Table-4: ANOVA to check the assumption of equality of variances (Non-parametric) on the basis of Gender

Criterion Variable: Readiness towards Blended Learning Approach					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	189.179	1	189.179	.038	.845
Within Groups	2428492.766	488	4976.420		
Total	2428681.945	489	100		

Table-4 shows that the F- value of ANOVA test is 0.038 whose probability of significance (df=1, 488) is 0.845 which is greater than 0.05, hence not significant at 0.05 level of significance. The null hypothesis "the readiness scores of male and female participants towards a blended learning approach

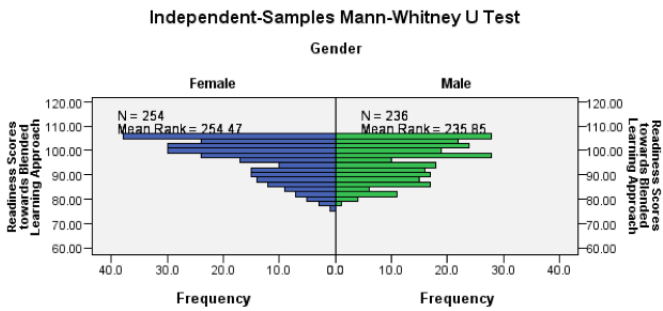
do not significantly deviate from non-parametric variance" is not rejected. Therefore, it can be concluded that the assumption of equality of variance (Non-Parametric) is satisfied.

Assumption#5- Assumption of Sample size

This assumption holds that sample size should not be less than four in both the groups of IV. In the present study sample size is more than 4 in each group of IV, Hence the fifth assumption of Mann Whitney U test is also fulfilled.

After testing and fulfilling all the statistical assumptions, the data related to the second objective was analysed with the help of Mann Whitney U test. The results are presented below through the figure-2.

Figure-1: Readiness Scores of Male and Female Participants towards using blended learning approach for teachers' preparation



Total N	490
Mann-Whitney U	32,250.000
Wilcoxon W	64,635.000
Test Statistic	32,250.000
Standard Error	1,562.974
Standardized Test Statistic	1.457
Asymptotic Sig. (2-sided test)	.145

It is evident from the above columnar that both the groups (Male and Female) can be considered uniform because of excess similarity in the distribution of dependent variables in both the groups. Therefore, it can be undoubtedly said that p- value obtained from the Mann Whitney U Test is reliable, further it is evident from the above table that the test statistics of the readiness scores of male and female participants towards blended learning approach is U= 32250.00 whose probability of significance is 0.145 which is more than 0.05, hence not significant at 0.05 level of significance, therefore the null hypothesis "there is no significant difference in mean rank of readiness scores of male and female participants towards blended learning approach" is not rejected.

Table-5: Summary of Mann Whitney U – Test for Mean rank Readiness Scores of Male and Female participants towards Blended Learning Approach

Ranks						
	Gender	N	Mean Rank	Sum of Ranks	Sig.	Remark
Between Groups	Male	236	235.85	55660.00	0.145	Not Significant
Within Groups	Female	254	254.47	64635.00		
Total	Total	490				

Further, it is clear from the mean ranks shown in the above figure that mean rank of readiness scores of male participants towards blended learning approach is 235.85 which is similar to that of female participants where mean rank of readiness scores is 254.47. Hence, it can be said that male participants have similar readiness towards using a blended learning approach than that of female participants.

Readiness of Rural, Urban and Semi Urban participants towards using blended learning approach for Teachers' Preparation

The third objective of the present research was to compare readiness of rural, urban and semi urban participants. For this researcher selected 490 participants (224 Rural, 213 Urban and 53 Semi Urban) associated with teacher education using convenient sampling techniques Since, in this objective three groups of participants are compared therefore ANOVA was used for analysis of data. But before using ANOVA, the first assumption of normality of the score of dependent variables for each level of IV was tested using Kolmogorov-Smirnov test. Table 6 shows statistical tests of Normality at different levels.

Table-6: Tests of Normality for Readiness Scores of rural, urban and semi urban participants towards blended learning approach

Criterion Variable: Readiness towards blended learning approach							
	Locale	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Readiness Scores towards Blended Learning Approach	Rural	.127	224	.000	.929	224	.000
	Urban	.123	213	.000	.926	213	.000
	Semi urban	.125	53	.037	.920	53	.002
a. Lilliefors Significance Correction							

From table-6 it is evident that the statistical value of Kolmogorov-Smirnov test of the Readiness Scores of rural participants and urban participants towards blended learning approach are 0.127, 0.123 respectively, whose probability of significance at df (224) , df (213) is 0.000 which is less than 0.01, hence significant at 0.01 level of significance. In this perspective the null hypothesis "The given distribution of the readiness scores of rural and urban participants towards a blended learning approach do not differ significantly from the normal distribution" is rejected. Therefore, it can be concluded that the assumption of normality of readiness scores of rural and urban participants towards a blended learning approach is not satisfied or it is violated.

Further, the above description indicates that the readiness scores of rural and urban participants are not normally distributed and readiness scores of semi urban participants are normally distributed. Because the first assumption of the normality of data of one-way ANOVA is not satisfied at all the levels of dependent variables, hence we use Kruskal Wallis H Test for further analysis which is an alternative non parametric statistics technique of one- way ANOVA. Further, before applying Kruskal Wallis H Test, all the assumptions related to Kruskal Wallis H Test were also tested which are given below:

Assumption#1- Independence of the Groups

According to this assumption all the three samples (Rural, Urban and Semi Urban) should be independent of each other i.e. selection of subjects of one sample should not be affected by the selection of subjects of another sample. It is clear from the observation of independent variable, there is independence of the observation in collecting rural, urban and semi urban groups.

Assumption#2 The scores of dependent variables must be at least on ordinal scale

On the basis of observation of the scores of dependent variables, it is clear that these scores are on interval scale. Therefore, the second assumption of Kruskal Wallis H Test that the scores of dependent variables must be at least on ordinal scale, is also fulfilled.

Assumption#3 Uniformity of distribution of dependent variable at both levels of independent variable

This assumption holds whether the distribution of scores of dependent variables for all the groups of independent variables (Rural, Urban and Semi Urban) has the same shape or a different shape. For testing it, graphical representation was used and uniformity found.

Assumption#4 Equality of variances (Non parametric)

For testing this assumption non parametric levene's test for equal variance is used. The results of ANOVA related to this assumption are presented in the following table -7.

Table-7: ANOVA to check the assumption of equality of variances (non-parametric) on the basis of Locale

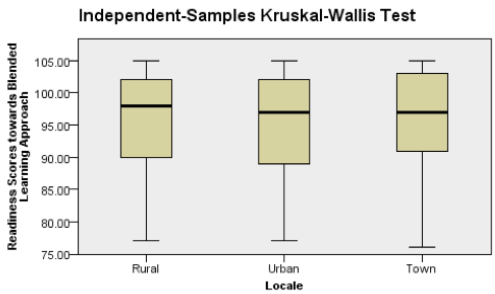
Criterion Variable: Readiness towards blended learning approach					
	Sum of Squares	df	Mean Square	Sig.	Remark
Between Groups	2147.204	2	1073.602	.217	.805
Within Groups	2410459.850	487	4949.610		
Total	2412607.053	489			

Table-7 shows that the F- value of ANOVA test is 0.217 whose probability of significance (df=2, 487) is 0.805 which is greater than 0.05, hence not significant at 0.05 level of significance. Hence, the null hypothesis "the readiness scores of rural, urban and semi urban participants do not significantly deviate from non-parametric variance, is not rejected. Therefore, it can be concluded that the assumption of equality of variance (Non-Parametric) is satisfied.

Assumption#5 Assumption of sample size

This assumption holds that sample size should not be less than four in all the three groups of IV. In the present study sample size is more than 4 in each group of IV, hence the fifth assumption of Kruskal Wallis H Test is also fulfilled. After testing and fulfilling all the statistical assumptions related to Kruskal Wallis H Test, the collected data were analysed with the help of Kruskal Wallis H Test. The results have been presented through figure-3.

Figure-1: Readiness Scores of Male and Female Participants towards using blended learning approach for teachers' preparation



Total N	490
Test Statistic	.536
Degrees of Freedom	2
Asymptotic Sig. (2-sided test)	.765

1. The test statistic is adjusted for ties.
2. Multiple comparisons are not performed because the overall test does not show significant differences across samples.

Table-8: Summary of Kruskal Wallis H Test for Mean Rank Readiness Scores of rural, urban and semi urban participants towards Blended Learning Approach

Ranks					
	Locale	N	Mean Rank	Sig.	Remark
Readiness Scores towards blended learning approach	Rural	224	248.66	0.765	Not Significant
	Urban	213	240.36		
	Semi urban	53	252.82		
	Total	490			

It is evident from the above columnar that both the three groups can be considered uniform because of excess similarity in the distribution of dependent variable in both the three groups. Therefore, it can be undoubtedly said that p- value obtained from the Kruskal Wallis H Test is reliable, further it is evident from the table that the test statistics of the readiness scores of rural, urban and semi urban participants is K= 0.536 whose probability of significance is 0.765 which is more than 0.05, hence not significant at 0.05 level of significance, therefore the null hypothesis "There is no significant difference in mean rank of readiness scores of rural, urban and semi urban participants" is not rejected, It is clear from the above figure that the mean rank of readiness scores of rural participants is 248.66 which is similar to that of urban and semi urban participants whose mean rank of readiness scores is 240.36 and 252.82. Hence, it can be said that rural, urban and semi urban participants have similar readiness towards using a blended learning approach for teachers' preparation.

Readiness of Teacher Educators, Research Scholars and Pupil Teachers towards using blended learning approach for teachers' preparation

The fourth objective of the present research was to compare readiness of Teacher Educators, Research Scholars and Pupil Teachers towards using a blended learning approach. For this, 490 participants (106 Teacher Educators, 105 Research Scholars and 279 Pupil Teachers) associated with teacher education were selected using convenient sampling techniques. Since, in this objective we were comparing three groups so it was suggested to use ANOVA for the analysis of data. But before using ANOVA, the first assumption of normality of scores of dependent variables for each level of independent variable was tested.

Table-9: Tests of Normality for Readiness Scores of teacher educators, research scholars and pupil teachers towards blended learning approach

Criterion Variable: Readiness towards blended learning approach							
Category	Designation	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Readiness Scores towards blended learning approach	Teacher Educators	.126	106	.000	.919	106	.000
	Research Scholars	.135	105	.000	.923	105	.000
	Trainee	.117	279	.000	.929	279	.000
a. Lilliefors Significance Correction							

From table-9, it is evident that the statistical value of Kolmogorov-Smirnov test of the Readiness Scores of Teacher Educators, Research Scholars and Pupil Teachers is 0.126, 0.135 and 0.117 respectively, whose probability of significance at df (106), df (105) and df (279) is 0.000 which is less than 0.01, hence significant at 0.01 level of significance. In this perspective the null hypothesis "The given distribution of the readiness scores of teacher educators, research scholars and pupil teachers towards a blended learning approach differ significantly from the normal distribution" is rejected. Therefore, it can be concluded that the assumption of normality of readiness scores of Teacher Educators, Research Scholars and Pupil Teachers is not satisfied or it is violated.

The above description indicates that the readiness scores are not normally distributed. Because the first assumption of the normality of data of one-way ANOVA is not satisfied at all the levels of dependent variables, hence we use Kruskal Wallis H Test (alternative non parametric statistics technique). Further before applying Kruskal Wallis H Test, all the assumptions related to Kruskal Wallis H Test were also tested, which are given below:

Assumption#1- Independence of the Groups

It is clear from the observation of independent variable that there is independence of the observation in collecting rural, urban and semi urban groups. Therefore, the first assumption of Kruskal Wallis H Test of Independence of the Groups is fulfilled.

Assumption#2 The scores of dependent variables must be at least on ordinal scale

It is clear that these scores are on an interval scale. Therefore, the second assumption of Kruskal Wallis H Test that the scores of dependent variables must be at least on ordinal scale is fulfilled.

Assumption#3 Uniformity of distribution of dependent variable at both levels of independent variable

This assumption holds whether the distribution of scores of dependent variables for all the groups of independent variables (Teacher Educators, Research Scholars and Pupil Teachers) have the same shape. For testing it, graphical representation was used and Uniformity found.

Assumption#4 Equality of variances (Non parametric)

For testing this assumption non parametric levene's test for equal variance was used. The results of ANOVA related to this assumption are presented in the following table-10.

Table-9: Tests of Normality for Readiness Scores of teacher educators, research scholars and pupil teachers towards blended learning approach

Criterion Variable: Readiness towards blended learning approach					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1927.727	2	963.863	.194	.823
Within Groups	2416070.186	487	4961.130		
Total	2417997.913	489			

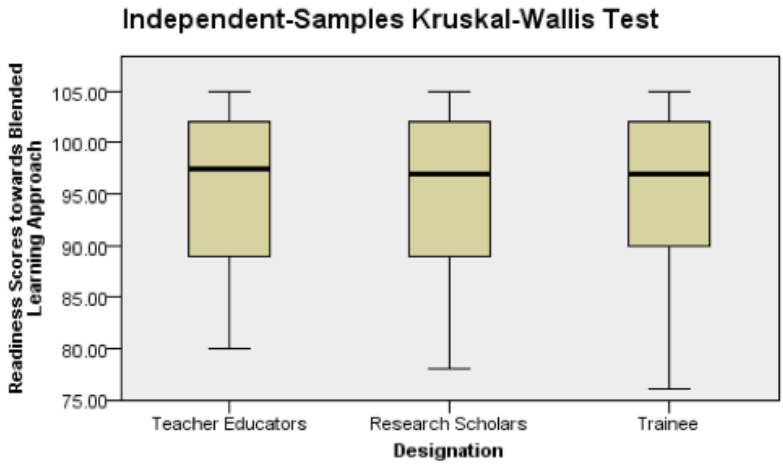
Table-10 shows that the F- value of ANOVA test is 0.194 whose probability of significance (df=2, 487) is 0.823 which is greater than 0.05, hence not significant at 0.05 level of significance. Hence, the null hypothesis "The readiness scores of teacher educators, research scholars and pupil teachers' participants towards blended learning approach do not differ significantly from non-parametric variance. is not rejected. Therefore, it can be concluded that the assumption of equality of variances (Non-Parametric), is satisfied.

Assumption#5 Assumption of sample size

This assumption holds that sample size should not be less than four in all the three groups of IV. In the present study, sample size is more than 4 in each group of IV. Hence, the fifth assumption of Kruskal Wallis H Test is also fulfilled.

After testing and fulfilling all the statistical assumptions related to Kruskal Wallis H Test, the data related to the second objective were analysed with the help of Kruskal Wallis H Test. The results are presented below through fig-4.

Figure-4: Summary of Kruskal Wallis H Test for Mean Rank Readiness Scores of teacher educators, research scholars and pupil teacher



Total N	490
Test Statistic	.009
Degrees of Freedom	2
Asymptotic Sig. (2-sided test)	.996

1. The test statistic is adjusted for ties.
2. Multiple comparisons are not performed because the overall test does not show significant differences across samples.

It is evident from the columnar that both the three groups can be considered uniform because of excess similarity in the distribution of dependent variable in both the three groups. Therefore, it can be undoubtedly said that p- value obtained from the Kruskal Wallis H Test is reliable, further it is evident from the table that the test statistics of the readiness scores of teacher educators, research scholars and pupil teachers towards blended learning approach is K= 0.009 whose probability of significance is 0.996 which is more than 0.05, hence not significant at 0.05 level of significance, therefore the null hypothesis "There is no significant difference in mean rank of readiness scores of Teacher Educators, Research Scholars and Pupil Teachers towards blended learning approach" is not rejected,

Table-12: Summary of Kruskal Wallis H Test for Mean Rank Readiness Scores

Ranks					
	Designation	N	Mean Rank	Sig.	Remark
Readiness Scores towards blended learning approach	Teacher Educators	106	246.09	0.996	Not Significant
	Research Scholars	105	246.26		
	Pupil Teachers	279	244.99		
	Total	490			

It is also clear from table-12 that the mean ranks shown in the figure of readiness scores of teacher educators towards blended learning approach is 246.09 which is similar to that of research scholars and pupil teachers where mean rank of readiness scores is 246.26 and 244.99. Hence, it can be said that Teacher Educators, Research Scholars and Pupil Teachers have similar readiness towards a blended learning approach.

Findings of the research

The following are the findings of the present research:

1. The mean readiness scores of all the participants towards using a blended learning approach for teacher's preparation found to be favorable. Further, the standard deviation shown relatively small variations and coefficient of variance is quite low, hence it reflects that teacher, research scholars and pupil teachers have high readiness towards using blended learning approach for teachers' preparation. The results also indicate that, as a group the readiness towards using a blended learning approach was almost irrevocable and favorable. It may, therefore be concluded that all the participants of teacher education have high readiness towards using a blended learning approach for teachers' preparation.
2. The mean readiness scores of participants towards using blended learning approach in teachers' preparation do not differ significantly when compared on the basis of gender, hence the null hypothesis "there is no significant difference in mean readiness scores of male and female participants towards using blended learning approach for teacher's preparation" is not rejected. It may therefore be concluded that readiness of male and female participants was found to be equally positive.
3. The mean readiness scores of participants towards using blended learning approach in teachers' preparation do not differ significantly when compared on the basis of locale, hence the null hypothesis "there is no significant differences in mean readiness scores of rural,

urban and semi urban participants towards using blended learning approach for teachers preparation" is not rejected. It may therefore be concluded that readiness of rural, urban and semi urban participants found to be equally positive.

4. The mean readiness scores of participants towards using blended learning approach in teachers' preparation do not differ significantly when compared on the basis of level, hence the null hypothesis "There is no significant difference in mean readiness scores of teacher educators, research scholars and pupil teachers towards using blended learning approach for teachers preparation" is not rejected. It may therefore be concluded that readiness of teacher educators, research scholars and pupil teachers were found to be equally positive.

Discussion on findings

The objective wise findings of the present study have been discussed.

To study the readiness of teacher educators, research scholars and students towards using blended learning approach for teachers' preparation.

It is clear from the above results that the mean readiness scores of participants towards using blended learning approach for teachers' preparation found to be favourable. The results also indicate that, as a group, the readiness towards using a blended learning approach were almost irrevocable and favourable. This is a positive finding. These findings were supported by Korkmaz & Karakus (2009); Adas & Shmais (2011); Alseweed (2013); Nordin & Alias (2013); Aldalalah & Gasaymeh (2014); Gyamfi & Gyaase (2015); Ja'ashanl (2015); Angadi (2016); Khan (2016); Qiang (2016); Bakeer (2018); Birbal, Ramdass & Harripaul (2018); Sari (2019). Thus, the above description reflects that using a blended learning approach may prove beneficial for teachers' preparation.

To compare the mean readiness score of male and female participants towards using a blended learning approach for teachers' preparation.

The mean readiness scores of participants towards using blended learning approach in teachers' preparation did not differ significantly when compared on the basis of gender, It may therefore be concluded that readiness of male and female participants found to be equally positive and both are ready to incorporate blended learning for internship activities. This finding has been supported by Korkmaz & Karakus (2009); Adas & Shmais (2011); Alseweed (2013); Angadi (2016); Khan (2016); Qiang (2016); Bakeer (2018); Birbal, Ramdass & Harripaul (2018). Thus, the above description reflects that using a blended learning approach may prove beneficial for teachers' preparation and gender have no effect on its effectiveness.

To compare the mean readiness score of rural, urban and semi-urban participants towards using a blended

learning approach for teachers' preparation.

The mean readiness scores of participants towards using a blended learning approach in teachers' preparation did not differ significantly when compared on the basis of locale. It may therefore be concluded that readiness of rural, urban and semi-urban participants found to be equally positive and all are ready to incorporate blended learning for internship activities. This finding has been supported by Adas & Shmais (2011); Alseweed (2013); Nordin & Alias (2013). Thus, the above description reflects that using a blended learning approach may prove beneficial for teachers' preparation and locality has no effect on its effectiveness.

To compare mean readiness scores of teacher educators, research scholars and pupil teachers towards using blended learning approach for teachers' preparation

The mean readiness scores of stakeholders (teacher educators, research scholars and pupil teachers), towards using a blended learning approach in teachers' preparation do not differ significantly and found to be equally positive. They are ready to incorporate blended learning for internship activities. This finding is supported by Adas & Shmais (2011); Alseweed (2013); Nordin & Alias (2013). Thus, the above description reflects that using a blended learning approach may prove beneficial for teachers' preparation and experience have no effect on its effectiveness.

(Acknowledgement: Author is thankful to ICSSR IMPRESS scheme for the financial support for conducting this research study successfully)

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Research Article

Inside Online Classrooms: Teachers' Online Teaching Experiences during COVID-19 Pandemic

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Abstract

As a preventive measure to control the spread of the novel coronavirus nationwide lockdown was imposed in India in March. Since then schools in Delhi have been closed and online teaching is being done to prevent academic losses. Teachers went through a sudden shift from classroom teaching to online teaching. Online teaching is new to teachers. In the absence of any standard protocol or a structured approach, it is being delivered in varied ways. The current study explores the experiences of teachers and the opportunities and challenges felt during online teaching. This qualitative study was done using an online questionnaire and telephonic interviews with eight teachers working in different private and government schools in Delhi. Teachers mainly relied on WhatsApp to connect with students and found online teaching interesting and interactive. Major challenges highlighted were the non-availability of smartphones and the internet, the speed of the internet, and the lack of student motivation.

Keywords: Online teaching, Teachers, Schools, COVID-19, Pandemic

Introduction

On 31 December 2019, a cluster of cases of pneumonia caused by novel coronavirus was identified in Wuhan City of Hubei province, China and within a few months, there was a 13-fold increase in outside China cases of COVID-19 as a result of which WHO declared COVID-19 a global pandemic on 11 March 2020 (Prasad, 2020). On 30 January, India had its first case in Kerala.3 new cases came by February 3, 2020 with no significant rise till March (Rawat, 2020). 4 March 2020 became the tipping point when the number of Corona positive cases rose to 28, including 12 Indian citizens and 16 Italian tourists (Outlook Web Bureau, 2020). As the cases of Coronavirus disease began to rise in India, on 24 March 2020 nationwide lockdown was imposed. Almost all sectors including industries, aviation, banking, retail, education, etc. stopped working with immediate effect. The education of students across the country got adversely affected due to the closure of schools. Disrupted classrooms raised concerns amongst the state authorities and in no time schools switched to online teaching (Asian

News International, 2020; Sharma, 2020). Teachers overnight adapted to a completely new form of teaching. The literature review showed that efforts for online teaching were in progress for quite some time and e-learning was possible via MOOCs (Dhawan, 2020, p.13). India boasts of having the world's largest free online e-learning platform SWAYAM, as illustrated on the AICTE website. India has been prepping up for online education by developing a gamut of e-resources like NPTEL, Virtual labs, A-VIEW, Consortium of Educational Communication (CEC), digital libraries, ePathshala, e-PG Pathshala, DIKSHA, SWAYAM Prabha, Gyandarshan. But, online education did not get much foothold.

The unprecedented circumstances created by COVID-19 pandemic resulted in a switch to online teaching and learning and what the world saw was a mega educational experiment in action. Education in the year 2020 was supported by online platforms that included learning management systems (LMSs) like Google classroom, Microsoft teams, Edmodo, EduPage; video sharing websites like TEDEd, YouTube; instant messaging platforms like WhatsApp, Gmail; video conferencing apps like Zoom, Google meet, Google hangouts, Skype; online assessment tools like Quizizz, Google forms, Kahoot (Addimando et al., 2021; Atmojo & Nugroho, 2020; Basilaia & Kvavadze, 2020; Sharma, 2020). As there were no pre-designed strategies to run online education for a prolonged period, every country came up with dynamic solutions. Various challenges and opportunities surfaced during this period of online teaching.

Challenges of Online Teaching

Indian e-learning scenario has always been plagued by challenges of equity and access, digital divide, low digital literacy. Ensuring quality education is another major challenge (Dhawan, 2020, p.14). Some basic challenges faced during implementation of online teaching are poor network especially in remote areas, lack of smartphones, distraction, low cyber literacy, the requirement of technical support, need of designing specific online curriculum and creating online teaching content, the requirement of training teachers in skills like online interactions and online assessment, the additional cost of internet and hardware, added responsibility on teacher to provide technical support to students, difficulty in dealing with individual differences and ensuring student engagement (Atmojo & Nugroho, 2020; Hasan & Khan, 2020; Kaup et al., 2020; Slimi, 2020; Wedenoja, 2020; Zhang et al., 2020). Regular teaching material, methods, and assessment techniques cannot be used in online teaching. But, instead of delivering specialized content designed for the online mode of teaching, often teachers use classroom teaching content in online classes (Fedynich, 2014; Wedenoja, 2020; Zhou et al., 2020). Successful delivery of online teaching depends heavily on the technological abilities of both teachers and students. In the case of school students, lesser access and exposure to online learning tools, difficulty in time management, lack of students' motivation, social isolation

are also some barriers (Fedynich, 2014; Tamm, 2019; Windiarti et al., 2019; Wedenoja 2020). Online teaching becomes challenging especially in the case of the young learners as they may not have the basic technical skills like texting and sharing attachments. In online teaching, there is a limited scope of hands-on activities and interaction required to engage young learners (Kim, 2020, p.148). Another limitation is the additional requirement of parental support and supervision for online learning of young learners. Online teaching put a burden on teachers, in a short span they had to understand the use of digital tools, apply them and try different teaching strategies. Alongside, they had to stay in contact and ensure the well-being of students (König et al., 2020). Designing online assessment and ensuring quality is another challenging task for teachers (Kaup et al., 2020; König et al., 2020; Slimi, 2020; Tamm, 2019). Security and privacy concerns of teachers and students, difficulty in teaching practical aspects are added challenges. Online teaching suffers due to the lack of regulation, technology infrastructure, and funding (Slimi, 2020).

Opportunities of Online Teaching

Due to the increase in the access of touch screen smartphones and the internet; online tools are being used by children from a very young age (Kim, 2020, p. 149; Edwards et al., 2018). Leveraging upon this, online teaching was prescribed from primary to higher education level during the COVID-19 crisis in India. Online mode of learning offered features like flexibility, accessibility of content, interaction, self-paced learning from the comfort of home. These features along with the affordance to teach from anywhere anytime made online teaching a global solution for continuing education (Hasan & Khan, 2020, p. 206; Kim, 2020, p. 148). Online teaching provides an opportunity for synchronous as well as asynchronous communication which increases student participation. Online tools are useful in giving creative activities to students and save time and cost of travel (Fedynich, 2014; Kim, 2020, p. 149). Online teaching helps in reforming the methods of teaching in line with the needs of the digital age (Zhou et al., 2020). Using online platforms teachers could communicate regularly with students and parents, provide learning content, assign work and provide requisite feedback (König et al., 2020, p. 615). Screen sharing during synchronous online classes was appreciated by teachers (Basilaia & Kvavadze, 2020; Kim, 2020, p. 151). Online teaching during pandemic has helped in refining the technical skills of teachers and students. Online learning has developed critical thinking and problem solving in students and improved their information searching skills. It has also highlighted the need for upgrading the technology infrastructure of educational institutions and the need for the preparation and training of students and teachers (Slimi, 2020, p.47). The flexibility of time and space possible through online teaching appeared as its biggest strength in times of crisis and online teaching done in virtual classrooms by qualified teachers served as the best-suited substitute for traditional classroom teaching (Manegre & Sabir,2020).

Lack of impetus and resistance of stakeholders; had kept online teaching at bay. But, these desperate times have called for desperate measures. Due to the COVID-19 pandemic opening of schools appears perilous. In Delhi at the beginning of September 2020, the total confirmed positive cases soared to 1.7 million and cases have been coming each day (Ministry of health and family welfare website). In the given scenario, online teaching has become the new normal across all schools of Delhi.

Research Question

This study is an attempt to address the following research questions:

1. What types of online teaching practices are being followed by school teachers amid the COVID-19 pandemic?
2. What opportunities and challenges were felt by school teachers during online teaching?

Objectives of the study

1. To study the online teaching practices being followed by the teachers teaching primary, secondary, and senior secondary students amid the COVID-19 pandemic.
2. 2. To identify the perceived opportunities and challenges of online teaching.

Methodology

Sample of study

The present study follows a qualitative design of research. The sample of the study includes 8 teachers. There are 5 PRT (Primary Teacher), 1 TGT (Trained Graduate Teacher), 2 PGT (Post Graduate Teacher) teaching in 7 different private and government schools of Delhi. Out of 8 respondents, 6 are females and 2 are males. The age of respondents is between 30 to 57 years. The respondents are of varying teaching experience ranging from 3 years to 34 years. Teachers who were conducting online classes during the lockdown and were willing to participate were chosen as respondents for the present study.

Data collection tools

Data collection was done using an online questionnaire and semi-structured telephonic interviews. The questionnaire included 17 questions, with 7 questions related to personal details about gender, classes taught, teaching subject, designation, etc, and 10 questions related to teacher's online teaching experiences with 2 multiple choice questions and 8 open-ended questions.

Data collection and analysis

Data collection was done during June-July 2020 from the respondents who were taking online classes from the first week of April 2020. Thematic analysis of responses of the participants was done and the responses were divided into three broad sections: online teaching practices of teachers, challenges faced and opportunities discovered which are presented in detail in the next section.

Analysis and interpretation

The 8 teacher participants are referred to as T1, T2, T3, T4, T5, T6, T7, and T8 to maintain anonymity. The demographic details and general information provided by the teachers are summarized in table 1.

Table-1: Details of Respondents

Teacher	Gender (Female: F, Male: M)	Class (es) taught	Subject(s) taught	Designation	Experience (years)	Type of school	Students in contact/ Total Strength	Platforms used for online teaching
T1	F	I and II	English, Hindi, EVS	PRT	10	Private	45/45	WhatsApp, email, Microsoft Teams, YouTube
T2	F	III	English, Hindi, Mathematics, Social Science, EVS, Drawing	PRT	5	Govt.	22/40	WhatsApp, YouTube
T3	F	II	English, Hindi, Mathematics, Social Science, EVS, Drawing	PRT	5	Govt.	16/31	WhatsApp, YouTube
T4	M	V	English, Hindi, Mathematics, Social Science, EVS, Drawing	PRT	19	Govt.	10/40	WhatsApp, YouTube
T5	F	I	English, Hindi, Mathematics, Social Science, EVS, Drawing	PRT	14	Govt.	19/41	WhatsApp
T6	F	X	Natural Sciences	TGT	5	Govt.	96/117	WhatsApp, YouTube, Google Forms, Kahoot
T7	F	XII	Political Science	PGT	3	Govt.	50/50	WhatsApp, Zoom, Skype

T8	M	XII	Painting	PGT	34	Govt.	45/50	WhatsApp, Google, YouTube, Google Meet

1. Online teaching practices of teachers

The first objective was to study the online teaching practices being followed by the teachers teaching primary, secondary, and senior secondary students amid the COVID-19 pandemic. For this, the platform used for online teaching, plan of online teaching, type of teaching session, and online teaching strategies of teachers were studied.

a) Platform used for online teaching

In schools of Delhi, WhatsApp and YouTube are the most used platforms across all levels (column 9, table1). The preferred use of WhatsApp is due to its availability in most households. It emerged as a platform of choice for online learning because it is easy to access as a free mobile app and is a user-friendly platform. It has features like texting, networking, file sharing, audio recording, audio and video calling which makes it suitable for discussion, knowledge sharing, communication, and collaboration.

"Students would submit assignments on WhatsApp and I would check and give them remarks"..(T6)

"I searched teaching content on Google and YouTube and sent it to my students through WhatsApp...explained the theory to the students by audio recording and gave instructions through WhatsApp...The students submitted their work by sending photos on WhatsApp"..(T8)

A teacher also highlighted the possibility of record-keeping using virtual storage space available through WhatsApp.*"Also through WhatsApp keeping the record of whatever is taught to them is easy and also (students) they can revise it anytime".. (T3)*

YouTube, a video platform with millions of videos, provides easy search and sharing options. It is free to access and does not require having an account. Videos on YouTube are used by teachers as a quick fix teaching aid. *".. interesting videos (shared online) are a nice method and better than methods used in the classroom"..(T4)*

b) Plan of online teaching

The plan of teaching has been flexible at the primary, secondary, and senior secondary levels (column 3,table2).

".. Every day in primary class one subject is enough. In MCD schools, parents are mostly daily wagers...so flexibility be given for students to let them complete homework at any time"..(T2)

"In regular teaching, there were boundaries of periods which is no more"..(T8)

This flexibility is partly due to the very nature of online teaching and partly to accommodate the shift from classroom teaching to online teaching.

c) Type of teaching session

Teachers employ mostly asynchronous sessions at all levels (column 4, table 2). But at the primary level, T1 teaching in a private school uses "live session to clear the concepts" using Microsoft teams. She shares the schedule of classes with parents. Students of private schools have parents who are digitally literate and can provide requisite resources and assistance. T7, a political science teacher in the government school, also prefers synchronous teaching sessions. Along with the issues of network and lack of resources, she faces difficulty while using the platform and in assisting the students but she finds live teaching more satisfying. She shares, *"First I used the zoom app for conducting online classes as it was most easy to handle but later due to safety concerns I switched to another alternative Skype. It was a bit difficult for me as well as for students"*.

Table-2: Plan of online teaching and type of teaching session

Teacher	Teaching level	Plan of online teaching	Type of teaching session
T1	Primary	Flexible	Mostly synchronous and sometimes asynchronous
T2	Primary	More often flexible sometimes fixed	Asynchronous
T3	Primary	Flexible	Asynchronous
T4	Primary	Flexible	Asynchronous
T5	Primary	Flexible	Asynchronous
T6	Secondary	Flexible	Asynchronous
T7	Senior Secondary	Flexible	Mostly synchronous and sometimes asynchronous
T8	Senior Secondary	Flexible	Asynchronous

d) Online teaching strategies of teachers

The teaching strategy adopted during online teaching appears as a mix of traditional methods with an increased use of multimedia delivered through online platforms. Some efforts are visible where teachers are trying a combination of online tools to make remote teaching more effective. Instructions are given using WhatsApp; Lecture or explanation of content done through Google meet, Microsoft teams, Zoom, Skype and by audio notes on WhatsApp; Support material includes worksheets, pdf of notes and NCERT ebook; Teaching Aid includes, YouTube videos, e-content from Google; assessment is done using WhatsApp, Google forms and Kahoot,

Teaching strategies for primary students

In government schools, teachers are using multimedia like audio, YouTube video, pictures, presentations, games to engage students. Sharing worksheets is the most preferred way of teaching primary students.

> *"Colorful worksheets and interesting videos (shared online) are a nice method …Children are more attentive and attracted to audio-visual aids which can be used in online classes".. (T4)*

> *.."more suitable is giving worksheets. Most students respond to this method. They are eager to know the teacher's responses to their work"..(T5)*

Instructions are given by audio message, copies corrected by pictures sent by students, remarks given in audio/text messages on WhatsApp.

"Question and answer session, ppt, video (from the internet), tutorial video (self-made), assignment, live session to clear the concepts" via Microsoft teams are all part of online teaching being done by (T1) a primary teacher of private school. The school has purchased the license and trained teachers to communicate remotely and to conduct synchronous teaching sessions. The teacher would share the schedule and instruct on WhatsApp.

Teaching strategies secondary students There is use of a variety of multimedia resources (text, audio, video, ppt), online platforms (WhatsApp, YouTube, Kahoot), and online resources (e-book, Google form) to teach students. As secondary level students can follow instructions easily, the teacher tried to engage them through various platforms.

> *"I started by sharing some notes on class WhatsApp groups and made ppts for the students. I would then share the pdf of the chapter from the NCERT book and for a better understanding of students, I would share (self-recorded) audio, ppts, Youtube videos followed by home assignments. I also took tests using Google forms and held quizzes on Kahoot"..(T6)*

Teaching strategies for senior secondary students

A political science teacher of a government school used a combination of synchronous and asynchronous sessions using Zoom, Skype, and WhatsApp. She had to initially give technical assistance to her class XII students regarding live online classes. …. *"all the students were able to see it properly and were able to follow my instructions".. (T7).* Later students could easily join classes. A fine arts teacher with 34 years of classroom teaching experience resorted to YouTube for teaching painting skills and used e-content from Google. *"I searched teaching content on Google and YouTube and sent it to my students through WhatsApp"..(T8)*

2. Challenges faced by the teachers

Online teaching perplexed teachers and brought a bunch of challenging situations. Some of the challenges are due to the digital divide and some are a result of an unplanned switch to online teaching.

a) Lack of devices and internet

In private schools, the teacher can connect with 100percent of students. In contrast, teachers teaching in

government primary schools can connect with only 44.08percent of students. At the secondary level, the teacher can connect with 82.05percent of students and 95percent at the senior secondary level (column 8, table1). The non-availability of devices is the main reason for limited reach.

> *"The main issue in online teaching is that we are not able to connect with all the students as they are not having any resource with them"..(T3)*
>
> *"But the only negative part is that many parents still do not have a smartphone or sufficient (internet) data"..(T4)*
> *"all students are not accessible as everyone is not having smartphones and sufficient data" ..(T5)*
>
> *"Students do not have personal smartphones/laptops. Students often message to inform me that they missed some information as their father took the phone to work"..(T6)*

b) Cost of internet

Another challenge in many low-income families is the financial burden of providing internet for their child's learning. *"I feel the cost of the internet might be a burden as well"..(T6).* As pointed out by T2 *"parents are mostly daily wagers"* and most of them lost their work during the COVID-19 crisis. Providing the internet to sustain the education of their children is difficult. T7 felt that *"more (internet) data consumption"* restricts students from participating in online activities. Many govt. school teachers are restricted to sharing audio messages, text, and pictures to avoid heavy data consumption.

c) Internet speed and network quality

This is a problem faced by teachers who take live classes through video conferencing which is dependent upon the speed and quality of the internet.T1 and T7 find *"poor network"* a challenge while taking live classes. *"Another problem was that the voice clarity was not good where there was a network issue at the residence of a few students"..(T7).*

d) Lack of Parental support

Due to the sudden implementation of online teaching, students were not prepared to learn online. In such a scenario, parental support is required for smooth online learning. T2, a government primary school teacher said, *"those kids whose parents are illiterate are not able to cope up with online classes".* In government schools, many students are first-generation learners who cannot take the help of their parents and with little or no digital skills they fail to participate in online classes.

e) Non-responsiveness of students

Teachers teaching primary and secondary students found difficulty in ensuring the active participation of students. While teaching through remote means, teachers could not ensure 100percent participation. T2 shared *"60percent of students responded timely and almost daily". T3 also said, "many of my students are not responding online". Another primary teacher T4 said, "students are not responding despite so many reminders only a few students gave the response". "Keeping students motivated to learn is also difficult while*

teaching online"..(T6). Teachers struggle without any guidance about strategies to ensure the motivation and participation of students in online environments.

f) Disturbance

During online teaching students learn from home. And if the entire family is staying in a small place due to lockdown, it becomes a very inadequate space for learning. T7 during her online classes noted, *"most of the time the sounds from their houses or of other people were coming and were disturbing the class".*

g) Difficulty in hands-on practice

T8 specifically pointed this out, as he teaches painting which requires demonstration and hands-on practice. His concern was, *"Practical cannot be conducted in online teaching... demonstration to show the skills of painting is difficult online".* This challenge is often felt by science, vocational, fine arts, and performing arts teachers.

h) Feeling of isolation

A classroom is also a place of social learning. Online teaching misses this aspect as learners participate from different spaces. T8 shared, *".. in online teaching physically the students cannot be connected".*

> *"While conducting the classes I noticed that most of the students were reluctant about showing themselves on the camera...sometimes I felt uncomfortable because I wanted all my students to show themselves on the camera so that I can see their faces"..(T7*

3. Opportunities faced by the teachers

The fact that the entire world resorted to online teaching in times of pandemic, states a lot in itself about the opportunities online teaching and learning provides. In the present study, following opportunities were revealed.

a) Anywhere-Anytime learning

Online teaching ensures anywhere-anytime learning. During the pandemic, this advantage of online teaching has helped in the safe and continuous learning of the student. In the state of crisis, online teaching appeared useful as *"We can reach all students who have smartphones"..(T7)*

> *"Online teaching brought a lot of opportunities like anytime, anywhere teaching and learning. Remotely I can reach my students while we all stay safe in our homes".. (T6)*

> *"students can be connected anytime... In regular teaching there were boundaries of periods which is no more"..(T8)*

b) Easy sharing of a variety of multimedia

The online platform allows easy access and sharing of multimedia resources. They are user-friendly due to which teachers from varying age groups in the present study have used online file sharing tools to share learning material.

> *"Through online teaching, I am able to use audio-visual aids very well".. (T3)*

> *"In classrooms, it's not possible to show videos and give attractive worksheets"..(T5)*

"I can now use a variety of engaging ways and various audio-visual resources easily"..(T6)

".. there was one good thing which I noticed was that of screen sharing and of reading out the content"..(T8)

c) Interesting and engaging learning

Online teaching provides the scope of using interactive aids like *"videos and games" (T4)* which appeals to the learner and increases engagement.

"This method of teaching is more interesting for students as well"..(T5)

"Because of the live interaction on the online classes students were able to ask their doubts and their doubts were immediately cleared by me so this was a plus point of live interaction through an online class"..(T7)

d) Flexibility in deciding schedule and content

During online teaching, teachers were not restricted to any set pattern and could customize their teaching based on their judgment. T5 *shares, "We are allowed to share material at our level also". T1 now has her own "choice of teaching hours"* and she finds it more satisfying than the fixed schedule of classroom teaching.

e) Professional development

Online teaching has exposed teachers to a variety of online teaching tools. *"I have learned so many new things that are going to be useful in the future"(T6).* They have got experience in designing online content and online assessment. They have understood the need of learners in online environments. They have developed skills like problem-solving and critical thinking.

Discussion

From the analysis, it appears that apart from holding the fort in times of crisis, online teaching in the year 2020 gave a fresh perspective to all educators and students. It did serve the purpose of continuing education during tough times and helped in testing the potential of available online resources.

Online teaching practices of teachers

Platform of teaching

The online platform WhatsApp is ubiquitous at all levels and in both govt. and private schools. The ease of use and availability of this platform as a mobile app in almost every smartphone used in India made it more useful than any learning management system. These findings are consistent with the observation and findings of Alubthane & ALYoussef (2021, p.47,48) , Barhoumi (2015, p.236), Dhillon (2020), and Hasan & Khan (2020, p.206), Hulst (2020), Sharma(2020).

Plan of teaching

Teachers are preferably using a flexible plan and asynchronous session as school students do not have enough exposure and access to online tools. As a consequence, they have limited digital skills. Similar findings are seen in the work of Fedynich (2014), Kim (2020) and Wedenoja (2020). Access to the internet and smartphone is also an issue which deters teachers from having more

synchronous sessions.

Teaching strategies

As there were no standardized materials and methods specific for online teaching, teachers ended up replicating traditional teaching on online platforms. Online teaching requires a specific course design and transaction methods. If classroom teaching practices are used while teaching online then students do not perform well (Wedenoja, 2020). Providing worksheets during online teaching was found useful by primary teachers. Worksheets provided content in a structured manner and manageable chunks so that students can practice properly and teachers can easily check the work and provide required feedback (Martin, 2020).

Challenges faced by teachers

The challenge of lack of devices and internet is due to the problems of equity and access and stark digital divide in our country. Online teaching during pandemic has only widened the gap between haves and have-nots. Parental support is seen missing due to the low economic status of the family and no/low digital literacy of parents. Internet speed and network quality is a digital infrastructure issue that can be resolved. Challenges of non-responsiveness of the students and difficulty in hands-on practice are observed as teachers and students were least prepared for this mode of education. One striking observation was the feeling of isolation in online classes. In live video classes, teachers often find it difficult to teach a screen of black boxes and students feel more vulnerable to keep their cameras on as they do not feel comfortable in showing the surroundings they are sitting in and the idea that everyone can see them makes them uncomfortable (Reed, 2020).

Opportunities discovered by teachers

Online teaching was like a ray of hope in such grim times as it could afford anytime-anywhere learning. This is of great use when social distancing and isolation is required to break the chain during the pandemic. A plethora of online tools is available with advanced features which are helping teachers in making learning interesting and engaging. The ease of use, availability of mobile apps, and quality user interfaces help teachers in sharing media files conveniently. Online teaching allows teachers to decide the schedule and content of teaching which is satisfying for teachers. A similar finding can be seen in the work of Borup & Stevens (2016, p11). Teachers also felt that they developed digital skills, problem-solving, creative and critical thinking, and working under stress which would help them professionally in the future.

Conclusion

The present study found online teaching useful in the times of pandemic. Online teaching has ensured continuous learning. Despite many challenges teachers have worked assiduously. But, it is evident that we are yet not prepared with suitable infrastructure and trained teachers to teach in a fully online mode. There is a need to develop online content and provision of equitable access to digital resources if we have to take advantage of online teaching.

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Research Article

Effectiveness of Online Grievance Redressal and Management System: A case study of IGNOU Learners

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Abstract

Online grievance redressal systems have a very crucial role in retention of learners in open and distance learning (ODL) systems where learners are geographically away from institution, teachers and peer group and they get very few opportunities otherwise to get their grievances resolved. At any given time IGNOU is having enrolment of more than 3 million and to address grievances of these large numbers of learners, an online grievance redressal and management mechanism has been developed. In this paper, effectiveness of IGNOU online grievance redressal and management System (iGRAM) in handling learners' grievances have been examined by carrying out a survey among the learners who have used iGRAM for their grievance redressal. A questionnaire was developed and administered online to iGRAM users. Apart from demographic questions the survey model consists of a set of statements regarding effectiveness of iGRAM portal in handling learners' grievances. Survey results show that majority of learners were satisfied with this online grievance redressal and management system of IGNOU, however, with few additions/changes like development of mobile app based iGRAM portal, by addressing issue of non-receipt of study material and by putting more efforts in its popularization, iGRAM can be made more effective.

Keywords: Online Grievance Redressal, Open and Distance Education (ODL), Learners, Learner Support, iGram, IGNOU

Introduction

Grievance is generally defined as any communication that expresses dissatisfaction about an action or lack of action, about the standard of service/ deficiency of service of an institute and the complainant asks for remedial action. Grievance redress mechanism is part and parcel of the machinery of any academic institution. No academic institution can claim to be accountable, responsive and student-friendly unless it has established an efficient and effective grievance redress mechanism. In fact, the grievance redress mechanism of an academic institution is the gauge to measure its efficiency and effectiveness as it provides important feedback on

the working of the institution.

In Open and Distance Learning (ODL) institutions, grievance redressal and management are a very important component as it critically supports the final learning outcome of the learners. In ODL, learners do not get regular opportunities to interact with their peer group and tutors and learners perform a major part of their studies themselves. In comparison, in conventional mode of higher education, students regularly visit their institutions and they have ample opportunities to get their grievances resolved.

IGNOU has an enrollment of more than 3 million learners and the total fresh intake of learners in 2019, was close to 7.67 lakhs, spread across the 56 Regional Centers (RCs), 11 Recognized Regional Centers (RRCs) of the Army, Navy & Assam Rifles and nearly 1800 Learner Support Centres (LSCs) located across different states of India at various places. To address grievances of this huge number of learners, IGNOU has various mechanisms like e-mail, telephone, by post, social media etc. However, to provide a one-stop integrated IT solution for all types of student grievances in an efficient, effective and transparent manner a learner friendly grievance redressal web portal named, 'IGNOU Grievance Redress and Management" (iGRAM) was launched by the university. After being on hold for a while for upgradation, it was relaunched with modification and addition of new features on 5th September, 2018 (IGNOU Annual Report, 2018-19). Prior to the launch of the integrated grievance management system, iGRAM, the university has a system of redressing grievances of the students through email/phone/face to face interactions through help desks at regional centres. However, one of the biggest limitations of such a system was that tracking of the grievance in terms of its status, earlier reply given & its correlation was not possible. Besides this the top management is also not able to track how many grievances are pending at different levels i.e. Regional Centres, Schools of Studies, Divisions along with the areas to which it relates, so as to take corrective measures on it. With the help of iGRAM university is able to consolidate the different levels/areas in where grievances are emerging, so that appropriate policy interventions could be taken to minimize the grievances of different stakeholders.

As per the National Education Policy 2020, ODL must play a significant role in increasing Gross Enrollment Ratio (GER) to 50percent by 2035. In order to support it's essential that the innovation and expansion of ODL must be encouraged, while ensuring quality at the same time. At the same time there is an urgent need to institutionalize learner support services at all institutions offering ODL. These must be as responsive, effective and relevant as the ones on offer for full time students of the same Higher Educational Institution (HEI). These services will include: providing learning material (e.g. hosting courseware, repositories, Open Educational Resources or OERs, MOOCs), support from help desk services, tutoring and counselling, conduct of classes (through webinars, discussion forums, webcasting), library facilities, virtual labs, e-learning modules, timely feedback

on performance, online examinations, declaration of results, granting of certifications, redressal of grievances, etc. It ensures the delivery of time-bound and reliable quality of student services and grievance redressal; fines or other penalties or actions may be suitably levied on the concerned persons if not delivered as promised.

Review of the related literature

Mukerji, S. and Tripathi, P. (2005), deliberated in detail about the different dimensions of the quality education through open and distance learning institutions in India with the primary focus on the student support imparted at different levels i.e. Learner Support Centres, Regional Centres, HQ etc.

Arambewela et al. (2005) indicated that the quality of education, adequacy of student facilities, reputation of the institutions, marketability of degrees for better career prospects, and the overall customer value provided by the universities were the most important factors that had a strong impact on student satisfaction. It was revealed that students, in general, were satisfied with teaching quality and the quality of lecturers, but were unhappy with the university support and facilities.

The use of the Internet in the operation of government institutions has been emphasized by many workers (Cohen and Eimicke, 2002; Jorgensen and Cable, 2002). The worldwide explosion and acceptance of the Internet has shaped several implications for the public sector. Rather than duplicating their traditional brick and mortar equivalents, government agencies with digital delivery systems are non-hierarchical, non-linear, interactive in nature, and never closed (Schaupp et al., 2010; West, 2008). The current development of e-government services has opened new opportunities to deliver information and services more conveniently and cost effectively to the citizens (Wang and Shih, 2009). Nowadays the existence of an online system to redress grievances of the public is an integral part of E-Government.

While studying e-governance systems already in use at Indira Gandhi National Open University (IGNOU) for delivering various student support services online, Bhatnagar (2013) concluded that IGNOU needs to allocate more to its ICT budget so that learners and facilitators in its ODL system can seamlessly interact and gain in the process.

During their study on learner's expectations on future education policies Gowthaman et al. (2017) found that nearly 83.5percent of the learners preferred online grievance submission and redressal and recommended that the ODL policy should incorporate technology driven student support.

Flores (2017) highlighted that support resources must be available at all times for the distance courses and a grievance procedure should always be available for learners, including electronic faculty course evaluations.

Santosh and Dixit (2018) discussed e-governance in the context of distance education and stated that effective use of ICT in the education sector will help in enhancing the efficiency, bringing in transparency and cost reduction.

Subrahmanyam (2018) while discussing use of technology for learner support

services in IGNOU highlights effective use of technology by the university for internal processes, digital initiatives being provided for learner's support, challenges faced in implementation of technology and best ICT practices being followed by the university. He also talks about the digital initiatives for learners' grievance redressal such as UGC (University Grants Commission) online portal, Public Grievance portal and other platforms and how these have helped in channelizing the learners' grievances to the right place for speedy solutions.

Das and Biswas (2018) discusses the current use of ICT in higher education in the developing countries, the advantages of the ICT tools, and also explores the learner readiness in these countries to use ICT for learning purposes. They also describe the different types of learner support services being offered by the ODL system and the ICT tools being used to offer the services.

Singh and Sahay (2020) analyzed the queries received through iGRAM at IGNOU Regional Centre Delhi-1 and gave recommendations regarding efforts which may be made to minimize the number of queries at iGRAM further. They advocated the need to include the Learner Support Centres also in iGRAM network so that they may be made to respond through the network itself and thus the response time will be minimized. They also recommended creation of some automated response systems in iGRAM for general queries related to procedures, in order to save time on responses.

Based upon the above reviews, the need for comprehensive online grievance management is very much essential to manage grievances of millions of learners enrolled in the Open and Distance Learning (ODL) institutions. It is also a fact that learners in ODL institutions comes from diverse background like some are in jobs, some are freshers preparing for the other competitive examinations, some are doing one additional ODL course in addition to the their regular course in other institutions, retired people, jail inmates, transgenders, anganwadi workers etc. and it order to facilitate them to raise query/grievance at the convenience of their home, it's of utmost importance to have an integrated online support system for learners to resolve their issues related to their course of study.

Objective of the Study

The main aim of the study is to analyze the effectiveness of online grievance redressal and management systems for learners in IGNOU. The specific objectives of the study are as follows:

- To study the usefulness of the IGNOU Grievance Redressal and Management (iGRAM) with reference to demographic variables.
- To study use of iGRAM mechanism with respect to ICT infrastructure/environment available with the learners.
- To study the effectiveness of iGRAM mechanism in resolving learners' grievances.

Research Methodology

A questionnaire based on a 5-point Likert scale was designed in which 1 was

strongly agree, 2 agree, 3 neither agree nor disagree, 4 disagree and 5 strongly disagree. A Google form containing the questionnaire was developed and an SMS with the link of this Google form was sent to 1,200 learners registered under IGNOU Regional Centre Varanasi who had used iGRAM portal during the period of July 2019 to June 2020 for getting their grievances resolved. There were two sets of questions, the first set asked for demographic and internet access related information and the second set included 11 questions about the effectiveness of the iGRAM portal in resolving learner's grievances. The questions were drafted in Hindi and were structured in such a way that it would be easy for learners to understand the topic and answer properly. The demographic information which was asked for included: Learners programme of study, their age and gender, employment and marital status, area (urban or rural) they belong to, device used for internet access, place where they use internet, how they came to know about iGRAM and type of problem they raised on iGRAM.

Findings and Discussion

Objective 1: In order to examine the usefulness of IGNOU Grievance Redressal and Management (iGRAM) system with reference to demographic variables, learners were asked some basic questions related to their demography.

Table-1: Data related to demographic variables of iGRAM users

Demographic Variables		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Gender	Female	21	21.4	21.4	21.4
	Male	77	78.6	78.6	100
Area	Rural	40	40.8	40.8	40.8
	Urban	58	59.2	59.2	100
Employment Status	Employed	28	28.6	28.6	28.6
	Unemployed	70	71.4	71.4	100
Marital Status	Married	29	29.6	29.6	29.6
	Unmarried	69	70.4	70.4	100
Age Group	Age Up to 20	9	9.2	9.2	9.2
	Age 20-30	63	64.3	64.3	73.5
	Age 30-40	17	17.3	17.3	90.8
	Age 40-50	8	8.2	8.2	99
	Age above 50	1	1	1	100
Programme in IGNOU	Bachelors	41	41.8	41.8	41.8
	Certificate	8	8.2	8.2	50
	Masters	40	40.8	40.8	90.8

	Post Graduate Diploma	7	7.1	7.1	98
	Diploma	2	2	2	100
Came to know about iGRAM from	Friend	13	13.3	13.3	13.3
	IGNOU Website	71	72.4	72.4	85.7
	Induction Meeting	10	10.2	10.2	95.9
	Regional Centre	2	2	2	98
	Study Centre	2	2	2	100
Category of grievances	Non-receipt of study material	55	56.1	56.1	56.1
	Non updation of awards/ grades	13	13.3	13.3	69.4
	Admission related	10	10.2	10.2	79.6
	Non receipt of degree/ mark-sheet	8	8.2	8.2	87.8
	Change of electives	2	2	2	89.8
	Synopsis/ Project related	2	2	2	91.8
	Refund of fee	2	2	2	93.9
	Others	6	6.1	6.1	100
Days in which received response on iGRAM	Same day	27	27.6	27.6	27.6
	In 03 days	32	32.7	32.7	60.3
	In 05 days	12	12.2	12.2	72.5
	In 10 days	6	6.1	6.1	78.6
	More than 10 days	21	21.4	21.4	100

Interpretation of table

Total 98 learners, who had used iGRAM portal for getting a response of their grievance, participated in the survey. Out of these 98, majorities of the learners were male i.e. 78.6 percent and 21.4 percent were female.

40.8percent of learners using iGRAM were from rural areas and the rest 59.2 percent were from urban areas. Availability of internet facilities in rural areas is facilitating rural learners also to use online grievance redressal mechanisms. A good number of learners from rural areas used iGRAM for getting their grievances resolved shows that iGRAM is gaining popularity.

Out of the total respondents who provided their responses in the survey, 28.6 percent were employed and 71.4 percent learners were unemployed, whereas 29.6 percent learners were married while 70.4 percent were unmarried.

Maximum 64.3 percent of the respondents belong to the age bracket of 20-30 years, followed by 17.3 percent between 30-40 years, 9.2 percent are of below 20 years, 8.2 percent are in the age bracket of 40-50 years and only 01 percent of the respondents are of above 50 years of age.

Maximum 41.8 percent of learners who responded to the survey were of Bachelor degree programme, followed by 40.8 percent from Post Graduate Degree programme. Whereas respondents from Certificate programme, Post Graduate Diploma and Diploma programme constitute only 8.2 percent, 7.1 percent and 2 percent, respectively.

An institution should popularize its grievance redressal mechanism among its clients. In this study 72.4 percent learners reported that they came to know about iGRAM from IGNOU website, 13.3 percent from friends, 10.2 percent in Induction meeting and 2 percent from IGNOU Regional Centres (RCs) and equally 2 percent of the student users of iGRAM came to know about it from Learner Support Centres (LSCs). It shows that RCs and LSCs need to play a more proactive role in popularizing the iGRAM facility among learners. Learners should also be informed properly about the availability of online grievance redressal mechanisms in IGNOU during induction meetings which are held after the start of every academic session on a regular basis.

During this study, it was found that maximum grievances received at iGRAM are pertaining to non-receipt of study materials. 56.1 percent of the learners who participated in the survey reported that the grievances raised by them were pertaining to non-receipt of study materials. As per the present policy of the University, study materials are dispatched to learners from the Regional Centre as well as the Material Production and Distribution Division (MPDD) of the Head Quarters, addressing the issue of non-receipt of study material can significantly reduce the iGRAM grievances. It was followed by non updation of awards (assignment and Term End Exam awards) in Grade Card comprising 13.3 percent of total grievance. 10.2 percent of the grievances were admissions related and 8.2 percent were related to the non-receipt of degree/marksheet, 02

percent each related with change of electives, synopsis/project related, refund of fee etc. Remaining 6.1 percent of grievances categorized as others were of miscellaneous nature like, evaluation of answer scripts, name/ address correction, examination form submission etc.

The grievances in iGRAM are attended to on a day-to-day basis. As per the University's policy, the grievances received at iGRAM are to be responded to in three working days. In most of the cases at iGRAM the response is given to learners in 03 working days, however, in few cases where the information is to be collected from another place like LSCs or from headquarter or in other cases where grievance is to be forwarded to concerned division at headquarters, the response is delayed by another few days. In this study it was found that 27.6 percent learners received a response on the same day of filing their grievance while 32.7 percent learners received their response in 03 days. 12.2 percent learners received responses in 05 days, only 6.1 percent learners received their response in 10 days and in the rest 21.4 percent cases it took more than 10 days to respond to learners.

It means in about 60 percent cases learners received their responses within 03 days of submitting their grievance at iGRAM which is as per the University's policy of responding to learners at iGRAM within 03 working days.

Objective 2: With reference to this objective feedback from the learners were taken on various parameters related to the availability of the ICT infrastructure /environment with them.

Table-2: Data of ICT infrastructure available with the iGRAM users

ICT infrastructure available with learners		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Device used for internet access	Desktop	2	2	2	2
	Laptop	6	6.1	6.1	8.2
	Smart Phone	90	91.8	91.8	100
Place of internet access	Cyber Cafe	2	2	2	2
	Home	91	92.9	92.9	94.9
	Office	5	5.1	5.1	100

Interpretation of table

In response to the question regarding devices used for internet access, 91.8 percent learners said that they use smartphones for internet access, 6.2 percent use laptops and only 2.0 percent use desktop for internet access. The present iGRAM portal is basically a desktop/laptop version. As more than 90 percent of iGRAM users access the internet on their smartphone, the development of a dedicated mobile app for iGRAM will increase the accessibility of iGRAM.

This study reveals that the maximum number of iGRAM users i.e. 92.9 percent access the internet at home, 5.1 percent use the internet in office and only 2 percent users visit cyber cafes for internet access.

Objective 3: With reference to this objective feedback from the learners were taken on various parameters related to the effectiveness of iGRAM mechanism in resolving learners grievances

Table-3: Feedback of the learners on various statements regarding effectiveness of iGRAM portal

Statement	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
I shall suggest others to use iGRAM portal	30.6	45.9	10.2	7.1	6.1
iGRAM portal is effective in resolving learners problems	26.5	42.9	11.2	11.2	8.2
Language used in iGRAM reply was very courteous	27.6	58.2	6.1	4.1	4.1
iGRAM is more effective than email and telephone request in handling student grievances	31.6	41.8	11.2	12.2	3.1
Grievance can be registered on iGRAM easily in one go	34.7	48.0	7.1	7.1	3.1
I believe that after the iGRAM complaint was made, the authorities were more responsive	22.4	30.6	20.4	18.4	8.2
iGRAM portal helped me in establishing my faith in IGNOU grievance management system	21.4	44.9	11.2	14.3	8.2
iGRAM portal is an effective platform for addressing all types of query/grievances	26.5	36.7	19.4	12.2	5.1
Using iGRAM portal increases my chance of completing IGNOU programme in time	20.4	36.7	18.4	17.3	7.1

Using iGRAM portal I can get responses of my query/grievance in reasonable time	17.3	37.8	20.4	12.2	12.2
Information received through iGRAM was very useful	21.4	37.8	11.2	18.4	11.2

Interpretation of table

There were 30.6 percent learners who strongly agree with the statement that they shall suggest others to use iGRAM portal, while 45.9 percent agree with it. Thus, there were a total 76.5 percent learners who agree that they shall suggest others to use iGRAM portal. 7.1 percent learners disagree and only 6.1 percent strongly disagree with the statement and the remaining 10.2 percent learners gave their opinion as neither agree nor disagree.

26.5 percent learners strongly agree with the statement that iGRAM portal is effective in resolving student's problems and 42.9 percent learners agree with the statement. On the other hand, 8.2 percent strongly disagree and 11.2 percent disagree with the statement. 11.2 percent of learners remained neutral.

In the survey, the majority of the learners i.e. 58.2 percent learners agree with the statement that the language used in iGRAM reply was very courteous and 27.6 percent learners strongly agree on it. Thus, about 85 percent of learners agree that the language used by officials to respond to their query was courteous in nature. The percentage of learners who strongly disagree with the statement is 4.1 percent and equally 4.1 percent of learners disagree with this statement. In response to this statement, 6.1 percent of learners opted for neither agree nor disagree.

In response to the statement that iGRAM is more effective than email and telephone requests in handling student grievances, 31.6 percent learners strongly agree and 41.8 percent learners agree to it. Hence, in view of about 73 percent learners, iGRAM is a more effective medium than other modes like email and telephone in handling learners' grievances. Only 3.1 percent learners strongly disagree while 12.2 percent disagree with the statement.

There are 34.7 percent learners who strongly agree with the statement that grievances can be registered on iGRAM portal easily in one go and 48.0 percent learners agree with this statement. 7.1 percent learners disagree with this statement and only 3.1 percent strongly disagree on it.

In this survey 22.4 percent learners strongly agree and 30.6 percent agree with the statement that after the iGRAM complaint has made the authorities more responsive to their queries. While 18.4 percent disagree and 8.2 percent strongly disagree with the statement. Thus, only about 53 percent of learners are convinced that complaints on iGRAM made the authorities more responsive and about 26 percent are not in favour

of it. 20.4 percent learners remain undecided about the statement.

About 44.9 percent learners agree with the statement that iGRAM portal helped them in establishing their faith in IGNOU grievance management system and there are 21.43 percent learners who strongly agree with this statement. On the other hand, 14.3 percent learners disagree with the statement and there were 8.2 percent learners who strongly disagree with the statement. 11.2 percent of learners neither agree nor disagree with the statement.

Apart from this, 26.5 percent learners agreed with the statement that iGRAM portal is an effective platform for addressing all types of query/grievances and 36.7 percent learners strongly agreed with the statement. 12.2 percent disagree and 5.1 percent strongly disagree with the statement. 19.4 percent remained neutral i.e. neither agree nor disagree.

In response to the statement that using iGRAM portal increases their chance of completing the IGNOU programme in time, 20.4 percent learners gave their opinion as strongly agree and 36.7 percent agree. On the other hand, 17.3 percent learners who participated in the survey disagree and 7.1 percent strongly disagree with the statement. 18.4 percent of learners gave their opinion as neither agree nor disagree.

17.3 percent learners strongly agree with the statement that using iGRAM portal they can get responses to their query/grievance in reasonable time. 37.8 percent of learners agree with this statement. Percentage of learners who strongly disagree is 12.2 percent and equally 12.2 percent of learners disagree with this statement. Thus, about 54 percent of learners were satisfied with the response time within which they received solutions to their grievances.

In response to the statement that information received through iGRAM was very useful, 21.4 percent and 37.8 percent of learners strongly agree and agree respectively. 11.2 percent and 18.4 percent learners strongly disagree and disagree respectively with the statement. 11.2 percent responded as neither agree nor disagree. Thus, about 59 percent of the learners found that information received at iGRAM portal was useful for them and about 29 percent of the learners who took part in the survey found the information at iGRAM not very useful.

Summarily, during the analysis of data it has been found that in response to the 11 different statements regarding effectiveness of iGRAM in resolving learners' grievances total 67.4 percent learners agree with the effectiveness of iGRAM and only 19.2 percent learners disagree.

Table-4: Gender-wise feedback of the learners on various statements regarding effectiveness of iGRAM portal

Gender	Strongly Agree	Agree	Neither Agree nor disagree	Disagree	Strongly Disagree
Male	22.3	41.9	14.5	12.4	8.9
Female	37.2	42.0	9.1	11.7	0.0

Interpretation of table

During the analysis of data 64.2 percent male learners found to be satisfied with the effectiveness of iGRAM in resolving learners' grievances as in response to 11 different statements of the questionnaire they gave their opinion as either strongly agree or agree and 21.3 percent male learners found to be dissatisfied with iGRAM effectiveness as they gave their opinion as either strongly disagree or disagree.

On the other hand, comparatively higher percentage of female learners found to be satisfied with the effectiveness of iGRAM in resolving learners' grievances as 79.2 percent female learners gave their opinion as either strongly agree or agree and only 11.7 percent female learners found to be dissatisfied with iGRAM effectiveness as they gave their opinion as disagree. None of the female learners gave her opinion as strongly disagree regarding effectiveness of iGRAM in resolving learners' grievances.
Conclusion

Keeping in view the immense potential of IGNOU online grievance redressal and management in speedy and effective handling of learners' grievances, Regional Centres and Study Centres should make more efforts to popularize it among the learners.

Nowadays more and more people are accessing the internet on smartphone/ mobile which is also evident from the feedback received from learners during the present survey (91.8 percent iGRAM users access internet on mobile), IGNOU should develop a dedicated mobile app of iGRAM which will increase its accessibility.

During the present study it has been found that more than half of the iGRAM grievances (56.1 percent) comprise grievances related to non-receipt of study material. If timely delivery of study material is ensured then it will significantly reduce the number of grievances on iGRAM and as result officials can devote their saved time in addressing other grievances of important nature.

This study is based on a survey of iGRAM users of only one Regional Centre. It is hereby recommended that similar study be conducted from all the Regional Centres of IGNOU with a large sample so that results and viewpoints from larger databases could be utilized for further improvement of iGRAM portal.

Implications of the study

The implication of the research findings were given below:

1. The comparative studies of student satisfaction in relation to various demographic variables provide important i nsight on its effect on student satisfaction regarding IGRAM.
2. The finding of the study also throws light on correlation between effective use of IGRAM portal with respect to ICT infrastructure/ environment available with the students.
3. Findings of the present study will serve as a base for the research scholars doing research in the field of other institutes of Higher learning Institutions; hence, it may serve a wide spectrum of research scholars.
4. The findings of this study may also serve as a primary data source to the research scholars for further in-depth study in this field.
5. The findings of this study may be useful for Policy makers of ODL Institutions to study student satisfaction and may take appropriate measures to improve the student satisfaction.
6. The findings may also be used to improve the handling of the IGRAM Portal at the Regional Centres and in different divisions at Headquarters to improve the students' satisfaction regarding IGRAM Portal.
7. The findings of the study also focus on the practical suggestions to improve upon the student satisfaction in respect to use of IGRAM portal, which may be proved beneficial to Management of grievance portals while formulating the policies in this regard.
8. This study may lead to further research at the micro-level involving other related variables.

Limitations

The feedback of the learners, who had used iGRAM portal for grievance redressal, was taken from only one Regional Centre i.e. Regional Centre Varanasi out of the 56 Regional Centres across India. A comprehensive feedback from the learners using iGRAM from all the Regional Centres would give more insights and that would provide a larger database of valuable inputs of learners for further improvement and better utilization of iGRAM portal in IGNOU.

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Research Article

Offline to Online: A long way to go

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Abstract

The whole world has been grappling with the COVID-19 pandemic and its effects on various sectors. With physical distancing norms being advocated in the bid to prevent transmission of the virus, schools and colleges across the globe have faced a major setback. However, the pandemic has been the catalyst to bring online learning to the forefront as the solution to fill this void. With the advent of this emergency remote teaching, educators all over the world have been in a furore to create e-content and shift the teaching-learning process online. While several studies extol the benefits of online education, its success in the Indian education system is uncertain owing to several constraints that are endemic in the country. This paper aims to study the merits and challenges of online learning in higher education in India and suggest some remedies for the same.

Keywords: COVID 19, Online learning, Higher education, Challenges, Remedies, Merits

Introduction

Historically, India has been a country that is renowned for its education. Ancient Indian Universities like Nalanda, Takshashila, Valabhi and Vikramshila have always occupied the status of premier institutions of higher learning and research. Over the years, India has strived to maintain this status by constantly enhancing the quality of education and research in the country. With the passage of time, the country has embraced various pedagogies and methods of teaching and learning. The year 2020 has witnessed one such foray into a new mode of education across the nation - online learning.

The COVID-19 pandemic has upended the world as we all know it. Caused by the SARS-CoV-2 coronavirus, the disease is believed to have originated in Wuhan, China and was declared as a global pandemic by the World Health Organization on March 11, 2020. With the number of cases constantly fluctuating and the slow rollout of vaccines, the virus seems to be here to stay for the foreseeable future. The Ministry of Health and Family Welfare of the Government of India has imposed the use of social distancing measures to prevent and control the extent of transmission of the virus. This decision has major implications in the education sector and has resulted in a rapid

"migration" from physical classroom learning to virtual classroom learning in the blink of an eye. Educators have been stumbling along trying to adapt themselves to the use of technology, creating easily understandable and engaging e-content and acclimating themselves with the experience of 'speaking to a screen'. Thus, for all intents and purposes, this transition to online education in India is more of a crisis response than a well-thought out, tried and tested approach. There are various ways and formats in which online learning can take place. Several institutions are offering their courses "asynchronously", meaning students decide when to access the study material- video recording of a lecture conducted by the teacher, assignments, notes, etc. that is provided, as per their personal schedules. Thus, it is a more flexible and self- paced approach to learning. The more popular format that is being followed in most institutions is the "synchronous" approach wherein the teacher and students are online at the same time and the lecture is being conducted on a specific virtual platform at a predetermined date and time. It can be in the form of video-conferencing or live streaming of lectures. In this mode of learning, the students are actively engaged as they are provided with study material during the class and can interact with their peers and teachers in real-time. Thus, it provides a forum for active engagement and real-time discourse and debate. While online learning has been used extensively over the years for vocational courses and certificate or diploma courses, the COVID-19 pandemic has been the catalyst that changed the status quo and pushed it into the limelight as the new normal for all kinds of education. Kerala was the first state in the country to launch the new academic year on 1st June 2020 by setting up online learning across all schools and colleges.

Several studies have lauded the use of online learning and its benefits (Chen, 2010; Guadalupe, 1999). Some advantages of online teaching-learning include flexible learning, convenience in terms of saving time and money, accessing and reusing study material stored in an online database, reduction of logical barriers and self-paced learning to list a few. However, the efficacy of an online education will be different in a developed country as compared to a developing country. For instance, the aforementioned findings may not be applicable in the context of the Indian education system owing to constraints such as poor connectivity, limited resources, vast digital divide, etc. Higher education in India has witnessed a major inflow of first-generation learners in recent times. These students do not have access to many resources. If online teaching-learning continues to stay post the COVID-19 crisis, these learners who are already on the darker side of the digital divide may be pushed further away. Without proper support they may never be able to complete their studies. This paper aims to study the merits and challenges of online learning in higher education in India and suggest some possible remedies for the same.

Challenges in Online Learning

1. Access to gadgets

In a country like India a digital divide is clearly visible (Beniwal, 2020). India's digital penetration is not as much as many other developed nations. There are students who do not have access to smartphones or computers. Additionally, having a smartphone with a 4G connection is preferred for attending online classes that are conducted live, which may not be available to many students particularly those who have a low- income background. When online learning commenced in different parts of the country in 2020 after the imposition of lockdowns, numerous cases of suicides by students were reported. They allegedly resorted to such an extreme measure because they didn't own any suitable gadgets to attend the lectures. The lack of access to devices, which deprives them of their education, affects students' well-being (Bisht et.al, 2020). This reveals the pressures that the system puts on the students and points fingers at the need to bring in parity. Even among middle-class families there may be just one computer per household. In the event that there are multiple children who have online lectures, coupled with their parents who may have to 'work from home', the question of who gets to use the device and who has to forgo it, becomes a very serious question which has no right answers. If these basic issues are not resolved, education will become inaccessible to many in the nation.

2. Internet connectivity issues

The number of internet users in India has increased dramatically in recent years. But the low penetration of the internet restricts access only to the privileged groups (Illavarasan, 2013). According to experts, existing telecommunication infrastructure suffers from various challenges such as spectrum issues, lower broadband penetration and low level of wired connectivity. The present telecom infrastructure in India is not capable of handling the increased demand owing to the conduct of online lectures coupled with the 'work from home' strategy adopted by the corporate sector due to the imposition of lockdowns. The current technical design of the telecom industry is not equipped to cater to the needs of online teaching-learning thereby leading to network congestion and bandwidth issues. A report of Telecom Regulatory Authority of India shows that the internet has made deeper penetration into the society after 2017. But the rural-urban gap in internet access is a huge worry (TRAI report 2019). Affordability is yet another cause of concern. Affordable internet is a distant dream in India. Also, in this time of financial crisis, it is a big question that how many will be able to pay for internet, which is often considered a luxury in many parts of the country. There have been several instances wherein people have ventured out of their homes, sitting in their cars or even on trees in order to get better network coverage. Most households in the rural areas do not have a Wi-Fi connection. They rely on

cellular internet connectivity which can be erratic and hinders both streaming and downloading of online lectures. Additionally, students facing these issues often find themselves left behind in terms of class participation, doubt-solving and other class activities that happen in real-time.

3. Technophobia

Technophobia refers to the fear of technology. In the sphere of online learning technophobia is something that can affect both teachers and students alike. Users are more likely to experience frustration and anxiety at least sometime during the usage of technology (Oluwalola, 2015). Recurrent episodes of frustration and anxiety can create some fear and aversion in the minds of users prompting them to distance from technology. When students experience the problem, it may even affect their interest in the learning process. For several teachers embracing technology clearly means stepping out of their comfort zones. Studies have reported a negative relationship between technophobia and the well-being of teachers (Singh, 2017) and a positive relationship between technophobia and distress (Henderson et.al, 1995). Almost overnight, educators have been forced to transition from teaching using the blackboard and a piece of chalk and gauging students' understanding or lack thereof by analyzing their facial cues to teaching while staring at the computer screen with no way of knowing how much the learner has understood or whether they are even attending the class or have simply logged in for attendance purposes while going about their day. As most of the teachers have spent much of their career teaching in the offline setting, adopting online teaching has posed several challenges for them. Lack of student participation and involvement in classes coupled with technological difficulties faced by the teachers, many of them have not been experiencing the same level of job satisfaction as they used to before their forced foray into online teaching (Nambiar, 2020). In many cases, the teachers can be considered to be "digital immigrants" while the students are "digital natives" (Prensky, 2001). While most colleges and universities have campus support personnel and technical staff who are available to help faculty members by instructing and guiding them to learn the technicalities of the online platform to be used for conducting classes, it would not be possible for the technical team to provide the same level of guidance and instruction online as they could do by demonstrating it in a physical setting. Moreover, it is not feasible for the support staff to address issues of each faculty member as they are bound to be unique and extremely difficult to solve without face- to- face interaction. Thus, a fear could set in the minds of the teachers which could be due to many reasons such as lack of knowledge to use the platform, fear of embarrassment and fear of failure to deliver lectures effectively in online settings. Several cases have been reported in the newspapers and social media channels wherein teachers have been shamed and abused by the students for their inability to effectively conduct lectures in an online environment.

4. Misuse/ online abuse

Online abuse is another challenge associated with online learning. There were complaints from Delhi University about miscreants (not students) logging into the virtual classrooms and harassing teachers and disturbing the class by posting abuses and indecent material. Some universities in the UK have logged complaints of students posting highly obscene materials during online lectures. It causes embarrassment for all who are a part of the lecture. This incident points to two possibilities- either the outsiders must have hacked the account or some student must have shared the username and password with them. Female teachers in particular have found themselves to be victims of such online bullying. They are body-shamed, trolled and abused. Teachers have experienced online stalking and harassment from parents of their students during online lectures. The videos of teachers from the state of Kerala taking online lectures for smaller classes were widely trolled and were subjected to discourteous comments across various online platforms such as Facebook. Some even went to the extent of creating objectionable videos of the teachers and uploaded them on various platforms. All of these incidents point fingers at yet another Pandora's Box of problems. In addition to this, there can be the issue of digital privacy as well.

5. Distraction of students

Students are more likely to get distracted when the physical presence of the teacher is not around. 'Transactional distance' is more in online classrooms (Oluwalola, 2015). If the teaching style is not very interactive the perception of transactional distance will be stronger for a student. Students generally use smart gadgets for accessing the online classes. It would be difficult for them to keep their attention engaged when social media notifications keep popping up. Multitasking (doing two or more activities at the same time) is high when students are attending online lectures (Lepp, 2019). Several past studies support this finding that during the online part of learning, students engage in multitasking (Moreno et al., 2012; Manwaring et al., 2017). Past literature on psychology suggests that it is not possible to concentrate on two tasks with equal attention. So, when a student engages in multitasking during online lectures automatically his efficiency comes down thereby bringing down the task performance (Carrier et. al., 2015). The success of online learning to a large extent is dependent on the student's motivation and self- discipline. There have been several complaints by teachers that some students merely login to the lectures at the appropriate times but do not actually "attend" class. In a study conducted among school students in Delhi, lack of interaction and distractions in the home environment were identified as major deterrents of online learning (Khan et al, 2021). A study conducted on the efficacy of Massive Open Online Courses (MOOCs) documented that the students' inherent and visceral capacity for being organized, disciplined and having self-control was crucial for having a successful online learning outcome (Banerjee & Duflo, 2014). Thus, the success of online learning largely depends on students'

perseverance and dedication. Moreover, it is very difficult to track and penalize those who are flouting the rules and avoiding classroom interactions and assignments.

6. Physical and Psychological issues

Many households in India do not have a conducive environment for online learning. A student often has to share his study space with others in the family. Many of these students depend on the college library or reading hall as it gives them a quiet place to focus on their studies. Sadly, in many households a demarcated space for studying doesn't even exist. In such conditions longer hours of learning will become difficult. With online lectures mostly being conducted in the morning, many students are forced to attend classes in the midst of household chores and other activities due to which they are unable to pay complete attention to the lectures. Additionally, most of the reference books which students are prescribed for in-depth analysis and studies are very expensive, particularly those written by foreign authors. Hence, most students prefer to borrow such reference books from the library rather than purchasing it. Due to the closure of educational institutions, students no longer have this source of knowledge available to them and would have to rely on the internet (for those students who have access to it at their homes) and on the books that they have at hand. Over and above, studies are required to probe the effects of continuous gadget usage on the psychological well-being of the students. Emotional experiences of the learners can play a crucial role in online learning (Juutinen et.al, 2010). There is sufficient empirical proof for online learning systems putting learners in a frustrated and confused state and an eventual dislike for learning (Hara and Kling, 2000). If the learners suffer from technophobia the intensity of emotional problems could be greater (Brosnan, 1998). To top it all off, the lockdown imposed by the Government, the fear of contracting COVID, either by themselves or their loved ones and loss or reduction of family income have resulted in an upsurge of mental health problems across the globe. Several studies have shown that people are increasingly facing issues of depression, stress, mood swings, moderate to severe anxiety and other mental health issues. Such problems can negatively impact students' academic performance (Deb et al., 2016; Kulshrestha & Bahuguna, 2020). There has been an increase in the rate of suicide among students since the imposition of online mode of learning (Balachandran et.al, 2020).

7. Access to Electricity

Many towns and villages in India do not have uninterrupted access to electricity. Unexpected power cuts with no certainty of when it will be restored, is a common occurrence in many parts of the country. Such intermittent electricity connection deters many students from attending online classes which are either streamed live or are recorded. As per data from the Saubhagya Scheme of the Government of India which was formulated with the aim of providing free electricity connections in rural areas and among the urban poor, with the exception of Chhattisgarh, all other

states boast a 100 percent electrification status (Ministry of Power, Annual report 20-21). However, the reliability and stability of the connection is debatable.

8. Dropouts

The rural poor often tend to assign an "economic value" to children and view them as a source of labour and income (Corbridge & Watson, 1985). The lockdown which was initiated due to the COVID-19 pandemic resulted in scores of migrants losing their jobs and returning back to their villages. This loss of income exacerbated by their return to the villages with no permanent source of livelihood in sight could result in many children dropping out of schools and colleges. Additionally, students may be forced to stop their studies in order to leverage their earning capacity and contribute to the household functioning due to the increased opportunity cost of continuing their studies (Bharadwaj et al., 2020). Research shows that school dropout rates in India have always been a source of worry and these students have been pushed out of the system owing to a variety of reasons such as poverty, cost of education, poor quality of education and child labour. Temporary interruption in schooling, among the poor, has frequently culminated in permanently dropping out of the education system (Reddy & Sinha, 2010). Amidst the lockdown-induced closure of educational institutions and the transition to online learning, several children have dropped out of schools due to financial constraints resulting from the parents losing their jobs or experiencing a pay cut. This would ultimately result in these children not even entering the sphere of higher education which would be a detrimental loss to their earning capacity and standard of living.

9. Practical Learning

With the advent of online learning, several courses which involve application-based pedagogies have experienced a setback. Courses such as Master of Business Administration (MBA), Masters in Management Studies (MMS), Hotel Management and Entrepreneurship involve several simulations, real-world immersion and experiential approaches. While online simulations exist for this purpose, it is not an adequate replacement for the authentic experience. Years of pedagogy development, curriculum enhancement with respect to simulations and experimentation is needed in order to effectively transition quality online education in these fields (Liguori, & Winkler, 2020). Additionally, such courses involve internships as part of their curriculum in order to enhance the students' competencies in the real-world, which cannot be effectively experienced online. A critical aspect of higher education includes moulding students to work as a group, enhance leadership capabilities and improve their participation in collaborative experiments and projects. With the advent of online learning this aspect of their education has vastly suffered.

However, it must be acknowledged that online education has its fair share of merits as well.

Merits of Online Learning

1. Infrastructure

With the advent of online classes, educators are delivering lectures from the comfort of their homes. This provides them with various facilities that help in making the classroom atmosphere more interesting and engaging such as showing videos, sharing live data and use of other digital interactive tools which often proves to be a challenge in regular college classes owing to constraints such as lack of Wi-Fi connections on campus and portable speakers. In such cases, teachers would often share the link of such content with the students and would ask them to view these at home. However, this often created a disconnect between what was taught in class and what they understood from the aforementioned content. With online lectures, however, teachers can merely share their screens and stream YouTube videos, show data and graphs on Government and other institutional websites and make use of interactive digital technologies to further their learning. This enables students to connect with the topics being taught in real-time.

2. Time-Saving

In many cities, particularly in metros like Mumbai, Delhi and Bangalore students and teachers spend most of their time travelling. With the commencement of online lectures this time that was spent on travelling can now be utilized on more productive activities. There has been a significant fall in travelling expenditure as well. Moreover, in an offline setting, there is some amount of time that is spent in taking attendance, controlling the class and setting up projectors. With online classes, however, all of these tasks are accomplished by the mere click of a button thereby leading to complete utilization of the lecture time.

3. Platform for students to express themselves

The virtual world provides some sense of anonymity to people. Students who may find it difficult to interact in the offline classroom may find the comfort provided by online classes helpful for participation. The fact that students attend the class in the comfort of their homes puts them at ease and helps them to communicate better. Student interaction, especially those who are at the lower end of social outwardness, may increase during online lectures (Harrington & Loffredo, 2010).

4. Any time learning

Most of the online lectures are recorded which gives students a chance to go through the lecture multiple times. Students can access the recorded lectures from the repository and learn at their pace and comfort. This makes the learning process easier and gives a chance to relearn and understand concepts better. Flexibility is a significant advantage of online learning (Dhawan, 2020).

Possible Remedies to Tackle the Challenges in Online Learning

Online learning or e-learning is here to stay. Necessary measures should be taken to tackle the challenges discussed above to ensure smooth learning.

1. Access to gadgets

The Government and NGOs can actively

intervene to reduce the digital divide. Subsidies could be provided for buying gadgets and internet connection rates could be slashed down. The 'TV challenge', 'Mobile challenge' and 'Laptop challenge' are some challenges active in social media where people who can afford, sponsor new or old televisions/mobile phones/laptops to needy students so that they can access lectures broadcasted on TV or attend lectures online. Through the collaboration of various government agencies, NGOs and citizens of the country this digital divide could be reduced if not eliminated.

2. Internet connectivity issues

Unstable network connection has been a stumbling block in online education. To mitigate this problem teachers often ask students to switch off their videos and mikes during live online classes. This solution to provide some stability to the internet connection comes with a price as often the teacher tends to feel a disconnect from the teaching experience as ultimately, they are talking to a screen (Mishra et al., 2020). The best solution to handle internet connectivity issues is having wired connectivity using optical fibres. However, although wired connectivity provides reliable and continuous internet service that is sufficient for the smooth conduct of online lectures, it remains unaffordable for those who are below upper middle class. Therefore, the Government needs to take steps to mitigate this issue and improve internet connectivity across the nation. Additionally, telecom giants can take the issue up as part of their CSR initiatives and provide internet connections at affordable rates for educational purposes.

3. Technophobia

Adequate training and constant technical support should be provided to teachers and students to get them familiarized with the tools and technology of online teaching-learning. This step helps to reduce the anxiety and confusion for both teachers as well as students. At times the training for the use of online tools and platforms are conducted by the service providers who may not be aware of the extent of technical knowledge of all the teachers. Therefore, teachers can be divided into groups of both tech-savvy teachers and those with less technical knowledge. The teachers who are adept at technology and can learn the new processes quickly can act as mentors to the others. This would ensure that all the teachers are gaining an equal foothold with the new technology and would aid in a smooth transition from offline to online teaching. A more recent study which was conducted ten months after the initial lockdown couldn't find any significant negative relationship between well-being and computer anxiety of teachers (Satra, 2021). The result can be attributed to the training that teachers acquired during this period. This clearly shows that with constant training and support teachers can overcome the anxiety and distress associated with online teaching.

4. Misuse/ online abuse

To combat the issue of misuse and disturbances created during online lectures by people from outside, each

student who has enrolled for a course can be provided with a unique login ID and password that they must use to access the platform on which online lectures are being conducted. Students must be strictly warned not to share these credentials with anyone else. With most online teaching-learning platforms constantly upgrading their services, there are now facilities wherein teachers can lock the virtual classroom after a certain amount of time (similar to not allowing students to enter the classroom after the bell has rung), manage the settings so only the host or organizer can share the screen, enable the waiting room feature to prevent those who are not authorized from entering the class and can remove participants who are disturbing the lecture. Emotional maturity of students plays a pivotal role in their adjustment and responses in an online learning environment (Matulessy et.al, 2021)

5. Distraction of students

Online teaching should follow a flexible pedagogy. The teaching process should be more learner centric (Zayapragassarazan, 2020). Teachers may act as mentors rather than merely delivering lectures. Some extra effort may be taken by teachers to keep students at ease and make them comfortable for online learning. Simple things like turning on the camera during lectures and smiling at students will give a feel of physical proximity to them. Social presence and a sense of community are acknowledged as factors positively contributing to quality of learning and the motivation to learn (Haythornthwaite & Andrews, 2011). Interactions play a major role in developing an online learning community (Salmi, 2013). Teachers must try to engage students through meaningful activities to keep them enthralled (Muthuprasad et. al, 2021). Classes can be made very interactive by making use of online aids and resources. There are several digital tools available online that provide interactive online quizzes, polls and games that would help in capturing and maintaining students' interests and attention. Activity based interaction can promote active learning (Hirumi, 2002). These steps will help to reduce the transactional distance generally experienced in online learning. As there is physical isolation in online education, teachers lack the physical cues to understand whether learners are at the same pace with them. Researchers are working on developing systems that can detect the concentration of learners during the class with high levels of accuracy (Daniel, 2017). In the future such systems will be of great use to teachers.

6. Physical and Psychological issues

In this time of uncertainty amidst the pandemic and the lockdowns imposed by the Government, people are facing tremendous anxiety and stress. To maintain the mental health and well-being of both students and teachers, efforts should be made by the educational institutions to provide free counselling services for them (Sahu, 2020). Institutions can also conduct sessions on Yoga, meditation and activities like Zumba to keep students physically and mentally active

(Varalakshmi and Arunachalam, 2020).

7. Access to electricity

Government initiatives are required to ensure uninterrupted access to electricity in both urban and rural areas. The faster implementation of schemes like Saubhagya and Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) will help to achieve this goal.

8. Dropouts

In the span of a year there have been several reports of students dropping out of educational institutions as they cannot afford to continue their studies. Efforts can be made to secure funding from alumni of the institutions, the management or NGOs to create a fund that would help in sponsoring these children so they can continue with their education. Moreover, some State Governments have announced a fee waiver for those students who have lost their parents due to COVID-19. Thus, a joint effort between the Government, private entities and civil society is the need of the hour to soften the economic impact of the financial backlash faced by families due to the lockdowns and to ensure that it doesn't hamper students' education (Alvi & Gupta, 2020)

9. Practical Learning

Practical work including lab assignments and experiments were considered as impossible in digital mode. Technology advancements have provided an answer to this problem by enabling students to complete their assignments successfully at home (Venable, 2020). Digital simulations, home lab kits and virtual labs help the students to successfully complete the practical assignments. Home lab kits can be customized according to the curriculum of the institution. Safety and affordability are two major concerns when labs come home. Simulations and virtual labs can address the issue of safety but fail to provide hands-on experience.

Conclusion

This paper examines some of the major challenges of online learning and ways to tackle them. Additional empirical research is the need of the hour in order to study the impact of various factors on online learning. Several researchers suggest that self-discipline and higher levels of emotional maturity of students are basic requirements for online learning (Hiltz and Wellman, 1997). When students exhibit these qualities, the online environment becomes safer and more suitable for learning.

Online learning comes with its own set of pros and cons. Extensive research is required to determine whether the pros outweigh the cons or vice versa. However, one thing that is certain is that online learning is here to stay. Even when the pandemic is overcome, online learning can be used to complement offline education, particularly in case of conduct of webinars and workshops wherein expert speakers can interact with the participants from anywhere in the world.

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Research Article

eLearning Readiness of Higher Education Faculty Members

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Abstract

The COVID-19 pandemic has forced all institutions of higher education around the world to search for various new strategies to ensure the continuity of learning. This emergency eLearning situation created by the pandemic forced the faculty members of higher education to integrate information and communication technology in their teaching learning practices more than ever before. The present cross sectional survey study explores the readiness of higher education faculty members towards eLearning in terms of their technological readiness, pedagogical readiness, resource readiness and attitude. A self-developed likert scale consisting of 62 items measuring various dimensions of eLearning readiness was used to collect the data from 421 faculty members. The findings of the study revealed that demographic factors like age, gender, level of education, designation and discipline does not have any significant influence on the eLearning readiness scores of faculty members while teaching experience had a significant influence. The overall score of e-learning readiness was found to be satisfactory. The technological readiness of faculty members was found to be high compared to their other eLearning readiness dimensions scores. Faculty members were found to be least ready in terms of their pedagogical readiness and attitude towards eLearning. To increase the eLearning readiness of faculty members, the higher education institutions should organize more and more training and also provide the faculty members with adequate software and hardware required for adoption of eLearning practices.

Keywords: eLearning readiness, higher education, technological readiness, pedagogical readiness, resource readiness, attitude, eLearning Readiness of Higher Education Faculty Members

Introduction

The growth and adoption of education technology is on a rise in education and COVID-19 has increased this adoption further. With the outbreak of COVID-19, all over the world, an emergency e-learning situation is created in educational setup (Michael, 2020) and we are left with no other option than to adopt technology driven teaching methods. eLearning is being looked up as a potential solution to ensure continuity of learning at all schools and universities. The World Economic Forum reported a surge in the use of language apps, virtual tutoring, video conferencing tools, and online learning software in the last three months (Li & Lalani, 2020) and India is no exception to this. There is an e-learning boom in

the country with online classes (Zoom, WhatsApp, Skype etc.) becoming the norm for students, parents and teachers (Praveen, 2020). All this makes it mandatory to reconsider the current delivery and pedagogical methods in schools and higher education institutions which is a major challenge on the part of teachers (Richa, 2020). Majority of the traditional higher education institutions are scrambling towards eLearning to ensure normality in education and also to resume the academics without much gap once the COVID-19 crisis is over (Abhishek, 2020). The success of this emergency e-learning depends to a great extent on the readiness of teachers and students to accept and adopt it. Parameters like quality of faculty members, quality of IT infrastructure, acceptance of use of digital teaching technologies in teaching learning, trust/confidence on eLearning practices would determine the success of this emergency eLearning. Hence, it is rational to know the eLearning readiness of faculty members and students.

Objectives

The purpose of the present study is to explore the eLearning readiness (ELr) of higher education faculty members with respect to various demographic factors and E-learning dimensions and hence the following are the objectives of the study:

1. To study the dimension wise eLearning readiness of the faculty members of higher education institutions of Gandhinagar district with respect to their age, gender, teaching experience, discipline, education level, designation.

2. To study the overall eLearning readiness of the faculty members of higher education institutions of Gandhinagar district.

3. To study the dimensions of eLearning readiness.

Method

Data for the present study were obtained from the faculty members of higher education institutions located in Gandhinagar district, Gujarat using a cross sectional survey design. 154 higher education institutions/colleges listed in All India Survey of Higher Education 2018-19 (MHRD, 2019) was considered as a population frame for the present study and out of it, 60 colleges/institutions were selected using simple random technique and from those 60 institutions, the tool was distributed randomly to around 800 faculty members. 421 faculty members who responded constituted the sample of the study and thus the response rate was 53 percent with 45 percent female (n= 188) and 55 percent male (n=233). Around 75 percent of the faculty members were between the ages of 21 and 40. As high as 70 percent of faculty members had teaching experience between 1 to 10 years and 25 percent of them had teaching experience between 11 to 20 years. Most of the respondents (55 percent) were from Science & Technology discipline followed by faculty members from Social Sciences discipline (37 percent) and Arts & Humanities (8percent).

An inventory was constructed to collect the data for the current study. A thorough review of literature (Azimi,

2013; Doculan, 2014; Kaur & Abas, 2004; Mercado, 2008; Oketch, 2014) helped to identify the possible dimensions of eLearning readiness and the statements to be included in them. After making the corrections as per the suggestions given by the experts who were requested to validate the inventory, the final tool consisted of 62 items including 12 negative statements. The inventory had a total of 5 sections including a section on demographic information. The statements under the dimensions of ELr were measured using a likert scale consisting of 5 point rating items scored between 1 for strongly disagree and 5 for strongly agree. Negative statements were reverse scored before computing the dimension wise score and total ELr score. There were unequal number of statements in each dimension which ranged from 21 to 12 as follows: TR -21 likert items (maximum score would be 105 and the minimum would be 21), RR-15 likert items (maximum score would be 75 and the minimum would be 15), A-14 likert items (maximum score would be 70 and the minimum would be 14), PR-12 likert items (maximum score would be 60 and the minimum would be 12). The demographic characteristics of respondents like discipline, designation, gender, age, their education level and teaching experience were also collected. The inventory had an overall Cronbach-alpha coefficient of 0.88 indicating high level of internal consistency of the statements. Its subsections which are dimension wise had Cronbach-alpha coefficients of 0.88, 0.94, 0.90 and 0.56 for TR, PR, RR and A respectively. The data was analyzed using SPSS and results were presented using descriptive statistics and wherever required box plots and bar charts were used to present the results. Influence of demographic factors was tested using One-way ANOVA.

Results and Discussion

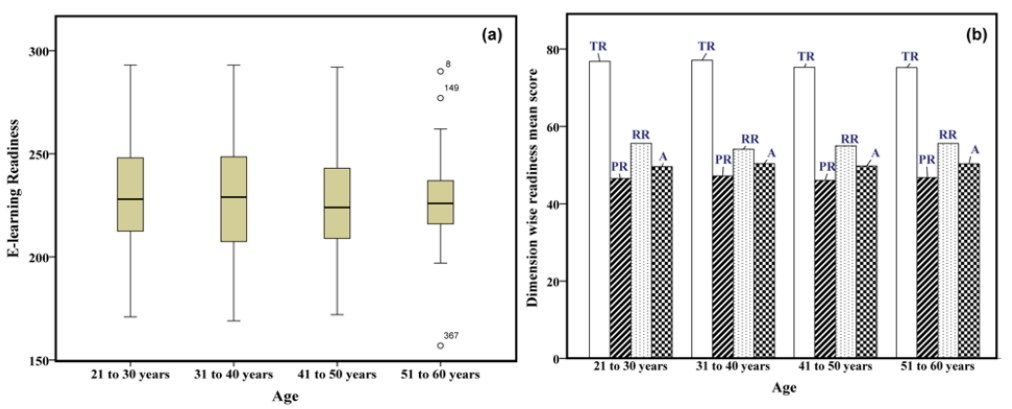
Age and ELr dimensions

The sample for the study consisted of faculty members from various age groups. The youngest faculty was of 21 years age and the eldest was of 60 years. Figure-1 (a), (b) represents the age wise score of ELr of faculty members and the mean scores obtained by them on different dimensions of ELr i.e., TR, PR, RR and A respectively. From figure 1 (a), it can be observed that the maximum and minimum score of ELr of faculty members belonging to various age groups is almost the same except for the faculty members in the age group of 51 to 60 years. The interquartile range (IQR) indicated by the height of the boxes shows that the spread of ELr scores is more in faculty members belonging to the age group of 31 to 40 years when compared to other age group faculty members. The figure also indicates that the median score of ELr of faculty members belong to age groups of 21 to 30 years and 31 to 40 years is more than the median score

of ELr of faculty members of 41 to 50 years and 51 to 60 years age groups. The results of one way ANOVA ($F(3, 417) = 0.247$, $p = .863$) indicated that there was no significant influence of age on ELr scores which is in line with the findings of many studies which stated that age does not have any significant impact on perception towards technological challenges (Aldowah, 2017), attitude towards

eLearning (Alenezi, 2012; Al Gamdi & Samarji, 2016), eLearning readiness (Oketch et. al., 2014), satisfaction with eLearning(Fleming, 2017) and the present finding is in contrast to the findings of studies which stated that age can have a significant effect on ELr (Al-Fadhli, 2009; Islam, 2011; Nauaf, 2010; Navani & Ansari, 2016; Soydal et. al., 2011), perception regarding contextual challenges (Adelabu, et al., 2014; Aldowah, 2017; Osika, et al., 2009), institutional barriers (Lloyd, et al., 2012), ICT anxiety (McMahon, et al., 1999), technology access and skills (Doculan, 2014), use of new technology (O"Donnell, 1991; Tusubira and Mulira, 2004). Further, from figure 2, it can be interpreted that the faculty members in all age groups scored highest in terms of their TR. However, the mean score of their PR is least in all age groups. The faculty members also scored less in A dimension of ELr. Thus, it can be concluded that the faculty members belonging to different age groups are symmetrically distributed in terms of their ELr scores and there are no obvious outliers in any of the samples. It can also be concluded that there is no significant effect on age on ELr scores. Further, from the dimension wise mean scores we can conclude that even though the faculty members' are technologically ready for eLearning, their readiness in terms of their pedagogical practices and attitude towards eLearning is very low.

Figure-1 (a): Box plot displaying the ELr scores of Faculty members according to their age group; (b) Dimension wise readiness mean scores of faculty members with respect to their age group

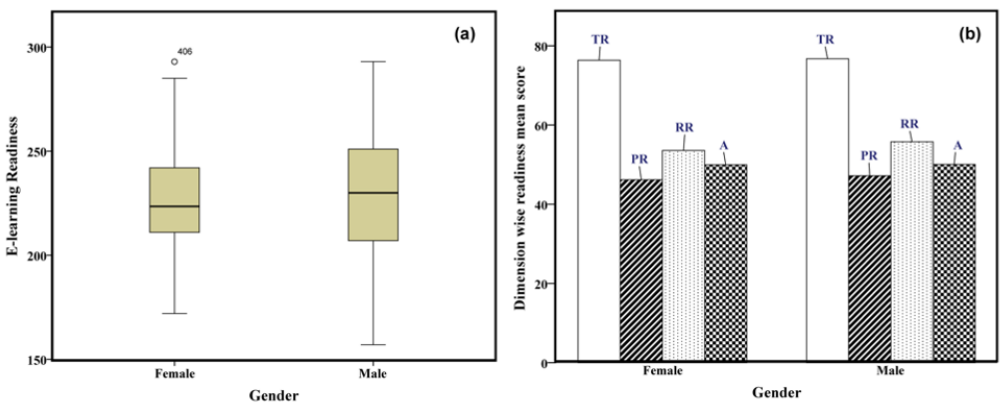


Gender and ELr dimensions

The sample for the study consisted of 45percent female faculty members and 55percent male faculty members (Female: M = 226.08, SD = 22.55; Male: M = 229.74, SD = 27.46). Figure 2 (a) and (b) represents the gender wise score of ELr of faculty members and the mean scores obtained by female and male faculty members on different dimensions of ELr respectively. From figure 2 (a), it can be interpreted that the maximum score of ELr of male faculty members is more than the maximum score of female faculty members. Also, the minimum score of ELr of male faculty members is less than the minimum score of ELr of female faculty

members. The IQR indicates that the variability of ELr scores is more among male faculty members than in female faculty members and the median score of ELr of male faculty members is more than that of female faculty members. It also shows that the ELr scores of both female and male faculty members are symmetrically distributed and there are no obvious outliers in any of the samples. The result of one way ANOVA (F (1, 419) = 2.165, p = .142) indicated that there was no significant influence of gender on ELr scores which is in line with the findings of many studies which stated that gender does not have any significant impact on ELr (Agboola, 2006; Oketch et. al., 2014; Soydal et. al., 2011) perception towards eLearning (Mutiaradevi, 2009; Wong & Atan, 2007,) and the present finding is in contrast to the findings of studies which stated that gender differences were observed with regard to perception towards: effectiveness/readiness of eLearning (Islam, 2011; So & Swatman, 2005; Taha, 2014; Volery, 2000), barriers towards eLearning (Al Gamdi & Samarji, 2016; Lloyd, et al., 2012), technological challenges (Aldowah, 2017; Goulãoak, 2013; O"Donnell, 1991). Fleming, Becker & Newton, (2017) claimed that there is significant difference in the virtual learning style of males and females. Alenezi, 2012; Navani & Ansari, 2016 claimed that gender has significant correlation with regard to attitude towards eLearning. Further, from figure 2 (b), it can be interpreted that both female and male faculty members are almost equal in terms of their TR. Both female and male faculty members scored least in terms of PR followed by their least score in A dimension. They both scored higher on RR when compared to PR and A. Thus, it can be concluded that gender does not have any influence on ELr scores of faculty members and they both are technologically ready for eLearning. However, their readiness in terms of their pedagogical practices and attitude towards eLearning is very low.

Figure-2 (a): Box plot displaying the ELr scores of Faculty members according to their gender; (b) Dimension wise readiness mean scores of faculty members with respect to their gender



Teaching experience and ELr dimensions

As high as 70 percent of the faculty members who participated in the survey had teaching experience between 1 to 10 years. The maximum years of teaching experience was 37 years and the minimum was one year. Figures 3 (a) and (b) respectively, represent teaching experience wise score of ELr of faculty members and the mean scores obtained by them in relation to their teaching experience on dimensions of ELr. As only three faculty members belong to the group of 31 to 40 years of teaching experience, the discussion about this group is not done here.

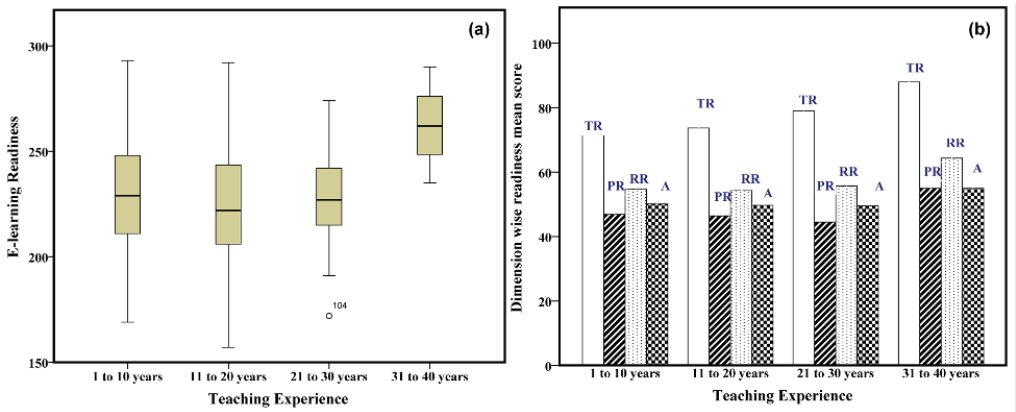
Further, from figure 3 (a), it can be interpreted that the faculty members who had an experience between 11 and 20 years had the least minimum score of ELr followed by the faculty members' minimum score of ELr in the experience group of 1 to 10 years. From the figure, it is also clear that the median score of ELr of faculty members whose experience is between 1 to 10 years and 21 to 30 years is more than the median score of ELr of faculty members whose teaching experience is between 11 to 20 years.

The IQR indicates that the spread of ELr scores is more among faculty members who have experience of 11 to 20 years than compared to faculty members in other experience groups. The plot also indicates that their ELr scores are symmetrically distributed. Further, it is also clear that there are no significant outliers in any of the samples. Also, the result of one way ANOVA ($F(3, 417) = 2.876$, $p = .036$) indicated that there was significant influence of teaching experience on ELr scores.

Alshangeeti, Alsaghier, & Nguyen, 2012 also reported that acceptance of online learning is highly dependent on the length of teaching experience and Navani & Ansari, 2016 also claimed that there is positive correlation of teaching experience with ELr. Lloyd, et al., 2012 also concluded that there is a strong effect of experience on resistance to online education. Further, figure 3 (b) shows that faculty members in all groups of teaching experience scored high in TR. Faculty members having teaching experience between 11 to 20 years had a least mean score of TR followed by faculty members who have 1 to 10 years of teaching experience. It can also be interpreted from figure 3 (b) that the faculty members scored higher on TR when compared to other dimensions.

Also, their score on RR is higher than scores of PR and A. Thus, it can be concluded that teaching experience has an influence on ELr scores of faculty members and irrespective of their teaching experience, the faculty members' readiness in terms of their pedagogical practices and attitude towards eLearning is low.

Figure 3 (a): Box plot displaying the ELr scores of Faculty members with respect to their teaching experience; (b) Dimension wise readiness mean scores of faculty members with respect to their teaching experience

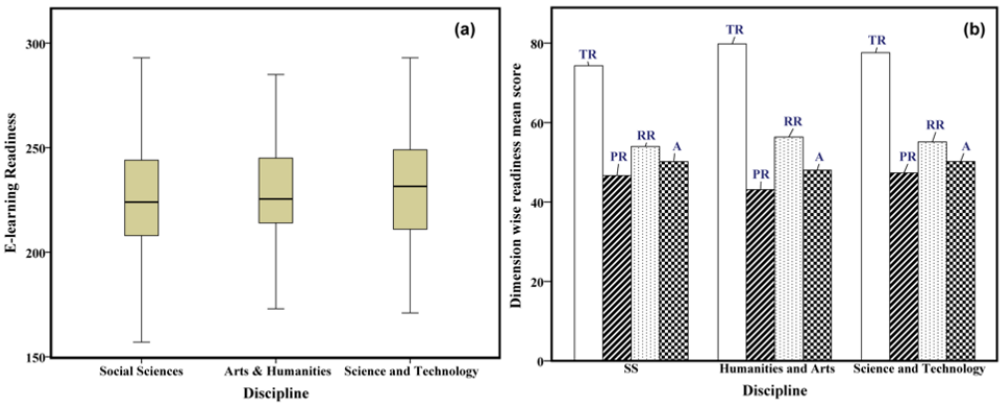


Discipline and ELr dimensions

The sample for the study constituted of 55 percent faculty members from Science & Technology (M = 230.28, SD = 24.92), 37 percent of faculty members from Social Sciences (M = 225.10, SD = 25.94) and 8 percent of faculty members from Arts & Humanities (M = 227.29, SD = 25.68) discipline. Thus, the mean score of ELr of Science & Technology faculty members is higher than the overall mean score of ELr (M = 228.11). Further, figure 4 (a) and (b) respectively represent the Discipline wise score of ELr of faculty members and the discipline wise mean scores by them on dimensions of ELr. The maximum score of ELr of faculty members belonging to Arts & Humanities discipline is less than the maximum score of ELr of faculty members belonging to Social Sciences and Science & Technology discipline (vide figure 4(a)). The ELr scores of faculty members belonging to Social Sciences and Science & Technology disciplines are more symmetrically distributed than the ELr scores of Arts & Humanities faculty members. Further, it is also clear that there are no obvious outliers in any of the samples. The result of one way ANOVA (F (2, 418) = 1.969, p = .141) indicated that there was no significant influence of Discipline on ELr scores. Al Gamdi & Samarji, 2016 reported that there were not significant differences even in the subscale scores among the faculty members belonging to various disciplines. While, Alsaghier & Nguyen, 2012 reported that the discipline to which the faculty members belonged to had a strong influence on their rating towards or against online teaching. From figure 4 (b), it is clear that the mean score of TR of faculty members of all the three disciplines is greater than their mean scores on other readiness dimensions i.e., PR, RR and A. The faculty members of all the three disciplines have scored the least mean score in PR followed by their readiness score on A. Thus, the mean score of readiness of faculty members of all the three disciplines is higher in their TR followed by RR, A and PR. Thus, it can be concluded that discipline does not have any influence on ELr scores of faculty

members and all the faculty members are technologically ready for eLearning. However, their readiness in terms of their pedagogical practices and attitude towards eLearning is very low.

Figure 4 (a): Box plot displaying the ELr scores of Faculty members with respect to the Discipline; (b) Dimension wise readiness mean scores of faculty members with respect to their Discipline

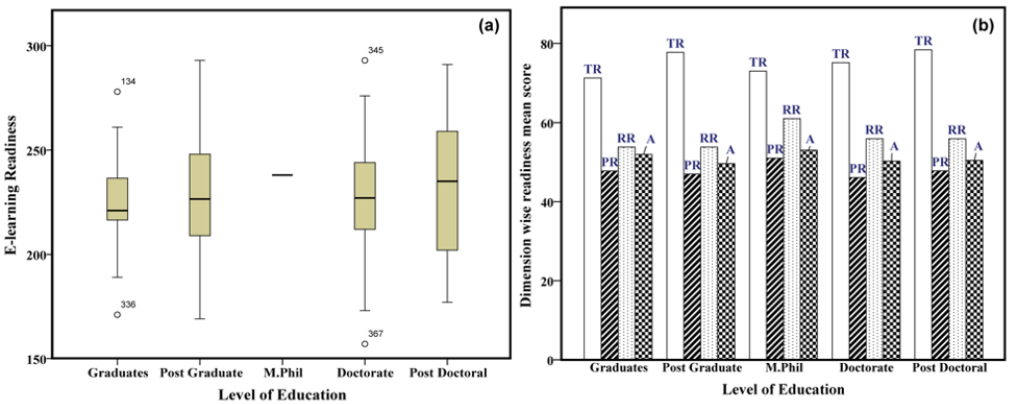


Level of education and ELr dimensions

The majority of faculty members (49percent) are Post Graduates (M = 228.12, SD = 28.01), and around 38percent of them are Doctorates (M = 227.37, SD = 22.39). Figure 5 (a) and (b) respectively, represent the ELr scores of faculty members according to their level of education and the mean scores obtained by them on dimensions of ELr. From figure 5 (a), the IQR shows that the ELr scores of faculty members who are Post Doctorates (PD) is more spread than the ELr scores of Post Graduates (PG), Doctorates (D). Further, the ELr scores of Graduate (G) faculty members are negatively skewed while the ELr scores of faculty members of other levels of education are distributed symmetrically. The maximum score of ELr of PG faculty members is highest followed by the maximum scores of PD, D and G faculty members. The median score of ELr of PD faculty members is highest followed by the median score of PG, D and G faculty members. Further, there are no obvious outliers in any of the samples. The result of one way ANOVA (F (4, 416) = .401, p = .808) indicated that there was no significant influence of the level of education of faculty members on their ELr scores. Agboola, 2006; Mutiaradevi, 2009; Oketch et. al., 2014; Parlakkiliç, 2015 concluded that faculty members' level of education does not have a significant effect on their perception towards eLearning or their ELr. On the other hand, Nauaf, 2010 claims that the level of education of faculty members significantly influenced their perception towards eLearning. Further, from figure 5 (b), it can be interpreted that faculty members with various levels of education scored highest in TR followed by their RR and A scores. The faculty members in all the groups scored least in terms of their PR. Thus, it can be concluded that level of education does not have any influence on ELr

scores of faculty members and they are technologically ready for eLearning. However, their readiness in terms of their pedagogical practices and attitude towards eLearning is very low.

Figure 5 (a): Box plot displaying the ELr scores of Faculty members with respect to their Level of Education; (b) Dimension wise readiness mean scores of faculty members with respect to their Level of Education

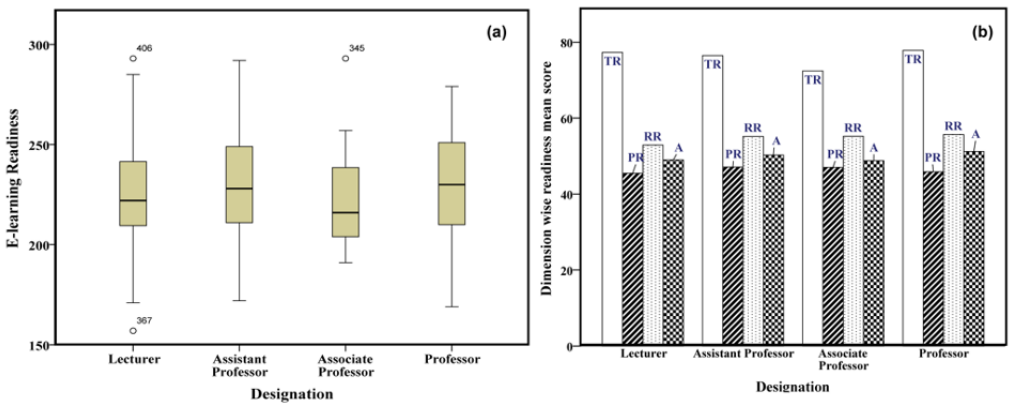


Designation and ELr dimensions

The majority of faculty members (70percent) are Assistant professors (M = 229.11, SD = 24.57), and around 19percent of them are Lecturers (M = 224.69, SD = 27.85) and around 10percent of them are Associate professors and Professors. Figure 6 (a) and (b) respectively represents the Designation wise score of ELr of faculty members and the mean scores obtained by them on dimensions of ELr i.e., TR, PR, RR and A. From figure 6 (a), it is clear that the median score of ELr of Professors is highest followed by the median scores of Assistant professors, Lectures and Associate professors. The IQR shows that the ELr scores of Lecturers are more consistent around the median followed by the ELr scores of Assistant professors, Associate professors and Professors. Thus, the ELr scores of Professors are more scattered than other faculty member groups. The ELr scores of Lecturers, Assistant professors and Professors are symmetrically distributed and the ELr scores of Associate professors are skewed towards the higher scores of readiness. The maximum score of ELr of Professors is lower than the maximum score of other faculty members. The result of one way ANOVA (F (3, 417) = .929, p = .427) indicated that there was no significant influence of designation of faculty members on their ELr scores. This finding is in contradiction to the studies of O"Donnell, 1991; Lloyd, et al., 2012 who stated that the position of faculty members significantly influenced their perceptions towards technological integration, cost/benefit barriers and barriers to online teaching. Further, from figure 6 (b), it can be interpreted that TR of faculty members of various designations is highest when compared to their PR, RR and A. They all scored least in PR followed by their least scores of A and RR. Thus, it can be concluded that designation of faculty members

does not have any influence on ELr scores of faculty members and they are technologically ready for eLearning. However, their readiness in terms of their pedagogical practices and attitude towards eLearning is very low.

Figure 6 (a): Box plot displaying the Designation wise ELr scores of Faculty members; (b) Dimension wise readiness mean scores of faculty members with respect to their designation



eLearning readiness

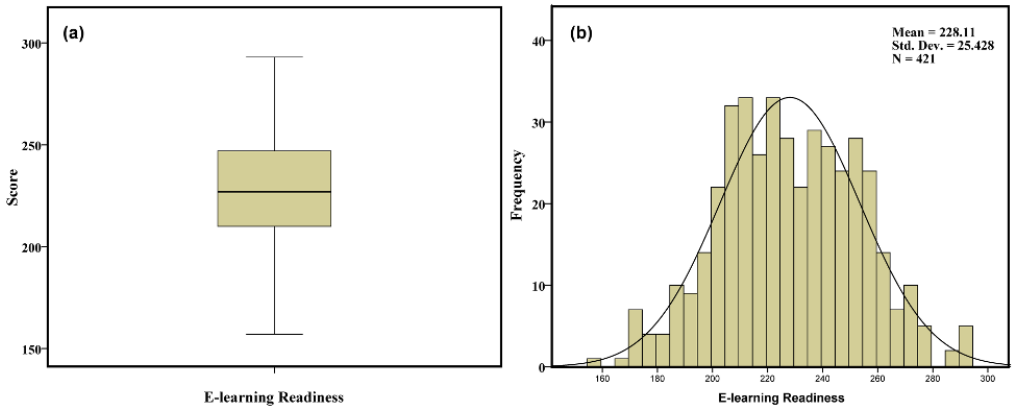
The ELr score (all dimensions scores added together) of faculty members ranged from 157 to 293 (M = 228.11, SD = 25.42) and were normally distributed (vide figure 7 (a), (b), table 1), with skewness of .030 (SE = 0.119) and kurtosis of -.346 (SE = 0.237). From figure 7 (a) it is also clear that there are no significant outliers in the ELr scores. As high as 75percent of faculty members scored above 210 and 25percent of them scored above 247.50 (vide table 1). From table 1, it can be concluded that the ELr score of the 95percent of the faculty members of higher education institutions of Gandhinagar district will lie between 304.394 and 151.826.

Table-1: Descriptive Statistics of ELr

			Statistic	Std. Error
eLearning Readiness	Mean		228.11	1.239
	95% Confidence Interval for Mean	Lower Bound	225.67	
		Upper Bound	230.54	
	5% Trimmed Mean		228.09	
	Median		227.00	
	Std. Deviation		25.428	
	Interquartile Range		38	
Percentiles	25		210.00	
	50		227.00	
	75		247.50	

Source: Research data

Figure-7 (a): Box plot displaying the ELr scores of faculty members; (b) Distribution of ELr scores of faculty members



Dimensions of eLearning readiness

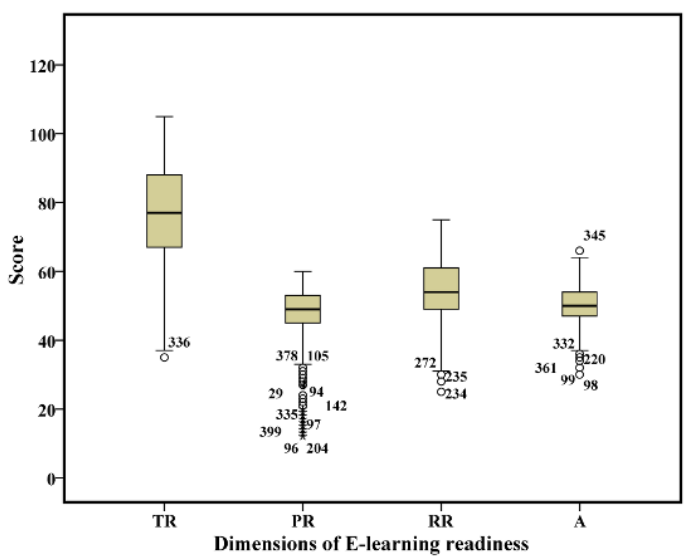
Table-2 shows the descriptive statistics of dimension wise mean score of ELr. Technological skills/components and pedagogical skills play a very important role in successful implementation of eLearning (Lloyd, 2012; Muhannad Anwar Al-Shboul, 2019; Oketch, 2014; Soong et al., 2001; Tarus & Gichoya, 2015). In the present study it was observed that faculty members scored highest in the TR dimension and least in the PR. Joseph, 2010 ; Adiyarta et al., 2018; Edumadze et al., 2014; Nisperos, 2014 emphasized that technological skills need to be improved to improve the effectiveness of eLearning. Eslaminejad et al., 2010 suggests that pedagogical innovations are required to improve the effectiveness of eLearning. Around 50percent of the faculty members scored more than the mean score of TR (vide table 2). The 50th percentile score of RR (vide table 2) indicates that 50percent of the faculty members scored more than the mean score of RR. Similarly, the 50th percentile score of A (vide table 2) shows that around 50percent of the faculty members scored more than the mean score of A and the 50th percentile score of PR (vide table 2) shows that around 50percent of the faculty members scored less than 49. In this dimension, around 64percent of faculty members scored more than the mean score. From figure 8, it can be interpreted that the median score of TR dimension is highest followed by the median score of RR, A and PR. The scores of PR are skewed towards the lower side and the outliers in PR indicate the presence of very least scores in this dimension. The outliers in each of these dimensions are mild and hence it can be said that the influence of these outliers on overall ELr score is not strong (vide figure 7 (a)).

Table-2: Descriptive Statistics of Dimensions of eLearning Readiness

		TR	PR	RR	A
Mean		76.55	46.74	54.80	50.02
Std. Deviation		14.264	10.157	9.186	5.952
Skewness		-.245	-1.650	-.096	-.452
Kurtosis		-.405	2.709	-.010	.625
5% Trimmed Mean		76.81	47.79	54.89	50.20
Percentiles	25	67.00	45.00	49.00	47.00
	50	77.00	49.00	54.00	50.00
	75	88.00	53.00	61.00	54.00

Source: Research data

Figure-8: Box plot displaying the dimensions wise readiness scores of faculty members



A further item wise analysis of the statements on the basis of their mean scores is presented in tables 3 & 4 which show the list of dimension wise top four statements and bottom four statements respectively. From these tables it can be concluded that in terms of their TR, the faculty members are good at basic digital skills but lack the important skills like developing podcasts, e-books, e-quiz, discussion boards and blogs which are very essential for developing content in eLearning platform. With regard to PR dimension, even though faculty members believed in basic principles of teaching, they all believed that teacher centered teaching is better than learner centered teaching which is not in favor of principles of eLearning. They also scored least with regard to their views on integrating various digital tools in teaching and development of question banks for the courses that they teach. Thus, the faculty members are

not ready in terms of the pedagogical dimension of eLearning. In terms of RR, it is good to know that the majority of the faculty members expressed that everyday they have access to reliable and unlimited internet connection, personal computer/laptop and a printer. However, they expressed that video editing software and e-content creating software are not available with their institutions which reduced their RR. A good point to observe is that many of the faculty members disagreed that their institutions do not have sufficient human resources or do not give any special credit for supporting eLearning practices. This indicates a positive institutional environment towards eLearning. With regard to the Attitude dimension of eLearning, the majority of the faculty members are aware about eLearning and believe that eLearning improves the quality and efficiency of teaching. They also do not feel that eLearning is difficult to handle and frustrating to use and it increases the workload of teachers, which are very good signs for adoption of eLearning practices in higher education institutions. On the contrary, they also expressed that use of eLearning practices will not bring much difference in face to face teaching. The faculty members also do not strongly believe that eLearning reduces communication barriers between teacher and student. However, the faculty members feel shy to use technology and they also do not consider themselves as experts in using eLearning technologies and hence these could be the reasons for their lower score on A dimension of eLearning.

Table-3: Top four statements in each Dimension of ELr

TR	PR	RR	A
Downloading and saving files from internet	Teaching should be planned according to needs of students	Access to reliable internet connection in institution	* Feel shy to use technology
Using MS-office	The methods of teaching should be according to nature of content to be taught	Have personal computer/laptop	Know what is eLearning
Using online technologies for communication (email, Whatsapp, chat etc)	A teacher should use new pedagogical approaches	Have unlimited internet in institution	eLearning improves quality of teaching and learning
Locating variety of resources from internet	Teacher should create lesson plans before teaching	Have access to a printer in institution	eLearning will improve efficiency in teaching

Source: Research data

Table-4: Bottom four statements in each Dimension of ELr

TR	PR	RR	A
In developing Podcast for my lessons	Students' physical presence is not must in a teaching learning process	Video editing software is available in institution	eLearning reduces communication barriers between teacher and student
In developing e-books	Teacher should develop question bank for the courses that they teach	e-content creation software are available in institution	eLearning is difficult to handle & frustrating to use
In developing online quiz (using hot potatoes/ Socrative/Kahoot etc.)	Learner centered teaching is better than teacher centered teaching	* Institution does not give any special credit for using eLearning	* eLearning increases workload of teachers
In creating discussion boards	Teacher should integrate various digital tools in teaching	* The institution does not have sufficient human resources to support eLearning	I consider myself as expert in using eLearning technologies

Source: Research data

* Negatively worded statements

Conclusion and implications

The present study concludes that demographic factors like age, gender, discipline, teaching experience and designation of faculty members does not have a significant influence on their ELr score. However, teaching experience was found to be a significant factor in ELr. With regard to dimensions of eLearning, a good indication is that faculty members are TR for eLearning. However, it is very essential to organize training programmes to increase TR (especially with reference to improve their skills to develop podcasts, e-books, e-quiz, discussion boards and blogs. Such training will not only change their attitude towards eLearning but also would increase their expertise in using eLearning technologies. The faculty members should also be encouraged to use various digital tools and develop e-question banks to increase their PR scores. Institutions should take the responsibility of providing necessary software and hardware facilities to faculty members for implementing eLearning practices which will increase their resource readiness scores. The findings derived in the present study provide a direction to the policy makers to take further steps in implementing/

promoting eLearning in higher education institutions. The findings also give an idea to the higher education institutions regarding the strength and weakness of their faculty members and suggest a way forward to them in adoption of eLearning practices. However, the present study considers only 4 dimensions of eLearning readiness and hence, further studies can explore the other dimensions of eLearning readiness.

(Acknowledgments: My sincere thanks to "Center for Policy Research in Education", PMMMNMTT, School of Education, Central University of Gujarat, for funding this research. The support of higher education faculty members who participated in this research is greatly acknowledged.)

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Research Article

The Effect of Text-to-speech Software on the Reading Skill of Poor Readers of English in a Bengali Medium School

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Abstract

The purpose of this study is to evaluate the effect of text-to-speech software used by K-YAN Projectors on the poor readers of English in a government sponsored Bengali medium school. A majority of the learners of Bengali medium government sponsored schools have very little exposure to English. They learn English as their second language which is also a foreign language to them. They can scarcely pronounce words correctly and are seldom fluent at reading as well as speaking English. This generates a general fear and dislike for English among the Bengali medium students which also has a serious consequence on their confidence. These learners fail to attain all the four language learning skills namely- listening, reading, speaking and writing. To correct this problem and to give our selected language learners proper language exposure we installed 'Balabolka', free text-to-speech software, in our K-YAN device and arranged some consecutive listening-reading classes and then recorded their improvement in reading skill, confidence, fluency and pronunciation via statistical measures. The statistics showed positive growth in learners' confidence, fluency, pronunciation and reading skill. This experiment clearly highlights the necessity of deploying text-to-speech software in crowded English language learning classes in government sponsored Bengali medium schools of West Bengal.

Keywords: K-YAN Projectors, English Language Teaching, Text-to-speech software, Government School

Introduction

English language teaching is not new to our country. English is taught in almost all the government schools and private schools of our country. But still English is a formidable language to most of the students. They are afraid of it and this fear of English ultimately undermines their confidence. The root cause of this fear, however, is lack of exposure. Most of the students who read in government sponsored schools of our country belong to parents of low or middle income groups. These students seldom get enough exposure to English in their family, surroundings or even in schools. Unlike the English medium schools in vernacular schools, all the subjects are taught in the local language. Therefore, the learners get exposure to English language only in their English class. Besides, they seldom find a chance to

apply their English language skills in their life. Therefore, English is an alien language to them.

Another obvious reason for a learner's failure to learn English is, of course, the overcrowded classrooms. In overcrowded classes a teacher often fails to draw the attention of all the students to study, teacher's voice may not reach the backbenchers; there could be individual differences in the learners' previous knowledge. These are practical problems that hinder effective English language teaching in the classroom. The answer to all these problems can be found in technology. Technology can help teachers to manage overcrowded classrooms more effectively and efficiently. It can boost up their confidence to manage chaotic classrooms, it can amplify their voice, and it can enable them to attract the attention of the majority of the students for a long time. Keeping in mind the benefits of education technology, government agencies of education are leaving no stones unturned to deploy technology in the practical field of education, namely the actual classrooms of government owned as well as the government aided and government sponsored schools, despite several constraints. The aim is to replace the regular classes with smart classes to harvest the benefits of use of technology in education. The Department of Education, Government of West Bengal with active encouragement of the Department of Information Technology, Government of West Bengal introduced computer based learning (CAL) system titled 'K-YAN' (vehicle of knowledge) in a phased manner through West Bengal Electronics Industry Development Corporation Ltd (WEBEL) mandated ILFS-ETS as implementing agency. This programme provides schools ICT tools like digital content, alternative power supply solutions and capacity building programmes to bridge the digital gulf and ensure sustainability. K-YAN has been deployed in almost all districts of West Bengal. The general outcome of this programme is positive (Sharma, 2014). We had further equipped the KYAN device with text-to-speech software, 'Balabolka.'

Need and Importance of the Study

This study is important because globalization and open market concepts are changing our economy and standard of living very fast. Multinational companies are making their presence felt. Parents who can afford private schools are sending their wards to English medium schools. According to a report of District Information System for Education (DISE) of National University of Educational Planning and Administration (NIEPA) under the Ministry of Human Resource Development, Government of India, enrolment in English medium schools has increased by 50% between 2008 and 2009. This clearly shows the importance Indian parents attach to English language learning. But a huge number of children who belong to the lower or middle income group parents, who cannot afford private education or English medium schools for their children are still sending their wards to government aided or government sponsored schools. These children who belong to the disadvantaged group

should not lag behind in the competitive job market in future. Therefore, it is important to find out the means to improve the quality of English language learning classes effectively; that is why this study was necessary.

Operational Definition of Key Terms

- **K-YAN Projector:** K-YAN is a single wire, plug and play, integrated digital teaching device which was developed in collaboration with IIT Mumbai in 2004. It is portable, user friendly and modelled on the best principles of technology in education. It has won the India Innovation Award 2005 and Maharashtra IT Award 2004 for best community learning technology. K-Yan is actually a device that amalgamates a powerful DLP projector along with a Multimedia Computer and audio amplifier with powerful speakers. The package also consists of accessories like Wireless Multimedia Keyboard; Wireless Optical Mouse; signal receiver for the wireless keyboard and mouse and a single Power Cord. Windows 8.1 SL / Linux is generally provided as an operating system. It also includes Office Package and other utility software. K-YAN can also be connected to the Internet. K-YAN can be used for different computations; it can also be used as a movie projector; we can use it for Video Conferencing, for powerpoint presentations and also as a Technology Aided Learning tool.

- **DLP Projector:** The abbreviation DLP stands for Digital Light Processing is a set of chipset based on optical micro-electro-mechanical technology that uses a digital micromirror device. It was originally developed by Larry Hornbeck of Texas Instruments. • Text-to-Speech or Speech Synthesis software: Text-to-Speech software or Speech Synthesis is the artificial production of human speech. A text-to-speech (TTS) engine converts written text to phonemic representation to waveforms that can be output as sound.

- **Balabolka:** It is a free text-to-speech software. Its quality and flexibility is as good as any paid application. With Balabolka we can customize the reading. We can choose one from the three reading options, namely- British English, American English and Indian English. We can select the pitch and the speed of the reading. We can also choose from different voices that the software offers. In our study we have used this particular software in the available K-YAN device. This software is available in various web platforms for free.

Literature Review:

K-YAN is certainly a very important invention for the education system of our country. It is a multimedia device; therefore, it is pretty effective to grab the attention of the learners for a long time. It makes children more attentive, enthusiastic and interested in study. Children seldom want to miss a class in which a K-YAN is deployed (Mondal, 2014). The good news is with serious effort on the part of the government K-YAN has reached a considerable number of schools. According to Shah (2019), in the last eleven years K-YAN has reached 30,000 schools and 5, 00,000 teachers. The same study shows that K-YAN empowers teachers as mentors; it also claims that introduction of K-YAN

has improved students' participation in class. On the other hand, Sharma (2014) statistically shows that teaching has improved and the improvement can be quantified in percentile terms as 4% every quarterly cycle, in comparison to the earlier rounds of field evaluation conducted. So, the effectiveness of K-YAN is quite evident.

Dutta and Bala (2012) evaluates teaching of English at primary level. In it, they point out that the textbooks at level 1 that is classes I and II are not focused on listening and speaking skills and that is why they do not build familiarity with the language. These books also do not link a child's life at school to its life outside the school. Therefore these books fail to build an emotional attachment of the child with the language. The same research also points out that the present curriculum does not offers any opportunity to the children to listen to the language or speak the language.

The study conducted by Bione et al. (2017) evaluates the voice quality of a TTS system in comparison with a human voice and examines its pedagogical potential for use in English as a foreign language (EFL) setting. Their findings suggest that TTS systems are ready for pedagogy because it has already proved its efficacy. Another study by Meihami & Husseini (2012) concludes that word stress and word intonation aspects of reading benefited most from using TTS in the classroom. Use of TTS in the classroom also improved the fluency of the learners. So this study also confirms the positive effect of text-to-speech software. All these studies indicate effectiveness of text-to-speech software in language teaching scenarios.

Objectives

The objectives of this research were:

1. To study the effect of text-to-speech software on the reading skill of the poor English readers of a Bengali medium school.
2. To study the effect of text-to-speech software on the confidence, fluency and pronunciation of the poor English readers of a Bengali medium school.

Methodology

The methodology of study comprises sample, population, tool, instrument, method of research, procedure of data collection and the procedure of data analysis.

Sample

For this study we have used a purposive sampling strategy. The sample of the study consists of 60 students of class VIII of a government sponsored Bengali medium high school. A diagnostic reading test was conducted to ensure that all the selected learners are poor at reading English. This school was selected because it has already been provided with K-YAN projectors by the government.

Population

The population of the study shall include all the current students of class VIII of Bengali medium government schools.

Tool

The tool for this study was a particular text named 'Midnight Express' (Lesson 11) which is an edited version of Alfred Noyes' famous short story of the same name and is included in the prescribed text book of class VIII, 'Blossoms'. Beside this, a word list of disyllabic, trisyllabic and tetrasyllabic words was prepared from the above mentioned text to conduct the diagnostic pre-test and the post-test.

Importance of K-YAN Projector for this study:

The K-YAN DLP Projector is an indispensable device for our experiment. We have already mentioned it. 'Balabolka', a popular text-to-speech software was installed which is easily available over the internet free of cost. It is a fact that we can install text-to speech software on any computer, laptop or a smartphone. But, unlike these devices K-YAN has an integrated powerful speaker which delivers very clear and loud sound output which is ideal for an over-crowded class. We have used 'Balabolka' to machine read the text we have selected before the sample students. K-YAN and the text-to-speech software worked wonderfully together. Even the backbenchers could listen to the reading. Beside this the children could follow the text if they want on a big screen where the projector projected the text. However, the students were instructed to follow their own text closely and to underline the words that they found difficult after each reading. K-YAN has many advantages that make it an ideal device for our text-to-speech aided reading classes. Beside this K-YAN is now available to a significant number of government sponsored Bengali medium schools.

Method of Research

For this research, single group pre-test and post- test design was chosen. This design has been chosen because random assignment of participants into experimental and control groups was not possible to make. The first step of quasi-experimental research was to select learners who are poor at reading English. To select the sample of 60 learners a diagnostic reading test was conducted to find out the learners who are poor at reading English. Their performance was evaluated under three heads namely- Confidence; Fluency and Pronunciation. All these three heads had full marks of 5. According to their performance, each student was given a certain mark under each head. Then all these 60 students were given the text-to-speech reading treatment. After the completion of the treatment period a post-test was conducted in the same manner in which the pre-test was conducted by a reading test and their performance was evaluated and the data of pre and post-test was compared. The text-to-speech read along treatment included machine reading of the text along with chorus reading of the text by the sample learners. The text-to-speech software used for this particular study was 'Balabolka'. It allows one to stop reading whenever we want. During the treatment the reading was stopped after every single sentence and after every polysyllabic word, so that the students can repeat the same aloud. The students were instructed to follow

their text closely and mark the words they found difficult during each reading. This way the learners became conscious of their weaknesses. They also got an instant chance to correct themselves. Thus, the students' listening skill as well as reading skill has been treated together. All of them participated in the study actively and by self-correction they improved their English as well as confidence with each reading.

The Difference between the Scores of Pre-test and Post-test

At the beginning of the study a pre-test was conducted and after the completion of the treatment a post-test was conducted and the data was gathered. Here, we showcase the difference between the data that was found after statistical interpretations in table-1.

Analysis and Interpretation of Data

Table-1: Difference between the mean scores and that of the standard deviation scores of pre-test and the post-test

Description	Mean	Standard Deviation
Pre-test	12.27	8.111
Post-test	19.64	6.982

Table-1 clearly shows the difference between the mean scores and that of the standard deviation scores of pre-test and the post-test conducted on the sample of our study.

The mean of the pre-test was 12.27 and the standard deviation was 8.111. On the other hand, the mean of the post-test turned out to be 19.64. The standard deviation of the post-test was 6.982.

T-Test of Pre-test and Post-test

Table-2: result of the T-Test performed on the data of the pre-test and the post-test

	Paired … 99% Confidence Interval of the … Upper	t	df	Sig. (2-tailed)
Pair 1 Post-test – Pretest	8.604	15.943	58	.000

Review of Data

Table-2 shows the result of the T-Test performed on the data of the pre-test and the post-test conducted on the sample. It was a two tailed test. Here, the df or degree of freedom (df) is 58. The T-value is 15.943. The T-value is tallied at the 99 percent confidence interval level and difference between the two means proves highly significant. Therefore, it can be concluded that there is a significant difference in the mean scores of the poor readers of English of the Bengali medium school between the pre-test and the post-test.

Table-3: Four pre-tests and post-tests

Mean			N	Std. Deviation	Std. Error Mean
Pair 1	**Post-test**	19.64	59	6.982	.909
	Pre-test	12.27	59	8.111	1.056
Pair 2	**Post-test of Confidence**	3.80	60	1.054	.136
	Pre-test of Confidence	2.73	60	1.260	.163
Pair 3	**Post-test of Fluency**	3.28	60	1.236	.160
	Pre-test of Fluency	2.27	60	1.287	.166
Pair 4	**Post-test of Pronunciation**	2.90	60	1.115	.144

Difference of Means, Standard Deviation and Standard Error of Mean of the Pre-tests and the Post-tests

Table-3 lists out all the four pre-tests and post-tests conducted in this experiment. The overall pre-test and post-test has been discussed already. However, to understand the impact of the treatment more precisely we have split the data further, under these three heads, namely- Confidence, Fluency and Pronunciation.

The first head is confidence. The mean of the pre-test of this head is 2.73. On the other hand, the mean of the post-test is 3.80. The standard deviation from mean of the pre-test is 1.260 while that of the post-test is 1.054. The standard error of mean of the pre-test is 0.163. The standard error of mean of the post-test is 0.136.

The second head is fluency. Here too, we notice a difference between the mean of the pre-test and that of the post-test. The mean of the pre-test is 2.27. The mean of the post-test is 3.28. Standard deviation from the mean of the pre-test is 1.287 whereas the standard deviation from mean of the post-test is 1.236. The standard error of mean in the pre-test is 0.166. The standard error of mean in

the post-test is 0.160.

The third head is pronunciation. The mean of the pre-test turned out to be 1.98. The mean of the post-test turned out to be 2.90. The standard deviation from mean of the pre-test is 1.186. The standard deviation from mean of the post-test is 1.115. The standard error of mean of the pre-test and f the post-test are 0.153 and 0.144 respectively.

All the data mentioned above shows a difference. Therefore, it is important to find out the significance of the difference. T-test was calculated to find out the significance of the differences.

T-Test of All the Four Pre-tests and Post-Tests

Table-4: Result of the four T-tests

		Paired … 99% Confidence Interval of the … Upper	**t**	**df**	**Sig. (2-tailed)**
Pair 1	**Post-test – pre-test**	8.604	15.943	58	.000
Pair 2	**Post-test of confidence -**	1.363	9.597	59	.000
	Pre-test of confidence	1.310	9.226	59	.000
Pair 3	**Post-test of Fluency – pre-test of Fluency**	1.195	8.780	59	.000
Pair 4	**Post-test of Pronunciation - Pre-test of Pronunciation**				

Table-4 lists the result of all the four T-tests that have been carried out. The result of the first test has been discussed already. The T-test concerning confidence has a Tvalue of 9.597; the degree of freedom (df) here is 58. The T-test concerning fluency has a Tvalue of 9.226 and the degree of freedom here is 59. The fourth pair or the test concerning pronunciation has a T-value of 8.780 where degree of freedom (df) is 59. All the T-tests that have been performed showed the differences as positively significant at the 99 percent confidence interval level. Therefore, we can declare safely that all the hypotheses have been retained.

Significance of the Study

Some of the benefits of the method of using text-to-speech software in conjugation with K-YAN projectors have

been listed here. This can show the way in which the study can enrich the present English language teaching of our country.

- During this experiment the majority of the learners listened to the machine reading of the text with full concentration and then they repeated the same aloud. Thus, this method develops the learner's listening skill as well as reading skill.
- They read the text aloud in chorus which helps them to overcome their anxiety of reading English.
- They participated in the reading process willingly with their peers. Thus, they overcome their inferiority complex.
- Text-to-speech software generally offers two or three variants of reading. In this case the options were- British English, American English and Indian English. Here, British English was chosen. Thus, the students got an opportunity to listen to the native speakers and imitate and internalise their style of speaking English which is beneficial for learning a foreign language, according to Lee and Heinz's (2016).
- Lee and Heinz (2016) also highlight the importance of learner autonomy in English language learning. While giving the treatment we asked the students to identify the words that they found difficult and take extra care to listen and correct the same in the next reading. This approach certainly awakens the learners and compels them to take part in the reading actively and thus be responsible for their own development.
- The experiment provides the learners exposure to British English language. The learners listen to the native speakers, the receipt pronunciation (RP). Thus, this method can save the learners from any subjective error on the part of the teacher.
- Text-to-speech reading treatment not only improves learner's pronunciation and fluency but also it improves their sense of intonation and stress. Meihami and Husseini's (2012) study points this out. The same is evident in our study.
- In our experiment the students are required to read aloud the text after listening carefully to the reading by the machine. Lee and Heinz's (2016) prescribe reading aloud as an effective strategy to improve language learning. The experiment includes this strategy also.

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Research Article

Best foot forward through transformed TIL paradigm for effective online learning in India: A survey study with higher education students in Delhi-NCR

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Abstract

The outbreak of COVID-19 enforced an abrupt and complete nationwide lockdown in India that was justified in its goal of preventing the spread of infection in a highly populous country like ours with poor health infrastructure and limited coping abilities. The best option to continue the disrupted education of millions of students was to transfer the delivery of course content through internet-based platforms. This led both teachers and students of regular Indian universities to continue their teaching learning process by rapid conversion of physical classrooms to online classes with both the stakeholders having no previous experience of participating virtually. The main objective of the study is to examine the perspective of students enrolled in higher education institutes, mainly in Delhi/NCR on the effectiveness of online learning mode as compared to traditional face to face classes. The study also analyses whether it has been able to transform the mindset of students towards online learning. The research methodology is quantitative by adopting a survey method for gathering data from a pool of respondents by asking a series of questions in a structured manner. By adopting a convenience sampling technique, 210 undergraduate and 39 postgraduate students had been approached to participate in this survey. The findings and conclusion brought out many hurdles faced by the students even in Delhi and adjoining regions. Knowing e-learning practice is going to play a prominent role in future education and realising an urgent need to redefine contemporary learning pedagogies for effective web-based delivery, this study proposes modification in the customary roles of all three stakeholders, namely, Teacher, Institute, and Learner -TIL

Keywords: Online learning, student perception, teacher, Institute of higher education, learner, COVID-19 pandemic

Introduction

The COVID-19 outbreak that brought the world to a standstill resulted in a complete lockdown of India by mid-March 2020 so as to contain the spread of the pandemic. Although no sector remained unaffected by this action of the Indian Government, the education sector probably was the worst hit, as shutdown on such a short notice halted the learning process. Considering the future of millions of students at stake, in no time the academicians at all levels - be it at school or at higher education, embraced tech-led learning, i.e. online learning or e-learning. Many definitions exist for e-learning, the prominent being, a mode of training enabled electronically and empowered by the use of digital technologies (such as CD-ROMs, internet, DVDs, intranet, etc), that is independent of time and place, can be delivered as live (synchronous) or as pre- recorded (asynchronous) sessions (Fee, 2005; Abbad, Morris & de Nahlik, 2009; Algahtani, 2011). There are numerous well-accepted benefits of e-learning such as better accessibility to higher education , cost and time advantage and flexibility for students to pursue education at their pace along with managing official work or home responsibilities (Oye et al., 2012; Pasha & Gorya, 2019).

India's higher education encompasses education pursued (a degree/diploma) in any field of Science, Engineering, Arts, Commerce, Architecture, etc., after completion of 12 years of schooling. Therefore, Graduation, Post-Graduation, M. Phil, MBA, Ph.D. as well as Certificate, Diploma or PG Diploma are included under higher education definition. University Grants Commission (UGC) under the aegis of the Ministry of Human Resource Development (MHRD) is the statutory body that is responsible for maintaining education standards in Higher Education Institutions (HEIs) in the country. As per the All India Survey of Higher Education (AISHE) report, absolute enrollment in all HEIs (993 universities + 39931 colleges) in the period 2018-19 corresponded to 3.73 crore students which were taught by 14.16 lakh faculty (AISHE report, 2019). Training such a large number of learners is a mammoth task for any HEI with its limited campus and resources. Therefore, one would have expected that with the advancement in information technology and rapid progress in online learning in the rest of the world, this learning style would be adopted quickly by the Indian HEIs as well. However, in India, the e- learning culture is still not popular and higher education is delivered in a traditional face-to-face (F2F) manner. Aversion towards online learning could be majorly due to the non-availability of infrastructure rather than reluctance on the part of educators and students to change their existing teaching-learning methodologies. A National Sample Survey carried out by the Ministry of Statistics & Programme Implementation, Government of India, for the period of 2017-2018 on 'Key Indicators of Household Social Consumption on Education in India' (Key indicators, 2018) revealed the disparity that exists in the proportion of rural and urban households that have access to computers (4.4percent versus 23.4percent) and internet facility (15percent as against 42percent). In fact, only 8percent of the population

(between the age group 5 and 24) that is in the process of attaining formal education can boast of both a computer and a stable internet connection. Another important factor that could be affecting the adoption of e-learning is the students' self-motivation and their engagement in a faceless environment (Nehme, 2010; Artino, 2008; Keller, 2008).

The main objective of this study was to find out the effectiveness of online learning from the learner's viewpoint, who in lieu of COVID-19 were suddenly shifted from traditional to online mode of learning. An additional objective was to assess whether this unexpected experience has transposed the mindset of students towards this mode of learning. If the learners can foresee the value of this pedagogy they might opt for online education, resulting in achieving the Gross Enrolment Ratio from the current 26.3percent (2018) to 50percent by 2035, as targeted in the New Education (NEP, 2020).

Research Methodology

Questionnaire /survey development

In order to achieve the objective of the study, quantitative research methodology has been adopted using Survey Method (Jackson, 2011) and preparing a questionnaire in a structured form to collect the data from the respondents. An initial questionnaire was prepared based on literature reviews, web resources and newspapers. Several iterative rounds of discussions amongst the authors and few students, in relevance to the proposed questions and objectives of the study, led to the development of the final questionnaire (Appendix A in Supplementary materials). The first section collected general information related to the respondent's university, course/ program and the place of residence from where they were accessing online classes. The second section included objective type questions to gather their perspective on the effectiveness of online learning, wherein they had to rate the convenience, structure of course content, course delivery and the communication between both parties on a Likert scale of 1 to 5 (low to high). Out of 21 questions, there were 6 multiple choice questions, 03 questions based on opinion scale, 8 likert scale questions and 4 true/false questions. While framing questions, major focus was given on student's adaptability for online mode of teaching in Theory Papers, Practicals, Extra-curricular Activities etc. The survey also aimed at soliciting essential attributes such as the time and discipline required for the online curriculum, satisfaction with the virtual mode of assessment, support during laboratory/practical based courses and extra- curricular activities. Additionally, a couple of open-ended questions where the students had to (1) give reasons if dissatisfied with the virtual mode of assessment and (2) specify which course taught online was easy, were also included in the questionnaire. Responses to open-ended questions were analyzed qualitatively by sorting through the information and extracting the relevant content. Lastly, the participants were asked to state preference out of online, F2F and hybrid modes of learning post COVID-19.

Distribution of survey and sample size The survey was conducted through Google Forms and the link was shared with the students of private as well as government educational institutions, majorly located in Delhi and National Capital Region (NCR). An attempt was made to target students pursuing diverse streams for instance humanities, sciences, engineering, education, etc. The target population consisted of undergraduates as well as postgraduates and a total of 249 responses were analyzed. The study employs a non-probability sampling technique as every survey was not picked up randomly. This convenience sampling technique (convenient to the researchers), resulted in snowball sampling as students further forwarded the link of Google form to their peers. This pilot-scale study was a cost-effective method for reaching students in multiple institutes/universities residing all over India in the shortest span of time.

Data Analysis

The proportion of respondents belonging to the undergraduate cadre was much higher than the postgraduates. Also, a higher number of responses were elicited from government-funded organizations over private universities. Accordingly, for the parameters examining effective online learning, data were analyzed for each of these subgroups independently to detect any significant differences or associations between these dimensions. Microsoft Office Excel (2007) spreadsheet software has been used in organizing and plotting all data.

Analysis & Results

Respondent characteristics

Among the 249 responses received for the survey, 85percent of the surveys belonged to the undergraduate cadre with the remaining being postgraduates. Total of 69 percent of the total respondents were from government universities and the rest 31 percent were from the private universities (Table-1). The heterogeneous responses provide credibility to the survey process. The respondents were residents of different states of India i.e. 90 percent of them were from Delhi and neighboring states (59 percent in Delhi, 19 percent in UP and 13 percent Haryana) and only 9 percent of them located in other states of India.

Table-1: Number of respondents from each educational program from Government and private colleges

Program	Government Colleges	Private colleges
Undergraduate courses		
B.Com (H)	25	1
B.El.Ed	56	0
B.Sc.(H) Microbiology	19	0
B. A (H) Political Science	9	0

B.Tech	6	34
B.Voc	37	0
B. A. (Hons.) Applied Psychology	1	0
B. Des. Fashion Communication	0	1
Bachelor's of Business Administration	1	2
B.A (H) English	1	0
B.A (H) Economics	1	0
B.Sc (H) Physics	1	0
Fashion and lifestyle business management	0	8
B.A (H) Social Sciences & Humanities	1	0
B.A program	1	0
MBBS	0	1
B.A (H) History	1	0
Bachelors in Media and communication	0	1
Japanese (H)	1	0
B.Sc. Home science	1	0
Postgraduate courses		
M.Sc. Microbiology	1	7
M.Tech	2	0
MBA	0	9
PGDM	0	4
Masters in planning	3	1
Masters in urban management	0	6
M.Sc in Management of built environment	0	1
Masters in sustainable development	1	0
MA Psychology	1	0
M.Ed	1	0
Masters in Early Childhood Care & Education	1	0
*Master in Economics, Data Analytics and	0	1
Corporate Finance	0	1
Total	172	77
Grand total	249	

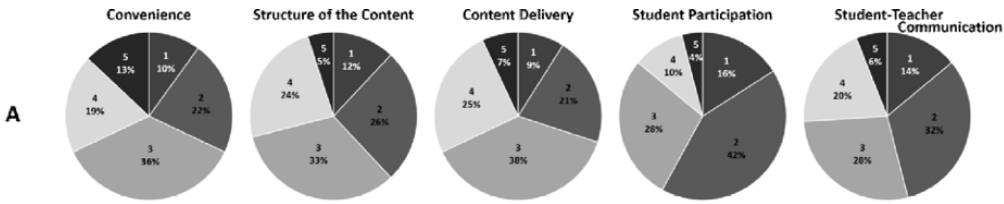
*Being pursued at École Polytechnique, France

(The universities where these respondents are enrolled include - Colleges of Delhi University, IGNOU, JNU, Central university of Punjab, Guru Gobind Singh Indraprastha University, Indraprastha Institute of Information Technology, Indraprastha college for women, Jaypee Institute of Information Technology, Delhi Technological University, Symbiosis Centre for Management studies Pune, CEPT University Ahmedabad, Deenbandhu Chhotu Ram University of Science & Technology, Asian Business School, Bennett University, Amity University, Shiv Nadar University, School of Planning & Architecture Delhi, Politecnico di milano, Bharati Vidyapeeth college of Engineering Delhi, Kasturba Medical College of Manipal, Netaji Subhas University of Technology, Institute of Management Technology Ghaziabad and Pearl Academy Delhi)

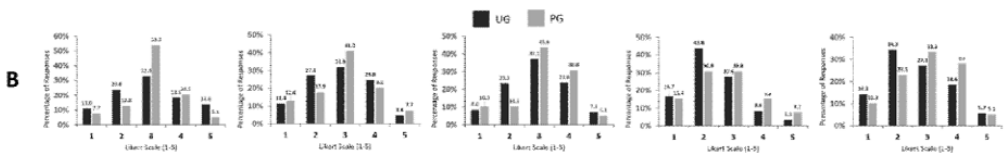
Assessing students perception of the effectiveness of online learning

Fig.-1A depicts the students' opinion on convenience and quality of online learning by putting together their responses on a scale of 1-5 (with 1 scored as lowest and 5 scored as highest). Out of 249 surveys, only about 30 percent of the respondents rated convenience, the structure of the content and its delivery above 3. Similarly, barring 14 percent of respondents, the rest indicated student participation in online classes to be moderate (28 percent) or low (58percent). In terms of effective intercommunication between the students and the facilitators during online delivery, 26 percent of students were in favour of the classes being interactive. The analysis was also performed by segregating the responses into undergraduate (black bars in Fig.-1B) and postgraduate students (grey bars in Fig.-1B), indicating that the perception of the postgraduate students towards the effectiveness of online learning was slightly more positive as opposed to their juniors. This outcome could be accredited to the fact that this cadre of respondents is more focused and mature (Fig.-1B).

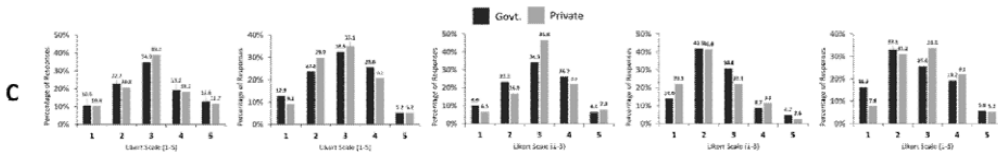
Fig. 2: Students' perception of the effectiveness of online learning



(A) Pie representation for percent responses obtained (on Likert scale of 1 to 5) for convenience, content structure and delivery, student participation and student-teacher communication. Responses were analysed after segregating the undergraduate (UG) and postgraduate (PG) students



(B) and subsequently separating the participants from government HEIs and private universities



(C) The numerical value on top of each bar corresponds to an explicit percent response and is mentioned for better clarity

The researchers also tried to analyse the quality of online teaching-learning processes based on the type of HEIs. Black bars in Fig.-1C represent students' responses from government organizations whereas grey bars are responses from students enrolled in private institutes. There is no considerable difference in the effectiveness of an online mode of teaching as perceived by students. One reason could be that 90 percent of the respondents are from Delhi-NCR and are tech- savvy, having easy access to resources and network connectivity.

On comparing the online curriculum to the regular on-campus classes, it was inferred that the majority of students (76 percent) had to put in additional or similar time in absorbing the contents clearly. Also, 75 percent of students acknowledged the fact that it required more self-discipline to attend classes online. This falls in with the existing belief that in the absence of F2F interaction with teachers or classmates, successful outcome necessitates online learners to be more self- disciplined.

Importance of class environment for learning

The sample students have been accustomed to the offline mode of campus learning throughout their lives and hence, not surprisingly, a unanimous consensus (97percent) reiterates the importance of a conventional class environment for learning (Highly important-72percent, Sometimes important-25 percent & Not that important-3 percent).

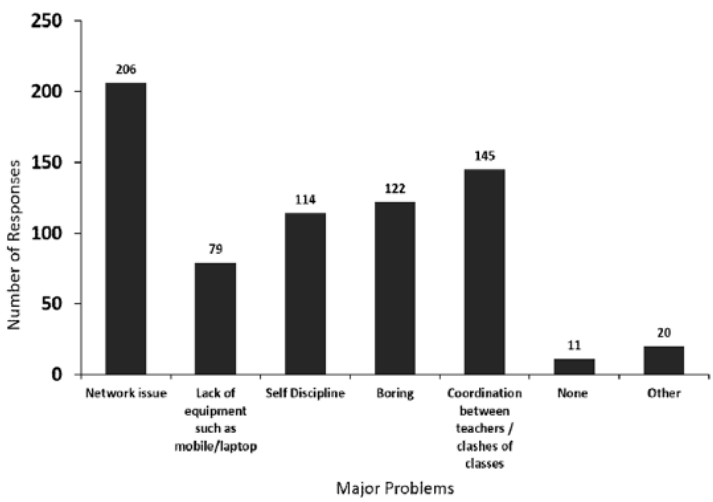
Problems in online learning as specified by the respondents

Anticipating the lack of experience and expertise in using online tools as barriers for the smooth conduct of online classes, the attitude of the surveys to adapt to computer-based technology was assessed by asking if they were open to expanding their skill sets. A positive finding of the study is that 91 percent of the respondents, representing Generation Z or Zoomers,

are comfortable in learning new skills and have no reticence to technology, However, it appears that most of them find online learning unsatisfactory and miss the classroom, teacher and peer interaction. The survey also asked which mode of learning is preferable post COVID-19, to which 46 percent of respondents voted for conventional classroom learning, 45percent pitched for blended mode (combining regular classroom with some online courses) while only 9percent opted for exclusive online education.

Fig.-2 is a compendium of responses stating the problems encountered by students during online classes. The respondents were provided the option to select multiple parameters from the common list of problems as apparent to the authors, for instance - network issue, lack of working equipment such as mobile/laptop, self-discipline, interest and coordination between teachers. A choice was provided to state any additional issues faced by them. The top three obstacles turn out to be network issues (206 tics), coordination problems between teachers resulting in the clashes of classes (145 tics), and lack of interesting content (122 ticks). Other problems put across by the respondents (tabulated as an inset in Fig.-2) are related to the absence of teacher-student interaction (especially where only the content has been provided with no ensuing discussion), inadequate planning and communication by authorities, difficulty in reading on mobile phones, background distractions leading to the loss of concentration, and lack of time due to pending household chores.

Figure-2: Main problems faced by the surveys during online classes



Other problems as specified by the respondents
Teachers don't' take classes; teachers are only giving reading material and no discussion or doubt clearing
Information not communicated to students; improper planning by authorities
Less class strength; less student teacher interaction
Difficulty in reading material on mobile phone
Family-background noises; distracted easily due to which the respective subject seems boring
Lack of time because of household chores

In fact, some of these cataloged problems reinforce the earlier observation made by 58percent of students wherein online learning is reported as less participative and interactive (Fig.-1A). Few respondents drew attention to some discipline-specific problems such as the need for practical exposure in life sciences, medical field, etc. To exclusively quote

one respondent, "Clinical knowledge can't be taught online. It requires a hospital setting with hand-on practice." These drawbacks have not been included in Fig.-2 because hands-on experience / practical aspects of the curriculum in online mode have been discussed in a separate section. Only 11 respondents out of 249 (~4 percent) did not face any difficulty in online learning. If the quality of education is to remain uncompromised during the ongoing pandemic, some tangible solutions have to be worked out before the commencement of next semester. Understanding the obstacles faced by online learners is vital in formulating student-centric policies.

Assessment is an integral part of a curriculum. On asking the participants (as an open-ended question in the survey), whether they are satisfied with the assessment conducted online, 50percent of the respondents responded affirmatively. For those who portrayed dissatisfaction, common key reasons are summarized in Table-2. Major apprehension is towards the online exam's inability to differentiate between a righteously submitted answer sheet over a dishonest one, causing disadvantage to students using ethical means. Additionally, the suitability of essay type questions for subjects related to humanities or solving of mathematical problems through online assessments has been raised. Technical glitches such as poor internet connectivity, unexpected power cuts, equipment failures and the crashing of assessment portals at the very end have made the process tougher.

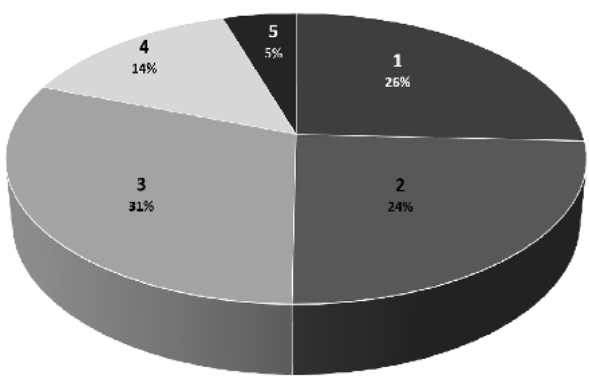
Table-2: Summary of responses to - If not satisfied with the methods of assessment, kindly state the reason for the same

S. N.	Reasons for not being satisfied with the online mode of assessment
1	Cheating is easier in an online mcq based test
2	Timely submission of timed online exams cannot be guaranteed due to technical problems such as computer/mobile hardware issues at that crucial time, power blackout,
3	Student presentations given in a classroom setup have a lot of value as classmates ask questions and the presentation is a two way process but in the virtual mode we prepare a video of the presentation and send it to our respective teachers for their assessment. Also first preparing a presentation followed by video recording and then finally uploading is very time consuming (because of large sizes) and feels like a complete waste of time for 5 or 10 marks.
4	Assignments that require writing are copied and pasted
5	I am more comfortable in writing regular exams than these online exams because of
6	Maths mcq based online exam is either wrong or right but in the regular mode of examination where you have to show the steps for answer, even if concept or some steps are correct and answer is wrong due to silly mistakes, teachers give marks during

7	Students have explored different ways to cheat during viva also
8	No coordination between faculties of different disciplines to limit the number of assignments and quizzes, too many assignments all at the same time from various
9	Lacking practice to answer an exam online especially in humanities
10	The non-Delhi students are among the most disadvantaged. The outstation students are
11	Not able to express our answers with full of satisfaction

Towards the end, the survey delved into the coverage of the practical component and the justice done towards the extra-curricular activities that took place during online classes. 62percent of the respondents agreed that they were unable to pursue their favorite activities. The hands-on laboratory classes were replaced with virtual laboratories especially in the areas of life sciences and vocational subjects. Such labs are simulations of real experiments and do not require any infrastructure or equipment, enabling the learners to follow a particular procedure via a web browser at their own convenience. In India, the Ministry for Human Resource Development launched vlabs portal (Vlabs, 2012), with an aim to provide technical education to those college students with inadequate lab-facilities. While teaching online during the COVID-19 era, theoretical briefing was accompanied by these simulated experiments wherever possible, however, most of the lab projects were replaced with review work on relevant topics. Only 19percent of the survey participants communicated satisfaction for the practical component indicating that hands-on activities are severely affected and need to be worked on for the effectiveness of the course content (Fig.-3).

Figure-3: Students response to the effectiveness of practicals conducted online on a scale of 1-5 (5 being the highest level of satisfaction)



Discussion

Meaningful Online education model in India

The unforeseen Corona pandemic forced every educational institute to shut down and pivot from "brick and mortar" classes to online classrooms to maintain continuity in learning as well as the cognitive and affective development of students. Conventional methods of education with projectors, smart boards, whiteboards, etc. were swiftly replaced with the digital communication tools and learning platforms. In fact, surprisingly in a country like India, where higher education has not yet embraced technological innovations, the initial shift from the formal classroom to online classroom did not pose too much of a problem, at least in the capital city. Barring the connectivity hiccups and infrastructure unavailability, both students and teachers managed to ease into the online format. But having reached this level is this the right way forward? The intent of the current study was to investigate if exposure to online learning has influenced the mindset of students in Delhi-NCR. The study assumed that in a metropolitan city, the internet fluctuations and technical knowhow may not be deterrents, and therefore, students may opt for this pedagogy of e-learning because of flexibility or convenience.

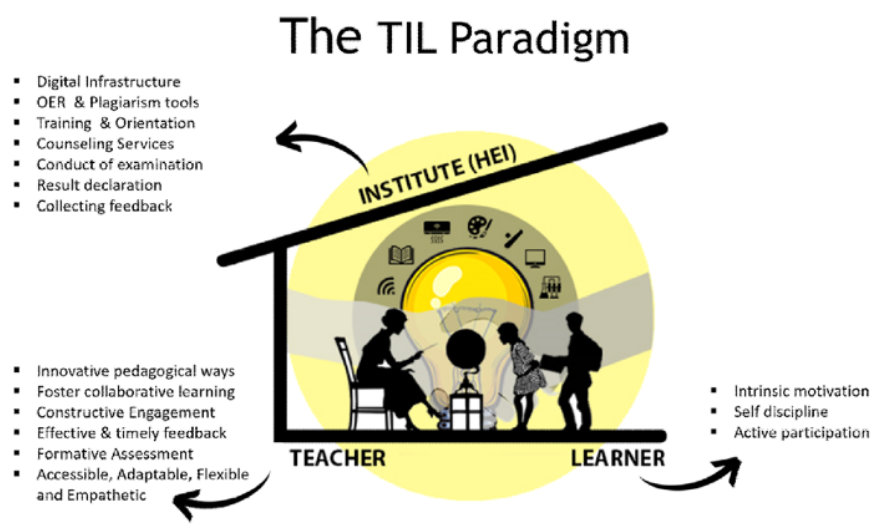
This survey, despite being small and restricted to a particular region, provides interesting insights. Although unanticipated, it is clear that the biggest hurdles encountered by respondents during the delivery of online classes have been internet connectivity and mobile signal issues. Therefore, if this is the situation for the students residing in the capital city of India, then what can be said about net accessibility for those residing in the remote villages of the country. This is probably the reason for India's slow progress in embracing online education and technological advances. However, distance learning is the only logical option available for continuing education for millions in the uncertain pandemic situation we are in today. Authors feel that under the lockdown circumstances, when the paramount interest lies in keeping students safe, these concerns can be taken care of with an asynchronous teaching style (Algahtani, 2011), involving minimal internet usage for downloading and uploading purposes. Further, as per the latest report from the Ministry of Electronics & Information Technology (MeitY), the torchbearer of the Digital India Programme, there are ~2.9 lakh functional Common Service Centres (CSCs) with ICT infrastructure resources located at almost all Gram Panchayats across the country (MeitY, 2019; 2020). Students can make use of these facilities for downloading learning content and uploading assignments, probably free of cost or at a nominal cost.

The survey reinforces some commonly held beliefs about virtual learning such as the need of more self-discipline, time and motivation, low level of class participation, communication gap with teachers (Fig.-2), lack of practical hands-on-training (Fig.-3) as well as extracurricular opportunities and additional factors such as unfair assessments (Table 1) and failing to take

care of socio-emotional needs. Indeed all these factors make a 100 percent transition from F2F to virtual format (post COVID-19) an unlikely eventuality which is not under deliberation at all. However, for ensuring the continuity, quality, and outreach of the university curriculum, when HEIs are forced to close down as a result of the COVID-19 pandemic, online education is the only option available to all stakeholders. No perfect roadmaps are available, but solutions can be extracted from our ancient education system, well-known for its holistic culture and nurturing students for their potential. Taking a cue from this, the Government of India has launched liberal National Educational Policy (NEP, 2020). The new framework allows universities to offer online degrees, in addition to traditional and distance learning degrees. Recognizing the need and importance of strengthening and expanding access to online education, IIT Madras has launched the first online degree program in India (IITM, 2020).

This is the time to rethink our academic structures for effective e-learning and the authors envisage the collaboration between 3 stakeholders – Teacher, Institute of Higher Education, and the Learner. To reap the fruits of e-learning, all the contributors need to join hands and take ownership of their extended responsibilities (Fig.-4).

Figure-4: The TIL handshake for effective e-learning. Each collaborator's characteristics and the explicit role is highlighted with bullet points



With this regard, the major challenges of online education appear to be the availability of infrastructure and other support mechanisms, the mindset of all stakeholders, and their affinity for digital technologies, motivation, and engagement of learners, use of innovative pedagogies by teachers for better interactions, etc. The following sections discuss the role of each contributor in the delivery of effective online education.

Teacher (T)- As a facilitator, the teacher

plays an important role in the adoption, expansion and persuasion of online education. They need to identify and analyse the student's motivational aspect, include more interactive tools of online instruction and assessment, make screen sharing student friendly, monitor students' performance at regular intervals and communicate their inputs timely (Keller & Suzuki, 2004; Perrin, 2005). For this, it is important that teachers undergo proper training programs for online content delivery (Yengin et al., 2010; Judahil et al., 2007). In order to create a sense of engagement some humorous activity can be undertaken and collaborative learning can be established through projects and peer-supported activities. Here, it is emphasized that teachers should be accessible, adaptable, flexible and empathetic in their approach towards students. To evaluate academic achievements, formative assessment by teachers should be continuous throughout the course (Baleni, 2015; Hargreaves, 2005; Wiliam et al., 2004). The purpose of assessment must not be to label or rank but to identify areas of strengths and weaknesses. A range of tools such as assignments, quizzes, projects, presentations including peer assessment may be employed for this purpose. The criteria and rubrics for assessment must be pre-determined and shared with students.

Institution of Higher Education (I)- A vital role needs to be played by HEIs so that proper implementation and acceptance of online education takes place throughout the country. It needs to ensure the availability of digital infrastructure and invest in creating standardised online education platforms. The requirement of any software in the course should be taken care of by building it as a part of the learning management system. Both, the teacher and student need to be comfortable with the technology for the smooth execution of an online program, therefore mandatory training/orientation programs should be arranged to empower them with technical know-how. Institutional support should include help desk and counseling services to take care of grievances and issues related to technology and infrastructure access, hosting courseware and discussion forums, library facilities, virtual labs, conduct of online examinations, declaration of results, granting of certifications, etc. One of the important and critical features for effective online learning is assessment (Bransford et al., 2000) which should be reliable, credible and vigilant. Assessments should be automated and plagiarism software incorporated through various tools.

Learner (L)- Learner will provide the final stamp of approval on the successful dissemination of the online learning program. The concept of basic education and hence also of online learning is to focus on the needs of individual learners (Marc, 2002). In the online system of education, self-discipline and initiative are expected from the learner to fulfil personal learning goals (Wolfe, 2000; Draves, 1999). The greatest advantage of e-learning is the flexibility of time (Smedley, 2010; Hemsley, 2002), that is sought by the learner while pursuing a course. Also it provides the learner with the freedom of one's pace resulting in

increasing satisfaction and decreasing stress (Codone, 2001; Algahtani, 2011; Klein and Ware, 2003). E-learner can harvest these benefits only with proper infrastructure and right degree of technological knowhow, judicious time management, self-discipline, high intrinsic motivational level, overcoming a sense of isolation through discussion forums, chats, messages, and finally accepting the entire demand of the system with an open mindset.

Conclusion

It is anticipated that the number of students in a classroom post COVID-19, especially at the initial part of the reopening of the higher institutes, will be low due to the requirement of maintaining physical distance. So, emergency operated remote learning mode will dominate the education sector. Teachers will have to be prepared for teaching modules/ sessions in both synchronous and asynchronous styles. Apart from live online lectures through zoom/google/ skype and offline content delivery via videotaped classes, online education in India is being conducted through radio and television also. When electricity and network issues are major challenges for virtual learning, these are still the most powerful communication tools available to poor and underprivileged (Rajagopalan, 2020). Encouragingly, NEP 2020 launched on 29 July, 2020 by the Ministry of Human Resource Development, Government of India, promotes online and digital education. It advocates use of online courses/ modules, digital repositories, TV channels, etc. for expanding open and distance learning as well for increasing GER in higher education. Apart from the initiatives from the government, there is a need to fill the present gaps in the role of the three main stakeholders–teachers (T), institutions of higher education (I) and learners (L). The study envisages Institution support to both T and L for effective e-learning, which is only at an initial stage in India and has a very long way to go to touch the satisfaction level and to compete globally. The survey carried out reflects that irrespective of hurdles faced by the students, most of them see the hybrid model becoming the future trend. In fact, more targeted surveys will help in understanding different aspects of online education and the need and resources available to learners in our country. If, the proposed features of the three stakeholders can be asserted along with government's supporting policies, the authors believe that e-learning will play a pivotal role in shaping India's future

(Acknowledgements: Special thanks to Preshtha Gupta for normalizing the responses obtained from the survey. Authors are grateful to Dr. R.K. Gupta (Principal, Ram Lal Anand College, Delhi University) for his encouragement in conducting this study and for his critical acumen of the manuscript.)

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Research Article

Understanding Music as a Mathematical Activity through Chrome Music Lab

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Abstract

The paper is an attempt to present some (four) Experiments of Chrome Music Lab in the context of mathematics. The activities suggested in the paper can be used by teacher-students as a pedagogical tool to understand music as a mathematical activity as well as to explore and work on some mathematical concepts as a part of music composition. The activities discussed in the paper can also be worked upon by the general public, parents, mathematics and music enthusiasts, and educators to understand and communicate music as a mathematical activity in an interactive manner.

Keywords: Mathematics, Music, Chrome Music Lab, Pattern, Digital Technology, Inquiry based learning, Visual, Auditory, Kinaesthetic

Introduction

The National Educational Policy 2020 envisions a multidisciplinary, experiential learning and arts integrated approach to curriculum (Ministry of Education, 2020, p. 12). It also advocates for breaking the boundaries between Sciences and Arts. When it comes to mathematics, research and various reports across the globe also emphasise connecting mathematics with interdisciplinary aspects to make learning an enjoyable experience for children. For example: the position paper on teaching of mathematics (NCERT, 2006) emphasises the need for making connections, within mathematics, and between mathematics and other subjects of study. It also emphasises the need to present mathematics as a part of culture through art, architecture and music. The principal and standards for school mathematics by NCTM (2000) on teaching of mathematics also emphasise linking mathematics with other subjects. Among other disciplines, Music is one such area which is enjoyed by learners across all age groups. Everyone enjoys to tap, clap, dance or hum even without any formal knowledge of music. Children can be observed dancing according to some rhythm. According to Shilling (2002) young children come to school with intuitive knowledge of musical patterns and rhythms. Infact, integrating music in a mathematics classroom can be an engaging and joyful experience for children. On the other hand, it is also important that children develop a sense of appreciation towards aesthetical aspects of music; especially in the context of mathematics i.e. they should be able to see or realise the mathematical elements in it and they should be also able to apply mathematical knowledge to understand

and appreciate this form of creativity (music).

Music involves auditory senses. It involves listening, singing, playing instruments but it is also a challenge to describe music in the context of mathematics only through written material. Thus, visualisation and engagement with learners are important to present or describe music as mathematics. Digital technology can ease this process through visualisation. Infact, teaching of interdisciplinary aspects of mathematics is well supported by digital aspects of educational technology such as videos, animations, software, mobile applications, interactive tools etc. Chrome Music Lab is one such example of interactive digital tools which can be used as an educational resource to explore the relationship between music and mathematics. This paper covers four Experiments of Music Lab: Kandinsky, Rhythm, Melody Maker and Song Maker. The paper also suggests some activities related to these Experiments which can be used with inquiry based approaches to understand music as a mathematical activity. As a part of music composition during activity, mathematical concepts can also be taught to children.

Mathematics and Music

Mathematical concepts (elements) in music: The relation between music and mathematics can be represented in various aspects. A musical piece has elements of steady beats, rhythm, tempo, notes, scale, harmony, melody, frequency, time intervals (metre or metrics), cycle, octaves, contrast (high pitch-low pitch) etc. These elements can be explored in the context of patterns, numbers, operations, fractions, multiplication, division, functions etc. Infact, a lot has been written on music-mathematics connections. Dave Benson (2006) presents a comprehensive view of mathematics in music: from trigonometric functions, Fourier analysis, simple integer ratios, scales to symmetry. Konar (2019a, 2019b, 2019c) in a series of article "The Sounds of Music: The Science of Scales", discusses the mathematical aspects in Sound, Western Music and Indian classical music. The three articles explain the science of frequencies, scales (a collection of musical notes), ratio of musical notes, Pythagorean and Equal tempered scale and the mathematical correspondence between Indian classical music and western classical music. However, the activities discussed in this paper are limited to these aspects: Beats (Rhythm) and Melody combination. The activities implicitly involve frequency, pitch, scales and octaves.

Challenges in teaching and communicating mathematical aspects of music: A piece of music or sound can be pleasant to ears, it can be felt or perceived by ears but it can't be seen or visualised directly through eyes. It is a challenge to communicate the mathematics behind rhythm of sounds or combination and timing of musical notes as these are abstract and moreover it depends on the perceiving ability of the listener. In this context, one also needs to introduce such a piece of music for which pattern can be easily recognised or deciphered by the audience. For example: Most of the listeners can talk about a song or a

musical composition by humming it or clapping at some critical points, while some music enthusiasts or experts can discuss the same composition in terms of its beat cycle (say, a raga Yaman composition based on teen taal), genre of music, its speed (tempo) etc. One may understand or internalize these ideas with practice (consciously or subconsciously). However, if one tries to communicate these ideas or concepts to children or the common public, it becomes a challenge both for the learner as well as the instructor. Infact, exploring patterns (mathematics) in a musical piece is not as similar as finding colour patterns in a drawing or pattern in arrangement of something concrete like pebbles. Often, people react in a surprised manner when one asks them about the relationship between mathematics and music. The task again becomes challenging when one has to demonstrate and communicate with them about these connections. So, visualisation of music is important and digital technology can bridge this gap between mathematics and music. With the advent of various softwares and digital tools related to music, experimentation with music has become feasible. Thus, one of the rationales behind writing this paper is also to present such activities which can help in communicating and demonstrating music as a mathematical activity to the society.

Chrome Music Lab

Chrome Music Lab is an interactive online resource to play and learn music visually. Chrome Music Lab is a website with a collection of 'Experiments' to create and learn music with hands-on experience. Experiments in Music Lab have been built with freely accessible web technology such as Tone.js, Web Audio API and WebMIDI. These experiments can be played across various devices such as smartphones, tablets and laptops (Chrome Music Lab, n.d.).

Exploring Music Lab to visualise and engage with mathematical concepts: According to Edelson & Johnson,

> "In music, children find patterns in the repeated melodies, refrains, or rhythms of a song. Working with patterns enhances children's thinking and reasoning skills, because they must: 1) analyze the pattern to figure out the rule, 2) communicate the rule in words, and 3) predict what will come next in the pattern" (2003, p. 78).

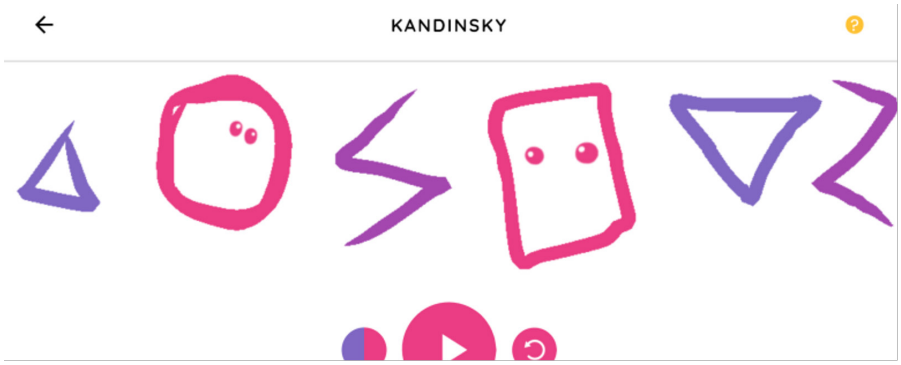
Music Lab explores such possibilities. In Music Lab one can begin with a simple pattern building-understanding exercise and then finally move to composing an instrumental music or song. Children can play with these Music Lab Experiments and create their music and they might not even realise or connect their actions with mathematics. But, engaging them in these Experiments through some activities (which explicitly emphasise mathematical terms and concepts) can help them understand their actions as a 'mathematical activity'. To add, an inquiry based approach can let them develop insights into the mathematical aspect of their Music Lab activities. It will also help them understand and

visualize what mathematics lies in making their musical composition. The following section briefly discusses the features and some activities designed for Experiments from Music Lab: Kandinsky, Rhythm, Melody Maker and Song Maker. One can visit Chrome Music Lab at https://musiclab.chromeexperiments.com/ and check out its Experiments.

1. Kandinsky

To begin with, Kandinsky can be used as a warm up activity to make as well as understand patterns. Kandinsky is inspired by Wassily Kandinsky, an artist who considered painting to make music (Chrome Music Lab, n.d.).

Figure-1: Scribbles and drawings on Kandinsky interface



Source: https://musiclab.chromeexperiments.com/Kandinsky/

Working: Any scribble or shape on Kandinsky produces a sound. Children (users) are free to scribble or draw any shape on the interface and listen to their composition (https://musiclab.chromeexperiments.com/Kandinsky/). Each shape sounds different from each other (However, it should not be emphasised that shapes have their own sound and music is generated because of shapes. The shapes and drawings are just for fun). When different sounds from the first shape to the last shape get played, it keeps repeating itself and this is an extension of the drawing in a cyclic way. Colour of the shapes can be changed by taping the colour option (left to play button). Sound also changes with change of colour.

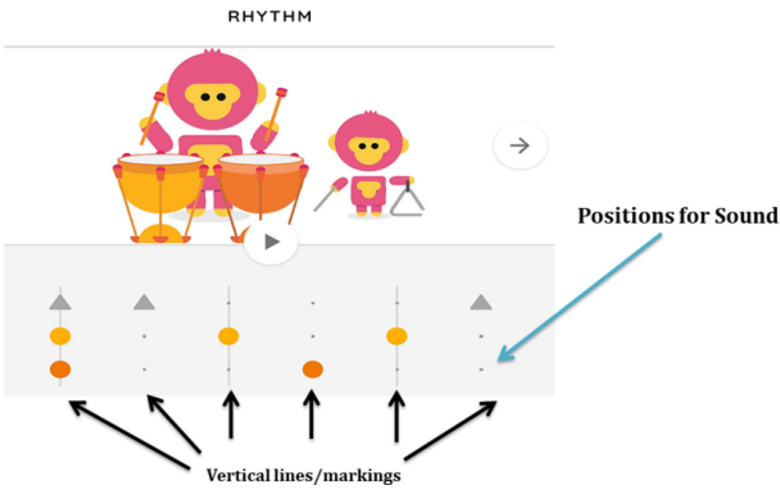
Engaging children with patterns: When children scribble or draw their shapes on the interface and tap the play button, they should listen to it for some cycles and understand the pattern. They can be asked to sing or hum the music played to recall the pattern. They can also be asked to scribble again in a way which produces the same pattern. They can also be asked to point or clap at the strongest sound they experience in their drawing (musical composition). Some questions can be posed (without using technical terms): Does the strongest (stressed) sound or a particular sound helps in pattern recognition? What is the role of this sound in pattern generation? They can be asked to listen and compare their music-drawing with their peers and speak out any difference in other's

patterns. Let this activity be subjective.

Mathematical significance and relevance: Children are often involved in pattern making or pattern decoding exercises through tactile resources or by drawing various shapes on a surface. But, Kandinsky also involves auditory aspects. The activity can be a good warm up for children to create music and sense auditory patterns through repetitions of sound of their drawing. In Kandinsky Closed figures sound different from nearly closed figures (figure-2). This way, children can learn to create their own sound pattern.

2. Rhythm

Figure-2: Rhythm Interface



Source: https://musiclab.chromeexperiments.com/Rhythm/
Developer: George Michael Brower

Rhythm is a pattern of set of sounds (say, drum beats) in a fixed interval of time. When it repeats for some time, one can decipher the pattern easily. This activity lets one create a rhythm through a combination of three different sounds (percussion or another instrument) by placing them on vertical lines/ markings (equally spaced). One sound or combination of more than one sound produced at one time (on one vertical line) can be counted as one sound. The activity is available in three levels with change of characters and also in the sound quality of drums (percussion) and instruments. The number of vertical lines/markings increases in the other two levels. For example, the cycle repeats itself after 6, 8 and 10 lines in the first, second and third level respectively (tap on the arrow pointing right to move to the other two levels). Characters change in these activities and they play their respective instruments based on the arrangement of sounds made by the user. For example, in this activity (figure), Beats can be created by tapping on the points marked on the six vertical markings. Here, there are a total 18 points (positions) and a particular sound (Grey coloured triangle or Orange circle or Brown Circle) can be placed/

played at maximum 6 positions (in their corresponding rows). If all the points of one vertical marking are occupied - it would sound together.

Steps to play and create rhythm (music):

1. Go to https://musiclab.chromeexperiments.com
2. Tap on Rhythm
3. Tap on the topmost point on any of the six lines. Similarly, tap on the middle point and on the lowermost point of any of these lines.
4. Each point corresponds to the instrument played by the two characters. It also represents the corresponding sound. This way one can check the different sounds on three ordered positions of lines.
5. Select or tap on all of these points or some points and then select the play option.
6. Listen to the music created through 'arrangement of different sounds'.
7. Likewise, one can create different 'patterns' by changing (increasing or decreasing) the number of sounds and also its position.

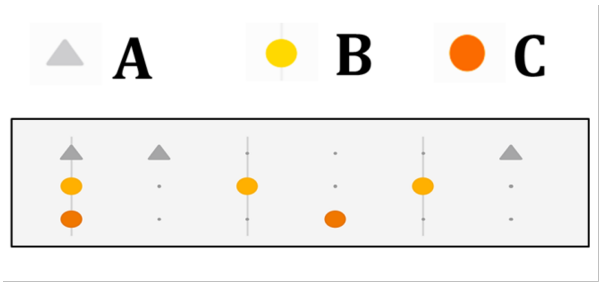
Note: Let the cycle of arrangement of these sounds repeat for some time until you realise or understand its pattern.

How can children understand Rhythm as a mathematical activity?

E. Geist (n.d.) highlights the importance of rhythm (in general) as "Rhythm helps children learn to recognize one-to-one correspondence and to identify and predict distinct patterns" (para. 9). The discussed activity also involves making sense of permutation and combination of three types of sounds, pattern making, symmetry, counting the number of sounds and the position of sounds (cardinal, ordinal and nominal) and spatial thinking (Spatial arrangement of sound on the interface and Symmetry of arrangement/position of sounds). Children can construct their own rules to make it and play. They can identify their rule in terms of their musical pattern. Edelson & Johnson (2003) suggest some pattern building activities (p. 3) through music. Some of these pattern building exercises can be explored with Rhythm in the following ways:

a. Naming or Codifying patterns:

Figure-3: Representation of sounds by letters



Source: https://musiclab.chromeexperiments.com/Rhythm/

In Figure-3 (A snapshot from the activity), Rhythm has been created with 4 grey triangles (sound A) in the first row, 3 yellow circles (sound B) and 1 orange circle (sound C). The positions (dots) are at equal intervals (though it depends on the user/children if they wish to play the sounds A, B and C at equal positions or any position). These different pieces of sound can also be played together. For example, if two positions on a line or all the positions A, B and C in a line are played together then it can be represented using brackets as – (AB) or (BC) or (ABC). A '-' can be used to denote an empty line (no sound played on a line). For this figure the pattern can be written or named as (AB) ABAB (AC). Numerals can also be used. For example: (12)1212(13), 1-2312, (123)-21 (23)12 etc. Corresponding colours (Grey, Yellow, Orange for occupied positions and White for an empty space) can also be used to represent the pattern in colour codes.

For example:

b. **Translating the pattern:** In this activity a pattern can be translated from one medium to another; for example, from sound to visual. The Rhythm pattern (figure) can be visualised in the form of gestures of physical movements by children. Each sound A, B and C can correspond to certain physical movements or gestures.

Table-1: Physical movements and gestures as per rhythm sounds

Sound	Physical movements/gestures
A	Raise left hand
B	Clap
C	Raise right hand
(ABC)	Raise both hands and Clap simultaneously
(AB)	Clap to left side
(BC)	Clap to right side
(AC)	Raise both hands
'-' Empty space	Free your hands

c. **Different elements in pattern:** The above pattern is a three element pattern. Three instruments are played by two characters. Children can be asked to identify the characters from corresponding sounds.

d. **Tracking any changes in Pattern:** Let children listen to patterns and engage them to raise their hand when they sense any change in the pattern. They can also raise their hand at the point of change.

Some additional activities can be suggested for Rhythm:

a. Children can be asked to find out the ratio of their three sounds in one cycle.

   For example: What is the ratio of these sounds A, B and C in one cycle?

   What is the fraction of sound A used in the composition?

b. Otherwise, they can be asked to create a musical piece where the ratio of three sounds is 1:2:5 (say). For example: What can be the different combinations of this ratio (A: B: C :: 1:2:5)? Play these and check how these combinations sound.

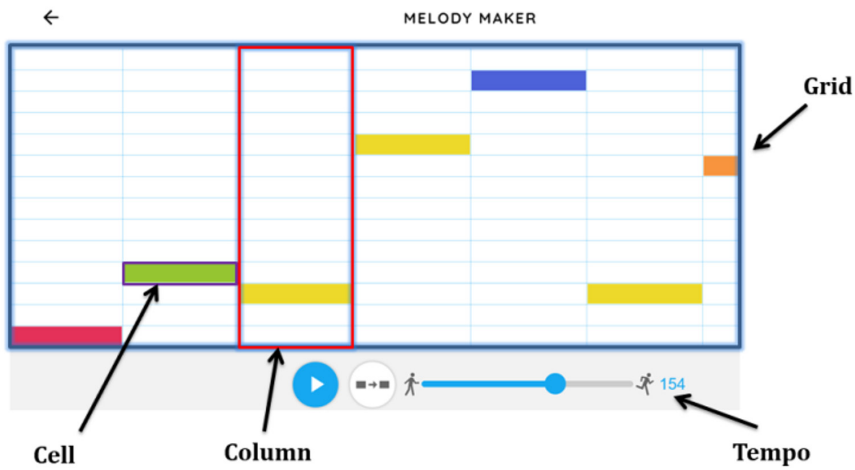
c. Based on the pattern they create, they can be asked to listen to different compositions and tell which pattern they like the most and why? Is there any symmetry in it or not?

d. A student can create a piece of music, and then another student can be asked to find out the respective positions of sounds produced by the two characters. So, by doing this, they can understand the mathematical grammar behind their music – combination and timing of sounds (beats).

e. Children can be asked to investigate position for a particular sound using coordinates and create a rhythm based on some set of coordinates. For example in (a, b) , if a corresponds to the position of vertical line (from left) and b corresponds to the position of point on line/marking (count as 1, 2 or 3 from the bottom of vertical marking), then sounds can also be represented through coordinates.

3. Melody Maker

Figure-4: Melody Maker Interface



Source: https://musiclab.chromeexperiments.com/Melody-Maker/
Developer: Yotam Mann and Eric Rosenbaum

In a song, Melody is the movement from one note to another note. Melody Maker is based on a grid-like structure- a collection of 14 x 8 cells (14 rows and 8 columns) as seen in figure-4. Each cell corresponds to a melody. One can play 14 different sounds in this structure. Sounds vary in pitch as one goes through the lowermost row to the top row. In each column, only one cell can be selected (played) at a time. Cells corresponding to a particular position (row, column) can be identified with a colour. Although there are 14 cells (different sounds), these are represented by 7 colours in an ordered way. One can select some cells at different positions and listen to the melody created. There is an option of switching the sound quality from piano to guitar etc. One can also increase or decrease the speed of the melody using the tempo option. Here, the range of tempo is 70-140 (measured in beats per minute).

Steps to play and create music:

1. Go to https://musiclab.chromeexperiments.com
2. Tap on Melody Maker
3. Tap on any cell in one of the columns to play notes.
4. Tap on some cells in any row.

   (By repeating steps 3 & 4, one can get used to the working of cells)
5. Tap on cells based on some pattern and then click the play button. The melody starts repeating after the last column. One can listen to the pattern.
6. One can increase or decrease the speed (duration) of your music using the Tempo option.

How can children understand Melody Maker as a mathematical activity?

Like Rhythm, this activity also involves permutation and combination of various cells. Arrangement of various cells at different positions also leads to spatial thinking. Children can create their own pattern using coloured cells- musical and colour pattern; and compare with patterns made by their peers. They can change the tempo of their melody piece and understand this action in terms of fraction, multiplication and division. Some activities have been suggested:

a. Pattern Building

- Exercises can be developed based on the pattern exercises discussed for Rhythm.
- Children can be asked to explain the colour pattern and musical pattern (rule) of their melody.
- They can also be asked to create a melody based on a fixed (given) pattern.
- The cells can be played at odd positions, even positions, equal intervals, random intervals.

b. Ratio and proportion:

- Like Rhythm, children can be asked to create melody and find out the ratio of different colours (sounds) generated. They can also be provided with a ratio of colours and asked to make a melody based on this. “Are there multiple ways/ combinations to create melody

based on this?" Such questions can be posed to children.

c. Fractions: The concept of fractions can be involved through some questions based on investigation and actions: For example: "What fraction of a particular row is coloured?", "Make a melody where 2/3 of the first row and ¾ of the last row are coloured" etc.

d. Multiplication and Division: Children can be asked to change the tempo by half, one fourth, one third of the current tempo. Likewise, they can be asked to increase or double the tempo. This way they can understand the speed of a melody (musical piece) in context of multiplication and division of tempo. They can also realise that as the tempo increases, the duration of completion of one cycle of arrangement of cells decreases and vice-versa.

e. Identifying a cell through [Row, Column] coordinates: The contrast between sounds of a cell can be investigated through coordinates (without help of graph), especially high pitched and low pitch.

4. Song Maker

Figure-5: Song Maker Interface (A Grid of bar length 3 and 2 Octaves)

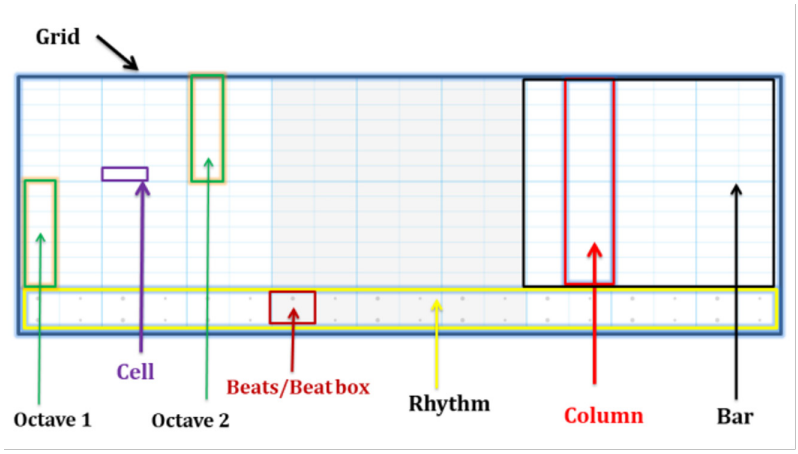
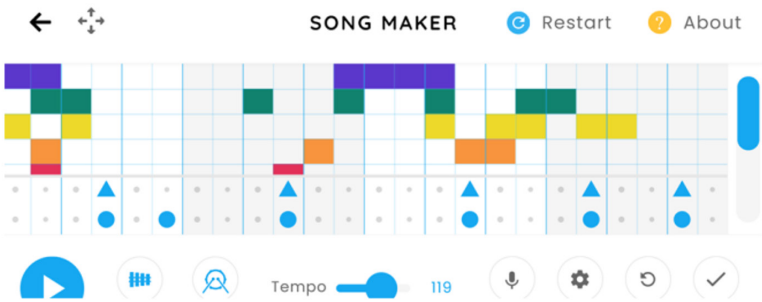


Figure-6: Playing music in Song Maker



Sources: https://musiclab.chromeexperiments.com/Song-Maker/

Song Maker is an extended version of Melody Maker. It has the flexibility to increase the number of grids and columns. Features of rhythm are also present below the grid. While only one cell in a column can be played at a time in Melody Maker, Song Maker allows playing multiple cells in a column at a time. Some practice with Rhythm and Melody Maker will make it easy to play music with Song Maker. One can switch between 5 instruments for melody and 4 instruments for Rhythm. The range of tempo in Song Maker is 40-140 (beats per minute).

Steps to play and create music

The steps are quite similar to Melody Maker, with an addition of Beats below the bar. There is also a flexibility to change the number of cells.

1. Go to https://musiclab.chrome-experiments.com
2. Tap on Song Maker
3. Tap on any cell in one of the columns.
4. Tap on some cells in any row.

   (By repeating steps 3 & 4, you can get used to the working of cells)
5. Tap on the dots below the grid. You can play some sound and generate a rhythm.
6. Make your selection of cells and click the play button. The melody starts repeating after the last column. You can understand its pattern after listening to it for some time.
7. Users can increase or decrease the speed (duration) of your music using the tempo option.
8. Sound effects of the cell and rhythm portion can be changed by tapping on the options beside Tempo.

Additional features: Users can change the grid style and scale and number of notes (cell), number of beats through settings (Figure-7).

Figure-7: Song Maker settings

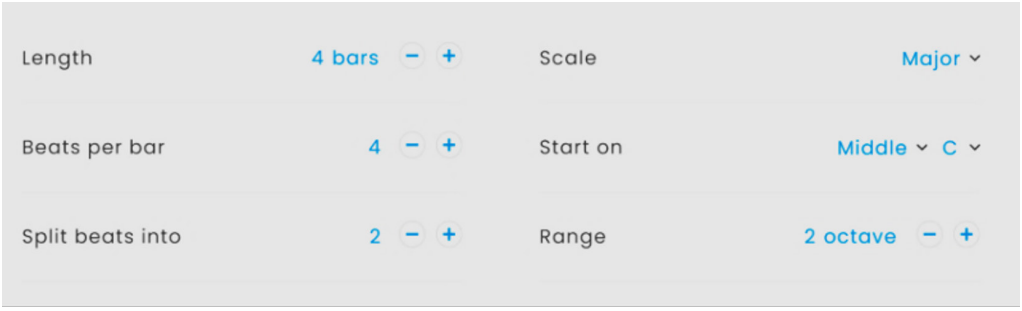


Image Source: https://musiclab.chromeexperiments.com/Song-Maker/

Important features in settings

Length: Length refers to the division of the complete grid into a fixed number of equal parts. For example a length of 4 bars means the whole grid has been divided into 4 equal parts. An alternate arrangement of 2 shaded and 2 unshaded bars can be observed.

'Beats per bar' & 'Beat Split': There are two sounds in a beatbox. These

beats (strikes) are used for generating rhythm in Song Maker. In Song Maker, beat actually refers to the beat box (figure 5). The number of beat boxes in a grid depends on the configuration of 'Beat split' and 'Beats per bar' and Length of grid. One can understand the grid configuration by manipulating the settings and observing the changes in grid and bar. For example: If 'Beats per bar' is 4, and 'Beat split' is 2, each bar gets divided into 8 columns and there are a total 8 beat boxes in that bar. Likewise, if the Beat split is 3 with 4 'Beats per bar' and the 'Length' of the grid is 4 bars, then there are a total of 48 (3 x4 x 4) columns in the grid, 12 (3 x 4) columns per bar and one beatbox per column.

The settings options for Scale, Start On and Octave deal with the qualitative aspect of sound and presence of particular musical notes in the grid. For example: by changing the Octave, one can divide the grid vertically into 2-3 parts. If you change the scale, the number of cells/notes in octave changes: Major (7 notes), Pentatonic (5 notes) and Chromatic (12 notes). One can sense the difference in melody and sound of the set of notes/cells in 1st octave and 2nd Octave and in different scales. The sharpness of sound produced by the same cell change when setting gets changed from Low to Middle to High. By changing the 'start on' notes (for example: C to C#), one can observe a pattern in the change of colour of cells as well as sound corresponding to a cell.

How can children understand Song Maker as a mathematical activity?

Song Maker can be treated as a combination of Rhythm and an extended form of Melody Maker. Like Rhythm and Melody Maker, this activity also involves permutation and combination of various notes (cells and colour). Activities based on Ratio-Proportion, Pattern Building, Fractions and Multiplication and Division can again be explored with Song Maker. Song Maker also lets one expand or reduce the size of grid, number of bars and columns according to one's choice, for example: change in the number of columns and cells per bar by changing the number of 'Beats per bar'. 'Beat split' and 'Length'. In addition to these, following activities can also be explored on Song Maker, which can add insights to the conceptual understanding of some topics among children.

a. LCM: Lowest Common Multiple

Using the rhythm option, in Song Maker, children can visualise and understand the concept of LCM. There are two types of sound (Triangular 'T' and Circular 'C') exactly below the melody bar (Figure-8). Depending upon the arrangement (position) of these two sounds; one can explore the concept of LCM.

Figure-8: LCM through occurrence of two different sounds

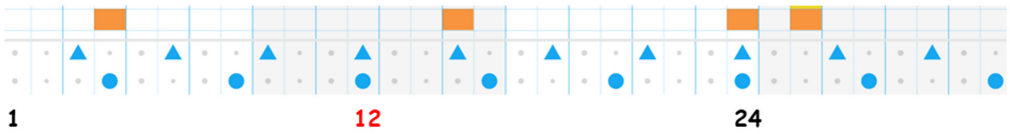


Image Source: https://musiclab.chromeexperiments.com/Song-Maker/

For example: If children make a rule for the occurrence of these two sounds, then they can see these sounds in context of LCM. Suppose, the two beats (say T and C) start at two different positions (count from extreme left of the grid): If T starts from 3rd position and sounds at every third position (interval of three) and C starts at the fourth position and then sounds at every fourth position (interval of four), then they would first sound together at the 12th position (and then sound together again at intervals of 12). In other words, 12 is the minimum distance on the grid where T and C (occurring first time at 3rd and 4th position) meet. Thus, 12 as the LCM of 3 and 4 is justified and visualised through this activity on Song Maker. The beat strip can be extended by changing the parameters in settings and hence, the LCM concept can be explored on Song Maker flexibly for various pairs of numbers.

Note: Experiment Rhythm has a limited number of vertical lines for positioning its sounds in all three levels (6, 8 and 10), so Song Maker can be a better option than Rhythm for visualizing LCM. Interestingly, this can be posed as an inquiry based question for children to find out the pair of numbers for which Rhythm supports generating LCM.

b. Manipulating 'Beat split', 'Beats per bar' and 'Length'

Based on these two activities (a, b), some inquiry based questions can be posed to children.

- Does the LCM of two sounds (T and C) change, when the 'Length' or 'Beats per bar' change?
- Does the number of columns in a bar depend on 'Length'?
- Is the number of columns in the grid or a bar directly proportional to the 'Length'?
- How is the number of columns in a bar dependent on the 'Beats per bar' and Beat Split?
- Can you establish a relationship between the number of columns and 'Beats per bar' and 'Beat split'?

Discussion and Conclusion

The musical activities discussed have been only explored by the author. There is a scope of further testing, experimentation and carrying out educational research with children using activities of Music Lab. However, the focus of the activities discussed is to make children and students aware and realise some mathematical concepts which they can use consciously or subconsciously while making music in daily experiences as well as in Chrome Music Lab. As a part of this, their mathematical learning can also

take place. Thus, the significance of these activities also lies in enhancing the mathematical learning of students. Studies (An, Capraro, & Tillman, 2013; An & Tillman, 2015) highlight music-mathematics integrated activities as application to Gardner's multiple intelligence theory (1983, 1993, 1999) and their results also indicate improvement in mathematical achievements of children after participation in music-mathematics integrated activities. Likewise, researchers (An, Zhang, Tillman, Lesser, Siemssen, & Tinajero, 2015; An & Tillman, 2015) have discussed mathematics as a tool in music creation, music as catalyst in mathematics cognition and music as a pedagogical approach. Embedding music activities naturally into children's engagements with mathematics and movements provides a way for children to develop their logic/mathematical and musical/rhythmic intelligences in ways we may not have considered before (Shilling, 2002). Thus, the activities discussed in the paper are relevant in the context of inquiry based learning; kinaesthetic activities, spatial-temporal reasoning and also significant from pedagogical perspective and cognitive development. Designing activities based on Chrome Music Lab's experiments can prove to be an engaging and explorative way of teaching and highlighting a mathematical concept. On the other hand, it can also strengthen peer learning, classroom interactions, and connect with the diversity of learners in the classroom.

Music is a highly social, natural, and developmentally appropriate way to engage even the youngest child in math learning. Music is children's first patterning experience and helps engage them in mathematics even when they don't recognize the activities as mathematics (Geist, E. Geist, & Kuznik, 2012, p. 78).

The activities which have been discussed so far for Music Lab involve basic mathematical concepts upto elementary level. For example: Kandinsky can be used as a starter to engage children with auditory patterns. Rhythm activities let one understand and appreciate the importance of basic elements (beats and timing of its position) in composing a piece of music. Through it one can also understand the role of gaps (time intervals) in music composition. This interactive activity can also be used in the context of inquiry-based learning: asking students to create their own rhythm and investigating questions based on mathematical concepts in their rhythm. In their attempt to repeat the same pattern in these four experiments, children also develop one-to-one correspondence of their drawing, instruments, cells, and colours with corresponding sounds. By manipulating settings in Song Maker, children can understand the proportional relation between columns and beat counts in the grid. Thus, while playing Music Lab through some designed activities, children and students can come across these major elementary concepts: Pattern, One to One correspondence, Making sense of Cardinal, Ordinal and Nominal, Permutation and Combination, Ratio and Proportion, Fractions, Spatial thinking, Coordinate representation, Row-Column representation, Lowest Common multiple, Multiplication

(Double, Triple), Division (Half, One-fourth etc.) and some allied concepts. The educational implication of Music Lab activities also lies in learning elementary mathematical concepts. Apart from these concepts, various allied, basic and high-level concepts can also be included depending on the audience and exploration with Music Lab experiments. Instructors may use the five phase instructional model for music-mathematics integrated lessons proposed by An (2012) and design their activities. Each phase focuses on varying levels of music and mathematics.

Infact, there can be two approaches to use these experiments in Music Lab for teaching mathematical concepts through inquiry-based learning:

1. Asking children, students to create a composition as per their wish and then taking them through their composition to make them realise the mathematical concepts used by them (consciously or subconsciously).
2. Asking children to compose music based on some conditions put by the instructor (for example: the ratio of red notes to yellow notes should be 1:3, only 2/3 of a bar or row can be played in the Melody Maker etc.).

The significance of these activities proposed for Music Lab also lies in the development of visual and auditory senses. Such activities through Music Lab as an interactive digital tool can be used for inquiry based learning in music-mathematics integrated lessons. It will not only engage children musically in learning mathematics, but it will also let them understand and appreciate music as a mathematical activity.

Music Lab Resources:

Chrome Music Lab: https://musiclab.chromeexperiments.com/Song-Maker/

Melody Maker: https://musiclab.chromeexperiments.com/Melody-Maker/

Rhythm https://musiclab.chromeexperiments.com/Rhythm/

Song Maker: https://musiclab.chromeexperiments.com/Song-Maker/

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Research Article

Appropriation of Twitter in Educational Settings by Mentor Teachers of Delhi Government Schools: A Beginning

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Abstract

This study aims to explore how Mentor Teachers (MTs) appropriate Twitter in their academic and pedagogic endeavours. It explores the journey of all 190 Mentor Teachers of Delhi Government Schools using Twitter in their educational settings; beginning from training of these teachers on tweeting skills to understanding their twitter usage post one year of the training. Tools and techniques of the study were the survey, interviews and content analysis. The findings of the survey and interviews were triangulated with the content analysis of the tweets. Five hundred tweets chosen for content analysis were hand-coded into emergent patterns to identify the messages these Mentor Teachers pass on Twitter. Findings of the study demonstrate that Mentor Teachers use Twitter to build networks with fellow Mentor Teachers, teachers and other educational professionals. The study reveals diversity in the extent of Twitter usage by the Mentor Teachers in their educational settings. Diversity is also evident in Mentor Teachers' sharing of resources related to their respective teaching subjects. Mentor Teachers' tweets' content relate to different themes. Inclination was most on the theme of sharing achievements of students, school, other teachers and self. Majority of the Mentor Teachers reported the positive role of Twitter in their professional development.

Keywords: Mentor Teachers, Twitter, Network, Codes, Achievements

Introduction

Beginning of the 21st century has witnessed the emergence of social media as a powerful tool of communication. It enables people to share their ideas, thoughts and practices. It has the immense potential to build powerful narratives thereby bringing a positive change in the society. In the last one and a half decade, the use of social media has been on a rise in the educational landscape. Social Media has helped teachers "foster interaction, collaboration, and contribution" (Gunawardena et al. 2009) in their academic and pedagogic endeavours. Interactions enhance a teacher's ability to engage in reflective dialogue and also question ineffective routines (Kruse & Louis 1993, Little 2002). Interactions and sharing of thoughts and practices are parts of professional development programs of teachers. When teachers participate in professional development programs, they "develop, implement and share practices, knowledge and values that address the needs of all students." (Schlager, Fusco et al. 2004).

From this, we can thus infer that social media has the potential to enhance the professional competencies of teachers in their educational settings.

Amongst the various social media platforms including Facebook, Twitter, LinkedIn, Instagram, this particular study focusses on use of Twitter in the educational settings. One of the prime reasons for choosing Twitter is its growing usage by the educators for their professional development in North America and Europe.

Review of Literature on the Use of Twitter in Education

In a 2012 study, researchers investigated how teachers used Twitter in their professional development (Forte, Humphreys & Park 2012). The study was exploratory in nature. Data collection tools were online survey and interview. The sample comprised 37 respondents. Majority i.e. 78 percent of these had been using Twitter for more than 12 months. Eight respondents were interviewed telephonically and these interviews were recorded. The respondents were asked to describe how their use of Twitter has changed over a passage of time. The findings from an online survey and detailed interviews were gathered along with 2000 tweets related to education. Content analysis of these 2000 tweets was done. The findings of the study were that with the use of Twitter, teachers built and maintained professional connections with other school teachers and shared new ideas, practices and resources with them. The study hailed teachers on Twitter as progressive thinkers who could raise the efficacy of the reform process by using social media for the classroom.

In a 2016 study, the researcher examined the way an online community of educators took part in professional development using Twitter (Wesely, 2016). The community of practice was composed of World Language (WL) teachers who used Twitter as a social media platform for professional development. This research study took a socio-cultural perspective in approaching and understanding teacher learning. It was a qualitative, netnography study. Researcher in the study was a participant observer for more than a year. The key data source was interviews with 9 teachers who were the community members. All the teachers in the community of practice (CoP) lived and worked in the United States and taught either Spanish or French language. The researcher analysed teacher learning situated in a community of practice on the basis of three essential characteristics specified by Wenger in 2006- Domain, Community and Practice. Evidence of the study demonstrates that the community of practice of educators distinguished themselves as experts in world language education. These educators shared resources and participated in joint discussions using Twitter. These discussions lead to collaboration and different projects initiatives and #chats. The #Langchat recorded the highest collaborative effort in this community of practice. This study provides ample evidence that in this process of tweeting, learning took place in the community of practice of world language educators.

Another 2016 study investigated

the factors affecting administrators' understanding about Twitter and it's use over a period of time (Cho & Rangel, 2016). The study is based primarily upon interviews and 1455 tweets of 17 administrators located in the United States and Canada. By approaching structuration theory, the study found that administrators' understanding and use of Twitter were based on their social contexts i.e. values, expectations and beliefs. Practices of using Twitter were neither predetermined nor fixed. In fact, enhanced interactions with colleagues and friends on the use of Twitter changed their perception about Twitter. Some administrators used Twitter more frequently while others used Twitter less number of times. The reasons for less use of Twitter by a few administrators were twitter's panoptic effect, increased surveillance in the online environment.

A study on '#PD: Examining the Intersection of Twitter and Professional Learning' was conducted in 2016 (Biddolph & Curwood, 2016). The study focused on use of Twitter for professional learning of English language teachers most of whom were from Australia. Data collection was done from multiple sources through online survey (of all 64 teachers), semi-structured interviews (with 8 participants) and content analysis of 530 tweets that used #ozengchat hashtag. The study gave evidence of use of Twitter as an authentic platform to share, promote and acknowledge teachers' ideas and practices. The study reiterated that Twitter helped teachers to exercise their agency in choosing professional development programs as per their needs and interests.

In a 2019 review study the researcher reviewed 103 peer-reviewed research studies published during the period 2007 to 2017. These research studies focused on use of Twitter across educational settings. Most of the reviewed research studies were descriptive case studies and were conducted with the students of higher Education of North American and European countries. Majority of the reviewed studies indicated that use of Twitter increases students' motivation, engagement in the class and their learning (Anthony & Jewel, 2017). Another major finding of the study was the professional development of teachers by networking, sharing of ideas, resources, practices and forming a community of practice of teachers.

Researchers noted many recurring negative issues of Twitter usage in Education; some of which were infringement to right to privacy, unavailability of sufficient space for expressing oneself and load of handling lots of information. In spite of there being drawbacks in using Twitter, there is enough evidence about Twitter's potentiality in aiding professional development for teachers and students as well (Carpenter 2014; Carpenter & Krutka, 2015). Finally, the study envisaged that most of the analysed studies were spread in North American and European countries. The study suggested an intense need to carry out more studies on the use of Twitter in other parts of the world especially within countries of Asia and Africa continents where use of social media is remarkable.

The review of the related literature suggests the need for the use of

Twitter for professional development of teachers in India. A study was thus conducted to support the Mentor Teachers of Delhi Government schools to appropriate Twitter in their professional endeavours.

Objectives of the Study

1. To enable the Mentor Teachers to learn the technique of tweeting through training.
2. To enable the Mentor Teachers to participate in Live Twitter chats.
3. To know the status of engagement of Mentor Teachers on Twitter post one year of the training.
4. To understand how Mentor Teachers appropriate Twitter in educational settings post one year of the training.

There are 1026 schools in Delhi which are funded and managed by the Government of National Capital Territory of Delhi. Teachers teaching in these schools are known as Delhi Government School Teachers. The total number of teachers teaching in Delhi Government Schools is approximately 60,000. Out of these, 190 teachers are Mentor Teachers. Most of the Mentor Teachers are Trained Graduate Teachers (T.G.T.s) and some are Post Graduate Teachers (P.G.T.s). The role of Mentor Teachers is to provide onsite academic and pedagogic support to teachers of their respective mentee schools. Each Mentor Teacher has been assigned approximately five schools. Mentor Teachers facilitate theme based and other programs to enhance the professional competencies of teachers.

Methodology

This study was conducted in four phases. In the first phase, Mentor Teachers were imparted hands-on training of using Twitter and participating in Live Twitter chats. After one year of their usage of Twitter in their educational settings, in the second phase, a survey and interview were conducted with the Mentor Teachers (Survey with 190 Mentor Teachers and Interviews with 12 Mentor Teachers). In the third phase, content analysis of 500 tweets was done. In the fourth phase, findings of the interviews and survey were triangulated with the content analysis of the tweets.

Training of Mentor Teachers on Tweeting Skills

Five day face to face training programme was conducted for Mentor Teachers on tweeting skills. Providing hands on experience on the technique of tweeting was the essential component during the training. Tweets done by the teachers were peer reviewed. Main parameters of discussion and review of the tweets were brevity, content of tweet, meaning to be conveyed, appropriate tagging and use of hashtags, number of characters, attaching photos and videos in tweets, time limit of video to be attached, safety, security and privacy issues. MTs were oriented in participating in Live Twitter chats. Followed by the training, MTs participated in 8 Live Twitter chats.

Survey

Next, post one year of the training, to explore MTs educational practices on twitter, an online survey of the entire population (190 MTs) was conducted via

google forms. One hundred and eighty four MTs responded to the survey request. Of these, 51.6 percent of the Mentor Teachers were female and 48.4 percent were male. Further, 81percent MTs were TGTs and 19 percent were PGTs. Almost all MTs (97.8 percent) were post graduates. TGTs and PGTs were of different subjects. Twenty Five percent of the TGT MTs were teachers teaching English, 20.1 percent teaching Mathematics, 18.5 percent teaching Science, 13.6 percent teaching Hindi, 10.3 percent teaching Social Science, 1 percent teaching other subjects and the rest were PGTs. Average teaching experience of these 184 MTs was 18.7 years. It had a wide range from 3 years to 36 years. Standard deviation of teaching experience was 7.2 years.

On being asked to share their experience of appropriating Twitter in the educational settings through an open ended question in the survey, the respondents shared their experiences in about 50 to 100 words each.

Interviews

Twelve participants were selected for a telephonic interview based on stratified random sampling technique- 2 participants (Mentor Teachers) teaching each subject at the secondary school level (English, Hindi, Mathematics, Science, Social Science). These respondents were at least for 1 year on Twitter and on average had tweeted at least 4 times a week.

Each telephonic interview lasted from 15 minutes to 25 minutes. These interviews were recorded and transcribed. The interviewees were asked to share in detail their tweeting experience, the various themes and their description on which they have been tweeting and how they appropriated twitter for their professional development.

The analysis of this interview content was done on Braun and Clarke (2006) approach in which patterns of conceptually related content were identified. Content of the tweets shared by teachers in their survey were classified into various themes as identified in the interviews. The researcher could understand from Mentor Teachers' shared experiences how they appropriated Twitter in their educational settings. In this study researcher herself being one of the Mentor Teachers was a participant observer. She trained the Mentor Teachers in tweeting skill, observed their tweets and participated in tweeting for more than a year. (May 2019 to September 2020). Thus, this analysis is based on grounded theory. However, this analysis does not build grounded theory as no theoretical explanations are developed on the content tweeted by the Mentor Teachers. This thematic analysis along with the survey details of respondents provided researchers a starting point of content analysis of tweets.

Content Analysis

A dataset of 500 tweets related to educational context tweeted by the Mentor Teachers (respondents) was collected. These 500 tweets were searched by using certain hashtags used commonly by the respondents. These hashtags are #DelhiGovtSchool, #ProudDelhiGovTeacher,

#LetsTalkEducation, #HappinessClass, #DelhiEducationRevolution, #EMC,

#DelhiEducationOnline. The 500 tweets have been identified in such a manner that they cover tweets tweeted in the entire period of the study (May 2019 to September 2020). These tweets give a fair representation of different periods of school activities and pandemic period activities.

This dataset of 500 tweets along with findings from the survey and interviews were triangulated to infer the meaning and essence of tweets tweeted by the Mentor Teachers. This meaning and essence paved a path for developing an understanding of how MTs appropriated Twitter in their educational settings.

These tweets were hand-coded to identify the emerging themes. For this, two researchers independently analysed 50 tweets in a set. The researchers categorised the tweets in different codes that had been decided after thematic analysis of the interview. Both the researchers compared and discussed the codes that finally emerged after the interviews. These codes were achievements, classroom activities, resource sharing, events, online teaching learning and other activities performed by teachers during pandemic, sharing of thoughts and ideas on education, motivational and inspirational quotes. This was followed by 2 iterations. Finally, both the researchers reached agreement on 93 percent of their observations. This process helped develop the final code book and meaning of various tweets to be included in this. Tweet Codes developed remained the same as decided post interviews. Each tweet was assigned just one code.

Tweet Codes along with their description have been given in the table below.

Table-1: Tweet Codes and Description

Code	Description
Achievements	Students' achievements, Teachers' achievements, Schools' achievement, Achievements of self
Classroom activities	Teaching Learning activities
Resource Sharing	Blogs, YouTube links, Links to tools related to education
Events	Parent Teacher Meeting, Annual Day, Sports Meet, School Management Committee Meeting etc
Online Teaching Learning and other activities of teachers during pandemic	Online worksheets, Teacher professional development sessions, teachers' duties in hunger relief centres and other field duties.

Sharing of ideas and thoughts on Education	Teacher thoughts
Motivational/Inspirational quotes	Inspiring poetry, famous quotes

Findings

Given below are the findings of the study in respect of Mentor Teachers' networks and engagement on Twitter, their reported experiences in this regard and their appropriation of Twitter in the educational settings.

Mentor Teachers' Networks and Engagement on Twitter

The survey shared data about MTs networks on Twitter. Their networks were diverse. Leaving aside the Mentor Teacher with the highest number of followers (4000 followers), the range of number of followers (teachers/ educational professional/ educational organisation) of MTs on Twitter was from 01 to 1116, average 163.2, standard deviation 187.9. Range of the people (educational professionals only) whom Mentor Teachers follow on Twitter was 00 to 1684, average 197.1 and a Standard deviation of 233.8. This implies that Mentor Teachers had developed strong networks with educational professionals on Twitter. MTs' engagement on Twitter in terms of their duration on Twitter was also diverse. Whereas 19.1 percent of Mentor Teachers have been using Twitter for less than one year, 46.7 percent have been using Twitter between 1 and 2 years and 34.2 percent have been using Twitter for more than 2 years. Further, in the context of the time frame of checking twitter, it was revealed that 58.7 percent MTs checked Twitter everyday.

It is also important to understand the range of average number of tweets per week tweeted by MTs in the context of Education. The range varied from 01 to 20, average 5.2, standard deviation 3.3. Further, responding to their participation in Twitter chat, 64 percent respondents reported that they had taken part in Twitter chat. Further in response to use of subject-specific hashtags in tweets, 48 percent respondents reported that they used subject-specific hashtags.

Reported Experiences of Mentor Teachers

In response to sharing their experiences as a Mentor Teacher on Twitter, in an open ended question; all 184 MTs shared their experiences in different ways. MTs used different adjectives to share their experiences. Some of the reported experiences were 'good', 'very good', 'wonderful', 'great', 'amazing','nice', 'excellent', 'unique', 'brilliant', 'useful', 'modern', 'awesome', 'happy' etc. Some other reported experiences were 'normal', 'mix', 'not much fond of', 'not much happy' and 'no comments' etc. Few of the MTs shared their twitter experience using a single adjective while the majority reported specific details of their tweets along with the adjectives. MTs gave their own perspectives on usage and role of twitter in professional development of twitter.

Fifteen percent of the surveyed respondents had reported some issue/ issues regarding use of twitter. These

issues were privacy, civil service conduct rules and trolling. Issue of privacy was reported by a high majority of the respondents.

The survey data revealed that overall the inclination of the MTs was more towards the use of Twitter in educational settings and in their professional development. These findings are in tandem with the study conducted by Forte, Humphreys & Park 2012 that hailed teachers on Twitter as progressive thinkers who could raise the efficacy of the reform process by using social media for the classroom.

Understanding MTs' Appropriation of Twitter in the Educational Setting

Mentor Teachers' tweets revealed that they were inclined the most towards sharing the achievements of their students, colleagues, schools and themselves on twitter. This also became evident from the interviews and survey data. A few verbatims from the interviews and survey have been shared below. (MT below stands for the serial number of the Mentor Teacher who was interviewed. S below stands for the serial number of Mentor Teacher in the survey)

'Sharing achievements of others on twitter spreads happiness around. The teachers of my school feel happy when I share their achievements on Twitter, when I post about their work. They work even harder for this now.' MT-2

'I have now started sharing with everyone the courses that I pursue. My achievements, I think this inspires people to join the learning fraternity with me. It motivates me as well.' MT-7

'My students come from marginalised sections of society. A little motivation means so much to them. I regularly tweet on their achievements and I make sure I tell them this. They feel happy, stay connected to me and strive to achieve more.' MT-3

'This year when I saw the results of my mentee school which had increased by 38 percent than the previous year, I was very happy. It is actually a boys' school. People have notions that no teacher teaches and no student learns in boys' school. I tweeted about my boys' school's achievement. I wanted people to know that when everyone in school works together towards a goal, results are fruitful.' MT-11

'Being a teacher I find this platform very useful for me to showcase my students' achievements, my online learning, achievement of self, nature related motivational thoughts globally.' S-47

'Twitter allows me to share a brief description of the achievements and the work being done in my mentee schools.' S-130

'It is a very nice and motivational thing to let the world and your friends and other eminent persons know about your achievement for your surroundings on good remarks.' S-57

The inclination of teachers towards tweeting the achievements was also evident from content analysis of tweets. Thirty two percent of the tweets related to the code- Achievements, 17 percent to the code- classroom practices, 12 percent to the code Event Sharing. Whereas 16 percent of the tweets related to online teaching learning and other activities of teachers during the

pandemic, only 6 percent related to sharing the motivational thoughts and quotes. Eight percent of tweets shared ideas and thoughts on the theme of education and 9 percent related to resource sharing.

With this data, the researchers could trace the emergent pattern of Delhi Government schools' Mentor Teachers' appropriation on Twitter in educational settings.

Conclusion

This study aimed at exploring how Mentor Teachers of Delhi Government Schools appropriate Twitter in the educational settings, post one year after their twitter training. Findings of the study reveal that Mentor Teachers use Twitter to build networks with fellow Mentor Teachers, teachers and other educational professionals. These networks help them build connections, share ideas and practices. The study reveals diversity in the size of the network of Mentor Teachers on Twitter. Diversity is also evident in the extent of Mentor Teachers' Twitter usage in educational settings and also in sharing resources related to their respective teaching subjects. Mentor Teachers' tweets' content relate to different themes. Inclination was most on the theme of sharing achievements of students, school, other teachers and self. Other themes chosen by Mentor Teachers for tweeting in order of priority were classroom activities, online teaching learning and other activities of teachers during pandemic events, resource sharing, sharing of ideas and thoughts on education, motivational/ inspirational quotes.

The study also reveals diverse experiences reported by Mentor Teachers in respect of tweeting. Majority reported the positive role of Twitter in their professional development. However, a few did not view Twitter with a positive disposition. Fifteen percent of Mentor Teachers raised issues about Privacy and Civil Service Rules. In totality, the journey of Mentor Teachers appropriating twitter in educational settings has begun and moved ahead on a positive note. However, this is just the beginning. There is still a long way to go.

(Acknowledgement: The researcher Manu Gulati is deeply indebted to her Supervisor for her valuable guidance. She owes a debt of gratitude to her father, her mother and to her husband for their unflinching support throughout this study.)

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Research Article

Revisiting the Pedagogy of Teaching - Learning: Students' Perspective

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Abstract

Pedagogy of teaching refers to the way teachers deliver the content of the curriculum to a class. Designing pedagogies that produce meaningful learning through educational concepts, competencies, content, evaluation, learning and teaching practices is paramount. Learning is dependent on the pedagogical approaches that teachers use in the classroom. Online Learning during this pandemic has changed much more than the content and approaches. The digital generation and the changes taking place in the present scenario like COVID 19 lockdown, technological advancements in teaching learning and flexibility in learning demands for innovation in teaching. This article brings out the need for revisiting the pedagogy of teaching - learning process on par with the changing educational scenario from the perspective of students. A sample of 97 students undergoing B.Ed and M.Ed Special Education courses in various specializations from the state of Tamil Nadu recorded their views upon the unanticipated transformation in the teaching learning process and its outcome in developing their knowledge and accessibility of resources. Findings of the study suggest that teachers have to augment their skills according to the emerging trends and untangle their conventional pedagogical approach in teaching by adapting to the technological changes.

Keywords: Revisiting, Pedagogy, Teaching - Learning, Students' perspective

Introduction

Pedagogy is globally stated as an approach to teaching. It signifies methods of teaching that comprise teaching styles, strategies, assessment and feedback. This process is regulated by the social and psychological phenomenon and development of learners. Pedagogy as an academic discipline studies the methodologies through which knowledge and skills are transmitted to the learners in an educational environment which encompass meaningful classroom interaction.

Pedagogy of teaching refers to how teachers convey content of the subject or curriculum to learners in the classroom. The process describes how a teacher carefully uses prior learning of students, imparting new learning experience and realizing end goals of the curriculum in a thoughtful and introspective manner. Pedagogy is defined simply as the method, and practice, of teaching. It encompasses:

- Teaching styles
- Teaching theory
- Feedback and Assessment

Pedagogy also includes the practical and the theoretical aspects of teaching which comprises various strategies and techniques adopted to teach effectively, teacher-student interaction, content for instruction, mutual goals agreed between the teacher and student and a variety of ways adopted for content delivery to the learner. A very essential thing about pedagogy is to design a meaningful learning material with good content, adopting effective evaluation strategies and finally executing it successfully. Effective pedagogies are inclusive and take the diverse needs of a range of learners, as well as matters of student equity, into account. These ideas regarding learning and development are particularly salient to education, given evidence that pre-existing knowledge systems can inform a variety of instructional behaviours such as the selection of pedagogical techniques and the interpretation of subject matter (Schoenfeld 2000).

Learning is dependent on the pedagogical approaches teachers use in the classroom. A variety of pedagogical approaches are common in the classroom, but some strategies are more effective and appropriate than others. The effectiveness of pedagogy often depends on the particular subject matter to be taught, on understanding the diverse needs of different learners, and on adapting to the on-the-ground conditions in the classroom and the surrounding context. In general, the best teachers believe in the capacity of their students to learn, and carefully utilize a range of pedagogical approaches to ensure this learning occurs. Effective pedagogy can lead to academic achievement, social and emotional development, acquisition of technical skills, and a general ability to contribute to society. .

The digital generation and the changes taking place in the present scenario like COVID-19 lockdown, technological advancements in teaching learning and flexibility in learning demands innovation in teaching. Innovative methods of teaching are methods of teaching that involve new ways of interaction between teacher and student in the process of mastering curriculum specified to attain the learning outcomes of a specified course. Through experimenting with different pedagogical techniques in the classroom, teachers amass a catalogue of knowledge about what works and what does not work. This type of learning is also known as experiential learning (Kolb 1984).

Wit, Heerwegh and Verhoeven (2012) stated that if online Learning can improve the ICT skills among the students, it is important for universities to distinguish the ways in which they want to use their skills with their learning styles. ICT skills are necessary for students because they need to benefit from online Learning so that they can improve themselves in their studies and learning styles. If students can adapt with online Learning easily, it shows that online learning has been implemented successfully in the educational institution.

Online Learning during this pandemic is changing much more than the content and approaches. Learning happens online and students in addition to listening lectures are expected to present their seminars, assignments

and lesson plans online. With this alternative, students can develop their technological skills as well as improve their teaching skills and communication with their lectures or other students in the classroom or outside of the class. The integration of ICTs provides countless opportunities and possibilities for learners in both higher education and general education. ICTs are significant tools for empowering knowledge and information; therefore, there is a strong need for policymakers and teachers to be aware of how technologies interact and work to use them effectively.

The COVID-19 crisis has raised salient questions about the necessity, importance and usefulness of certain curriculum content. It has highlighted the relevance of certain trends, particularly the authenticity of learning situations. This requires varied, flexible and authentic learning activities. In this regard, the authentic learning experiences resulting from the COVID-19 lockdown could be used to contextualize student realities during the pandemic. This represents an opportunity to rethink curricular content and approaches.

Need for Revisiting the Pedagogy in Present Context

Pedagogy of the twenty-first century cannot be equated with the pedagogy of the twentieth century. The social behaviour of people gets highly influenced by digital technologies as they influence the way people think, communicate and channelize their influence on other people.

Changes in society, student expectations, and technology are motivating higher education faculty (university and college) to rethink pedagogy and teaching methods. The increased emphasis on applying knowledge to meet the demands of 21st century society, such as developing and using skills like critical thinking, independent learning and the use of relevant information technology requires active learning in rich and complex environments, with plenty of opportunities to develop, apply, assess and practice such skills. This enables students to learn after graduation and educate them with the skills to manage their own learning throughout life, so they can continue to learn after graduation.

According to Sclater (2012), education is also the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits. There are many methods in education to get knowledge including storytelling, discussion, teaching, training, and direct research. This pandemic has mandated yet another method of teaching learning restricted only to online learning even though online teaching learning happened earlier in a meagre way in the form of video conferencing and tele-teaching.

With the recent developments in information and communication technologies (ICTs), there is a significant change in our daily life. Eventually, integrating ICTs into teaching and learning offers significant potential for higher education institutions and new challenges for educators, through their capacity to facilitate new kinds of education in digital environments. Online Learning becomes more effective

with the continuation of traditional classes with online classes. This makes teaching learning a potential to facilitate "24/7" student learning 'anytime and anywhere', a university education which is available worldwide and delivered from anywhere in the world (Parry, 2015).

Segall and Avner (2004) stated that the focus of teacher education should move forward from traditional practices in order to adopt creative techniques through which the students inherently recognise the pedagogical nature of the content and its application in the context of teaching. Conceptualization of pedagogical content knowledge has to be re-thought based on teacher efficacy and student readiness and participation in determining teacher professionalism Park et.al (2008).

Higher Education Institutes (HEIs) are now fast adapting to alternative pedagogy to engage students remotely and to continue the teaching and learning process in a “Teach-From-Home-Students-At-Home" situation. The COVID-19 pandemic-induced pedagogy has confronted the shape of traditional teaching and learning methods. Teaching flexibility to suit the student's needs should be the new apparatus for individual teachers to bring out the essential learning outcomes with maximum virtual outreach. The lockdown presents higher education institutions an opportunity to adopt an alternative pedagogy that uses technological tools to facilitate academic activities in the virtual world.

Online Learning is more geared towards self-regulated learning and is ideal for student teachers to instil their teaching skills that are mandated for future generation students. Thus, this study was developed to find out the teaching learning pedagogy that proves to be effective with adaptability to the changing scenario in the process of teaching learning. Online Learning becomes more effective with the continuation of traditional classes with online classes.

Online learning has also not undergone the same scrutiny as classroom teaching and researches on online teaching demonstrated mixed results (Ryan et al., 1999; Kenny, 2002; Atack and Rankin, 2002; Kozlowski, 2002). Educators of the 21st century classroom have to integrate ICT in teaching learning with the rapid advancement and shift in learning process as an outcome of the pandemic. Teaching practice also has evolved radical change with the vital impact of the post COVID-19 classroom influenced with the swift development in the teaching learning process.

The outcomes of this research will be helpful in developing a new learning approach in teacher education with the combination of both traditional and online learning and hence it is expected that the result of this study will reveal the effectiveness of learning experiences obtained by special education student teachers through traditional classroom and online classroom. Online learning using ICT prepares learners for the future technology based classrooms and facilitates to meet the advancements of the 21st century teaching learning. Moreover, online learning positively transforms the skills of special education student teachers to prepare and introduce activities in the

teaching and learning process which can significantly change their overall teaching skills to suit the 21st century classroom. In Indian context, online teaching is a relatively new phenomenon as compared to traditional classroom teaching and this COVID-19 induced sudden lockdown made the transition to online teaching imperative. Hence the study aims to study the following objectives to identify the perspective of special education student teachers in terms of their learning experiences gained in both traditional and online classrooms.

Objectives of the study

1. To find out the learning experiences of special education student teachers through various modes of learning.
2. To compare the learning experience of special education student teachers through regular/online mode in terms of

- developing knowledge
- offering effective learning resources

Meaningful online learning and teaching needs a proper planning to cater diverse needs of the students. Compromise in this planning leads to unproductive learning, resulting in non-accomplishment of learning objectives and learning outcomes. Given these concerns, the present research seeks to answer the following research questions:

1. What are the learning experiences acquired by special education student teachers regarding various modes (Regular, Online and Both) of teaching - learning?
2. Which of the two classrooms (regular and online) develop in-depth knowledge about a content?
3. Which of the two classrooms (regular and online) offers good learning resources to acquaint with learning of new content?

Design and Sample

A quantitative survey was used to examine the learning experience of students from undergraduate and postgraduate special education courses through online and regular classrooms. A sample of 97 students undergoing B.Ed and M.Ed Special Education courses with specialization of Visual Impairment, Hearing Impairment, Intellectual Disability, Autism Spectrum Disorder and Multiple Disability from four special education teacher training institutions from Tamil Nadu were selected using purposive sampling technique. The demographic details of the participants are given in table 1.

Table-1: Demographic Details of Participants

Area	Category	Number	Percentage (%)
Gender	Male	8	8.2
	Female	89	91.8
Age Range	21 to 30	85	87.6

	31 to 40	8	8.2
	Above 40	4	4.1
Residence	Rural	46	47.4
	Semi urban	11	11.3
	Urban	40	41.2
Course	B.Ed	87	89.6
	M.Ed	10	10.3
Specialization	Visual Impairment	26	26.8
	Hearing Impairment	27	27.8
	Intellectual Disability	32	33.0
	Autism Spectrum Disorder	5	5.2
	Multiple Disability	7	7.2

Analysis of Table 1 states that the majority of the respondents of the study (91.8 percent) are female student teachers and belonged to the age range of 21 to 30 years which constituted 87.6 percent of the sample. Respondents from rural and urban areas comprised almost the same percentage (47.4 percent and 41.2 percent, respectively) whereas 11.3 percent are from semi urban areas. Majority of the respondents (89.6 percent) represented student teachers studying B.Ed Special education whereas 10.3 percent belong to M.Ed Special Education. 26.8 percent of respondents belong to the Visual Impairment specialization course, 27.85 percent of respondents belong to Hearing Impairment specialization course, 33 percent of respondents belong to Intellectual Disability specialization course and 5.2 percent of respondents belong to Multiple Disability specialization course.

Method and Materials

The learning experiences of special education student teachers in online and regular classrooms were collected using a questionnaire that consisted of two sections. First section comprised demographic details of participants and second section with 15 statements reflecting their experiences on online and regular classroom learning offered by their respective institutions and teachers. The questionnaire was developed with a focus upon the nature of the learning experienced by the students through online and regular classroom in terms of developing knowledge, flexibility, provision of learning resources, mentoring and support system with four options. Developed questionnaire was converted to google form and mailed to the sample through their respective email as the data were collected during mid-May, 2020 when all institutions of India had switched to online mode of teaching due to COVID-19 pandemic.

Results and Discussion

Research questions framed based on the objectives of the study were answered by analysing the data collected from the respondents through percentage analysis, ANOVA and Tukey Multiple Comparison.

Research Question 1: What are the learning experiences acquired by special education student teachers regarding various modes (Regular, Online and Both) of teaching - learning?

Data gathered from the 97 students pursuing special education courses with various specializations at different levels were used to answer this research question. Frequencies of each item were calculated manually and then converted into percentages to show the attitude of participants towards revisiting the pedagogy of teaching in learning.

Table-2: Experience of special education student teachers in frequencies and percentages

S.N	Learning Experience	N	Regular		Online		Both	
			Fr	%	Fr	%	Fr	%
1	Flexible Learning Experience	97	60	61.9	3	3.1	34	35.1
2	Support from teachers	97	69	71.1	4	4.1	24	24.7
3	Offers good learning resources to learn new content	97	49	50.5	16	16.5	32	33.0
5	Discussion, quiz, interaction	97	70	72.2	7	7.2	20	20.6
6	Promotes creativity	97	53	54.6	14	14.4	30	30.9
7	Better student support services in learning	97	63	64.9	5	5.2	29	29.9
8	Exposure to theoretical and practical aspects	97	80	82.5	3	3.1	14	14.4
9	Flexibility in taking up assessments - assignment, test	97	56	57.7	17	17.5	24	24.7
10	Mentoring, supervision, feedback support	97	66	68.0	9	9.3	22	22.7
11	Promotes skill development	97	48	49.5	10	10.3	39	40.2
12	Attend to individual specific need of the student	97	67	69.1	8	8.2	22	22.7
13	Sharing of knowledge among students	97	56	57.7	4	4.1	37	38.1

From the table (1) it is observed that, the learning experience provided to the students by regular classroom is comparatively high when compared to online classroom and both classroom. 82 percent of the respondents recorded that regular classrooms provide a high-quality transaction and exposure to theoretical and practical aspects and 72 percent of the respondents felt that regular classrooms provide for interactive learning experience through discussion and quiz and 71 percent of recorded that support from teachers is high when compared to online and both (regular and online) classrooms. Respondents further recorded that online classroom provides least flexible learning experience (3 percent) and exposure to theory and practical aspects (3 percent) and sharing of knowledge among the students (4 percent) when compared to regular classroom and both (regular and both) classroom. Regular classroom learning (49 percent) and both online and regular classroom learning (40 percent) share the majority of skill promotion activities related to teacher education.

Response to the above research question reveals that learning experience acquired by special education student teachers through regular classrooms in terms of flexibility, support from teachers, student support services, sharing of knowledge among students and exposure to theoretical and practical knowledge is relatively high when compared to online and both modes of classrooms. In the study conducted by (Hasan, N., & Khan, N.H. 2020) it is established that online learning may be used as a supplement to offline/face-to-face learning as in the case of blended learning and flipped learning. The complete and only use of online mode of teaching and learning is perceived to be distracting and lacking support and interaction with teachers and fellow peers that makes it less effective and more burdensome.

Research Question 2: Which of the two classrooms (regular and online) develop in-depth knowledge about a content?

Table-2: ANOVA for significance difference among the programme in developing depth knowledge

Depth Knowledge	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.360	3	2.787	3.331	0.023
Within Groups	77.805	93	.837		
Total	86.165	96			

From table (2) it is found that the calculated value of f is significant at 5% ($P<0.05$) level [$F(3, 93) = 3.331$, $p = 0.023$]. Hence, it is inferred that there is significant difference among regular, online and both classrooms in developing depth knowledge about a content among the special education students studying I & II year B.Ed Special Education and I & II year M.Ed Special Education.

Table-3: Multiple Comparisons: Tukey HSD Multiple comparison of classroom in developing depth knowledge

(I) Programme	(J) Programme	Mean	Std. Error	Sig	95% Confidence Level	
					Lower Bound	Upper Bound
I B.EdSpl.Ed	II B.EdSpl.Ed	-.27405	19835	.514	-.7930	.2449
	I M.EdSpl.Ed	-1.22000	.47527	.056	-2.4634	.0234
	II M.EdSpl.Ed	.44667	.39518	.672	-.5872	1.4805
II B.EdSpl.Ed	I B.EdSpl.Ed	.27405	19835	.514	-.2449	.7930
	I M.EdSpl.Ed	-.94595	.48142	.209	-2.2054	.3135
	II M.EdSpl.Ed	.72072	.40255	.284	-.3324	1.7738
I M.EdSpl.Ed	I B.EdSpl.Ed	1.22000	.47527	.056	-.0234	2.4634
	II B.EdSpl.Ed	.94595	.48142	.209	-.3135	2.2054
	II M.EdSpl.Ed	1.66667*	.59041	.029	.1221	3.2112
II M.EdSpl.Ed	I B.EdSpl.Ed	-.44667	.39518	.672	-1.4805	.5872
	II B.EdSpl.Ed	-.72072	.40255	.284	-1.7738	.3324
	I M.EdSpl.Ed	-1.66667*	.59041	.029	-3.2112	-.1221

*. The mean difference is significant at the 0.05 level.

The Tukey honestly significant difference (HSD) test was performed under the significant result of ANOVA in developing in depth knowledge about a content through online classroom and regular classroom among students of B.Ed Special Education I and II year and M.Ed Special Education I and II year. Multiple comparison results presented significant statistical differences among students pursuing M.Ed Special Education I year when compared to all other categories of students. The mean difference of M.Ed Special Education I year students is significant ($P = 0.05$, $P < 0.05$)when compared to B.Ed Special Education I year and M.Ed Special Education II year respectively. Hence it can be specifically inferred that M.Ed Special Education I year students develop in-depth knowledge about a content through online mode of teaching when compared to M.Ed Special Education II year and B.Ed Special Education I year students.

In the study conducted by (Abdelrahman Mohamed Ahmed, 2020) it is established that ICTs prepare learners for the future and trains them to meet the technological advances of the 21st century. Moreover, ICTs positively change how activities are prepared and introduced in teaching and learning, which can significantly change the overall academic performance of the student teachers. This lines up with the response to the above question that master educators (M.Ed Special

Education) prefer online learning rather than other two modes of learning when compared to B.Ed Special Education student teachers.

Research Question 3: Which of the two classrooms (regular and online) offers good learning resources to acquaint with learning of new content?

Table-4: Tukey HSD Multiple comparison of classroom in offering learning resources

(I) Programme	(J) Programme	Mean	Std. Error	Sig	95% Confidence Level	
					Lower Bound	Upper Bound
Intellectual Disability	Multiple Disability	.16518	.36640	.991	-.8544	1.1847
	Autism Spectrum Disorder	-.20625	.42227	.988	-1.3813	.9688
	Visual Impairment	-.21394	.23185	.887	-.8591	.4312
	Hearing Impairment	-.62847	.22946	.056	-1.2670	.0100

From table-4 multiple comparison results presented significant statistical differences among students pursuing special education in Hearing Impairment when compared to all other specialization. The mean difference of students pursuing special education in Hearing Impairment is significant (P = 0.05) when compared to students pursuing Special Education courses in Multiple Disability, Autism Spectrum Disorder, Visual Impairment and Intellectual Disability. Hence it can be specifically inferred that students pursuing special education with Hearing Impairment as their specialization put forward that online classes offer good learning resources to acquaint with learning of new content than regular class. In the study conducted by (Hasan, N ., & Khan, N.H. 2020) it is revealed that the highly preferred mode by student teachers during online learning was teacher-made text materials and textbook materials compared to all other modes of materials and texts.

Conclusion

Pedagogies are constantly evolving.

It can be modified for 21st-century learning based on the changing scenario in teaching and learning. A pedagogy must fit the audience, and focus on helping students develop an understanding of the material beyond basic memorization and surface knowledge. Students should be able to relate concepts back to the real world, and even their own lives. eLearning

provides positive impact when used and best utilized by teachers and lectures and also helps in the application of 21st century skills in the education system (Masoumi & Lindström, 2012; Khasawneh et al., 2016).

Every pedagogy is different. A good starting point is to create a philosophy of teaching that outlines the objectives of being a good teacher adapting to changing scenarios. Also, an inspirational teachers' effectiveness is reflected in the plan to relate the work in the classroom to professional development to progress in the career. Then, design classroom experiences around this philosophy, work with students to adapt methods to encourage positive responses, and determine strategies to evaluate and assess their performance. Also, consider technology can be integrated into lesson plans and class work, as well as promote inclusivity. Zinger et.al (2017) further adds that both pre-service teacher education programs and in-service teacher professional development (PD), plays crucial roles in promoting teacher technological pedagogy and improved classroom practice.

The analyses of this study revealed that student teachers enjoyed learning through online mode, as it provided them with depth knowledge and adequate learning resources for learning enrichment. Based on the findings of this study, it is suggested that teachers have to augment their skills according to the emerging trends and untangle their conventional pedagogical approach in teaching by adapting to the technological changes. Taking all of this into consideration makes for a great recipe for a successful pedagogical approach. The more a teacher is aware of the way of teaching, the better he/she understands what works best for the students.

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Research Article

Effect of EduSat Lectures on Scientific Creativity among High School Students in Haryana

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Abstract

The study attempted to explore the effect of technology-based teaching on improving the scientific creativity of high school students in Haryana. The sample comprised 200 class IX students studying in four government schools of the Sonipat district. This was an experimental study using a pre-test/post-test equivalent group design in which the control and experimental group were equated on socio-economic status and intelligence levels. The Verbal Test of Scientific Creativity by Sharma and Shukla was administered at the pre-and-post treatment phase. The results reveal that technology-based EduSat lectures were not more effective than the normal classroom teaching in enhancing the scientific creativity of high school students. It is suggested that while developing EduSat lectures immense power of multimedia should be utilized to stimulate divergent thinking of students. The study has implications for policymakers, media personnel, teachers, students, parents and experts involved in the EduSat lecture delivery system.

Keywords: Effect, EduSat, Scientific Creativity, High School, Haryana

Introduction

Scientific creativity has been defined by researchers in different manners and contexts. Besemer and Treffinger (1981) stated that novelty, resolution, elaboration, and synthesis are the distinguishing features of scientific creativity. Mansfield and Busse (1981), based on their review of literature, have identified five basic ingredients of a creative act: problem selection, best efforts for problem solution, dealing effectively with restrictions, facing varying obstacles, and authenticating and extending the work. Ochse (1990) conceptualized creative persons as those who contribute something original and valuable to society and culture. Guilford (1950), a major contributor in the field of creativity research, described "creativity as being grounded in the ability to manipulate ideas in fluent, flexible, elaborate, and original ways". His views are supported by Torrance (1967) maintaining that creativity is exogenous and transferable in mental manipulations while Sternberg (1988) linked creativity with the development of insight. According to Shively (2011), the four key abilities closely associated with the creative process are fluency, flexibility, originality, and elaboration.

Creativity plays a crucial role in the process of science. Problem-solving, hypothesis formulation, experiment planning, and technical innovation require a specific type of creativity peculiar to science. Kocabas (1993) stated that scientific creativity is composed of motivation for scientific work, ability to formulate a scientific problem, ability to search for the solution, ability to assemble and narrow the probable solutions to the problem, and keeping patience and stamina in view of the limitations imposed by circumstances. Hu and Adey (2002) argued that scientific creativity can be described in three domains namely product, trait, and process. The product part depends on scientific phenomena, scientific knowledge, and the nature of scientific problems while the trait is evaluated by three structures namely fluency, flexibility, and originality. Imagination and new thinking are the characteristics of the process domain. In view of Runco and Nemiro (1994), scientific creativity is closely associated with the problem-finding behaviour of an individual whereas Heller (2007) believed that if a person is capable of solving a scientific problem innovatively then he/she possesses a certain level of scientific creativity. Ugras (2018) explained scientific creativity as a phenomenon whereby something new and somehow valuable is formed in science. Mukhopadhyay and Sen (2013) argued that creativity in science education has emerged as an independent field of research, and is drawing increasing attention of science educators, while Adzliana et al. (2012) have treated scientific creativity as fundamental to the achievement of a person, organization or country.

The research has emphasised the role of creativity in education and especially in science education and schools are considered as the most appropriate place to foster it. Sternberg and Lubart (1996) think that schools must nurture creativity in students, making them bold to take risks and such behaviour may lead to innovations and discoveries. The prevalent educational system in India is based on a model that was evolved in Europe in the 19th century when the aim was to produce proficient workers and submissive civil servants. This system was intended to cater to the industrial requirements prevailing at that time, but the situation in the 21st century is quite different. The contemporary era needs persons with new thinking and flexible ideas since the requirements of society are changing on a day to day basis. This requires schools to be open to instill such skills and become a field for exploration, inquiry, and reflection of ideas. However, existing classroom practices in the Indian schools indicate that the problems and materials are given to the students by teachers. This prevents the development of new thinking among students. In such a situation, the students rarely get a chance to think and demonstrate independently. In most of the cases, the teachers used to narrate the scientific knowledge and theories from textbooks. In science classes, the students are hardly allowed to perform experiments freely to reflect on their thoughts and practices. This is more prevalent in government schools where there is also a lack of laboratory equipment and chemicals and other facilities. It has been

experienced that independent thinking is rarely appreciated by the school world rather students are directed to follow monotonous steps decided and performed by the classroom teachers. This type of education not only diminishes the promotion of original, flexible, and divergent thinking but kills the student's instincts to explore the problems scientifically.

Guimbal (2015) has observed in "The Indian Express" that "most of the students in the country are indulged in memorization of lessons, dates and other pieces of texts or information to be able to write in their exams". It means that students' main objective appears to be getting good marks by memorization of facts while diminishing the application of critical thinking in a solution to a problem. Google Chief Executive Officer Sundar Pichai (2017 cited in "The Times of India", 2018, March 12) also expressed his distress about Indians not being flexible and lacking original thinking in work. One of the key reasons for unemployment in the country has been cited as a lack of original thinking among aspiring candidates. Similar observations were made by Wozniak, the co-founder of Apple, in his interview with "The Times of India" in 2018. While extending this debate, Wozniak commented that Indians lack creativity and original thinking because of an ill-structured academic system. In 2014, India was ranked 66 out of 140 countries by the United Nations Development Programme in terms of innovation ("The Times of India", 2018, March 12).

The reports in newspapers and personal observations by eminent personalities of the 21st century suggest that the education system in India is not upto the mark and it lacks the promotion of innovative and original thinking among students. It has been noted that the focus of the existing school system is on preparing students to study hard and getting good jobs rather than motivating them to think critically. The use of technology for learning and innovations is minimum, especially in rural areas and government schools where the maximum school population exists. The outdated pedagogy, with a minimal or complete absence of technology, is among the probable reasons for the lack of critical thinking and new ideas. The conventional pedagogy discourages original thoughts and innovative thinking but promotes memorization and indoctrination. The unavailability of teachers and science laboratories, particularly in rural government schools, makes the situation worst. Therefore, it is important to work for a complete overhaul of the quality and method of teaching used in today's education system to inculcate and enhance scientific creative skills among school students. Brinkman (2010) stated that "teaching students to be creative is a task teachers do not take because most teachers only recognize approaches for teaching for the best learning results rather than teaching for the discovery of new knowledge and creative ideas". However, Park et al. (2006) argued that teachers should use curriculum transactions as an opportunity to develop creativity by practicing creative teaching in the classrooms.

The government of India in 2002 launched an Educational Satellite popularly called EduSat to serve the

educational needs of all categories of learners including science students who may lack facilities, especially in remote and rural areas. In this mode, the school students, sitting at a distance, receive instructions through lectures pre-recorded by eminent experts which are later telecast through EduSat. This type of setting provides an opportunity for classroom teachers, sitting in remote-rural schools, to become more creative and instill creativity in students by using the latest technology of animation and visual effects while presenting abstract concepts. Visual experimentation is added as per the demand of the content. The use of animation and simulated experimentation facilitates the learning process to understand abstract ideas directly (Bates, 1998). The use of captions/ titles/ topics on the screen helps the students to read/ write/ note the learning points and move at their own pace. The pre-recorded lessons may be used time and again to understand the concept better and explore the issues minutely. The animation and experimentation used by experts make the lectures lively and generate interest among the students to think in a new and novel way. Research shows that EduSat not only increases the attendance and retention of school students but also helps the teachers in making their teaching more effective and innovative (Chaudhary & Garg, 2010).

In Haryana, the EduSat project was launched in 2007 to provide better education to all with a focus on rural and remote areas. Initially, 9000 schools were selected for the "Haryana EDUSAT Project" and the government established Utkarsh society under the aegis of the Education Department to implement it. Under this project, the curriculum-based pre-recorded videos are telecast from Panchkula Studio as per Time-Table. Currently, five channels, four Direct To Home (DTH) and one Satellite Interactive Terminal (SIT), are used for this purpose. These channels cater to the educational needs of elementary, secondary, technical, and higher education students. The government has also created a website www.haryanaedusat.com to help the students in this kind of learning.

However, doubts and concerns as regards the effectiveness of EduSat lectures have been expressed by many researchers at the national level. In a report by Azim Premji Foundation, it was put forward that EduSat lectures produced no robust evidence of improvement in the learning outcomes of students. The pedagogical model of education implemented via EduSat provided little opportunity for students to interact with teachers because pre-recorded lessons are transmitted through Receive-Only Terminals (ROTs) where students have no chance to ask questions. In a similar study, Dalal (2016) noted that the lack of trained manpower, improper monitoring, and missing administrative ethics had affected the performance of EduSat adversely. This argument is supported by the Comptroller and Auditor General (CAG) of India report in 2013 that 56 percent of the EduSat terminals in government schools in Haryana were non-functional (Siwach, 2013). Similarly, "The Indian Express" (2014, April 17) revealed that the EduSat has failed in

Haryana because of lapses and lack of monitoring.

Despite a few discouraging pieces of evidence, it has been felt that in recent times, EduSat has tremendous potential to be utilized for inculcating new knowledge, scientific and creative temperament. It has been cited repeatedly in the literature that the use of technology increases student's motivation as well as engagement for learning and promotes the constructionist approach in teaching and learning (Godzicki et. al. 2013). Halatand Karakus (2013) suggest students who are facilitated with technology for teaching and learning are more likely to make meaning and construct their understanding of complex ideas with observed motivation. In a study, Li and Zeng (2017) found that online courses can stimulate students' interest in learning and improve their creativity through video teaching. Research evidence also suggests that exposure to modern technology enhances creativity and high order thinking skills which is not found in the conventional approach (Yushau, Mji & Wessels, 2005). The edge of teaching through technology in comparison to conventional methods has been reported by many researchers but whether it also helps in nurturing scientific creativity and new thinking is a question that must be answered through empirical investigations.

Significance of the Study

The main aim of implementing new technologies in education is to advance the quality of education and foster better interactivity between the teachers and learners. Embracing new technology is not a challenge but acclimatizing it to several educational, pedagogical, and social realities is a major challenge. It has been widely acknowledged by educators that creativity in science education is an important issue and educators must work on methods and techniques to improve it. Although creativity has been studied by researchers for many years, there are not many studies that suggest ways and measures for improving creativity in science. For all these reasons, scientific creativity is a subject that needs to be emphasized. Also, it is needed to investigate how students' scientific creativity is affected by teaching them through technology-based EduSat lectures. A great benefit of EduSat lectures is that it offers numerous opportunities for creative instructions. The presenter can facilitate animations, panel discussions, oral lectures, experimentation, brainstorming, and more. Although there are limitations, it brings the opportunity for better education especially in rural and remote areas where access and lack of facilities are an issue. It aims to energise the students taking them from passive mode to active mode using the expertise of scholars in the transaction of the curriculum in an enjoyable mode. Learning to be creative requires active engagement and stimulating divergent thinking. Therefore, it requires investigation whether the lectures transmitted through EduSat positively increase or inhibit the scientific creativity among high school students.

Objectives

Following were the objectives of the study:

1. To study the existing level of scientific creativity among high school students.
2. To study the effect of EduSat lectures on different dimensions of scientific creativity among high school students.
3. To study the effect of EduSat lectures on overall scientific creativity among high school students.

Hypotheses

The following hypotheses were generated for the study:

1. After the exposure to EduSat lectures, there is no significant difference between pre-test and post-test levels of scientific creativity among high school students.
2. After the exposure to EduSat lectures, there is no significant difference between the scientific creativity of experimental and control group students.

Methodology

Sample

A sample of 200 science students from the IXth class of two urban and two rural area government schools of the Sonipat district of Haryana was drawn randomly. In the first instance, 20 schools were approached for the experiment but finally, four schools agreed to cooperate. In total, 583 students were studying in the IXth class of those four schools. All the 583 students were administered to Jalota's (1972) Group Test of General Mental Ability (Hindi) and Socio-economic Status Scale by Kulshreshta (1972) to equate them on intelligence and Socioeconomic status parameters. Based on scores on the Test of General Mental Ability, these 583 students were further divided into three groups i.e. high, average, and low intelligence levels group, Similarly, all 583 students were also enlisted into three groups having a high, average, and low Socio-economic status based on their Socio-economic Status Scale scores. The further analysis showed that 42 students were common to the high intelligence as well as high socioeconomic status. These 42 common subjects/students were divided randomly into two groups equally i.e. 21 to the control group and 21 to the experimental group. The same procedure was followed while dividing the students into the control group and the experimental group from the average group (92 students) and the lower group (72 students) of intelligence and socio-economic parameters. Out of these 206 common subjects in high, average, and low groups of intelligence and socio-economic parameters, 200 were selected by weeding out two students from the high, average, and low groups. Hence, in this way, a sample of 200 students was obtained randomly divided into control and experimental groups 100 each. Through equating and matching of subjects, an attempt was made to eliminate systematic bias and minimize the effect of the intervening variables. Thereafter, dividing the subjects to the control and experimental group randomly, the measures of two intervening variables (intelligence and socio-economic status) between the control and the experimental groups were tested statistically, to ensure the equivalence of the two groups. The 't'-test was applied to find out the

difference between intelligence and socio-economic status test scores of the experimental group and the control group. The results showed that the t-value between the groups was not significant. It means that no significant differences existed between the intelligence and the socio-economic status of control and the experimental group, indicating that they belonged almost to the same kind of intelligence range and socio-economic milieu.

Design and procedure

The study employed a pre-test/post-test equivalent group experimental design. The study included an experimental group and a control group. In this, true experimental design equivalence of the groups was provided by the matching of subjects, on two confounding variables i.e. intelligence and socio-economic status, to the experimental and control treatment. The experimental group was taught through pre-recorded EduSat lectures and the control group through the conventional lecture method.

Tools for Data Collection

The study employed three tools namely Socioeconomic Status Scale by Kulshreshta (1972), Group Test of General Mental Ability (Hindi) by Jalota (1972) and Verbal Test of Scientific Creativity by Sharma and Shukla (2005) for data collection.

The Socioeconomic status scale by Kulshreshta (1972) was used because this is a standardised scale with high reliability and validity, which especially measures the socio-economic status of the subjects belonging to the urban and rural areas. Moreover, in order to establish the relevance of the scale by Kulshreshta (1972) in the present context; the reliability and validity of the scale were rechecked. The scale was administered on a sample of 50 students. The test-retest method was used to check the reliability, and the coefficient of correlation was found 0.72. Construct validity was calculated by comparing the scale with the socio-economic status scale by Bhardwaj (2001). The coefficient of correlation was found to be 0.63. These values showed that the test is reliable and valid in present times also.

Similarly, the Group Test of General Mental Ability (Hindi) by Jalota (1972) was found appropriate in current times because no other standardised test with such high reliability and validity was available for subjects whose medium of instruction and examination was Hindi. Moreover, it is still considered as the most referenced and widely used tool to measure intelligence of Hindi speaking subjects.

The Verbal Test of Scientific Creativity by Sharma and Shukla (2005) was used to assess the scientific creativity of subjects before and after the experimental phase. It had 12 items. Each item was scored for the "fluency, flexibility, and originality" dimension of scientific creativity.

Analysis and Interpretation of Results

In the first phase, the existing level of scientific creativity among class nine government high school students was determined. The scientific creativity test

was administered to both groups. The results of the pre-test of both the groups for overall and dimension-wise scientific creativity are presented in Table 1.

Table-1: Difference in the Mean Scores of Experimental and Control Group on Scientific Creativity Pre-test

	Test	Group	N	Mean	S.D	't' value	Level of Significance
Overall Scientific Creativity	Pre-test	Experimental	100	40.39	14.71	0.09	Not significant at 0.05 level
		Control	100	40.30	14.87		
Dimensions of Scientific Creativity							
Fluency	Pre-test	Experimental	100	17.26	5.86	0.56	Not significant at 0.05 level
		Control	100	17.47	5.30		
Flexibility		Experimental	100	12.83	4.49	0.79	Not significant at 0.05 level
		Control	100	13.11	4.88		
Originality		Experimental	100	10.05	6.70	0.21	Not significant at 0.05 level
		Control	100	9.98	6.41		

Table-1 indicates that the overall scientific creativity mean scores of the experimental and control group on the pre-test are 40.39 and 40.3 respectively (obtained t = 0.09, not significant at 0.05 level). Further, the calculated 't' values 0.56, 0.79, and 0.21 for different dimensions of scientific creativity test namely fluency, flexibility, and originality respectively were also not significant at 0.05 level. This shows that before the exposure to EduSat lectures, the two groups started from essentially the same level of overall scientific creativity and almost similar levels of different dimensions of scientific creative ability.

The first phase was followed by the treatment phase. In the treatment phase, the control group was taught by the traditional lecture method and the experimental group by pre-recorded EduSat lectures. After the treatment phase, the results of pre-test and post-test on overall and dimension-wise scientific creativity level of the experimental group were calculated and the same is presented in Table-2.

Table-2: Difference in the Mean Score of Experimental Group on Scientific Creativity Pre-Test and Post-Test

Variable	Group	Test	N	Mean	S.D	't' value	Result
Overall Scientific Creativity	Experimental Group	Pre-Test	100	40.39	14.72	16.47	Significant at 0.01 level
		Post-Test	100	47	13.96		
Dimensions of Scientific Creativity							

Fluency Dimension	Experimental Group	Pre-Test	100	17.26	5.86	12.66	Significant at 0.01 level
		Post-Test	100	20.02	4.90		
Flexibility Dimension		Pre-Test	100	12.83	4.49	12.51	Significant at 0.01 level
		Post-Test	100	14.92	4.36		
Originality Dimension		Pre-Test	100	10.05	6.70	10.46	Significant at 0.01 level
		Post-Test	100	12.3	6.36		

Table-2 shows that the mean and standard deviation values of the experimental group on overall scientific creativity pre-test and post-test were 40.39 ± 14.72 and 47± 13.96 respectively. The 't' value obtained was 16.47, which shows a significant difference in scientific creative levels of the experimental group before and after the treatment. As indicated by the higher mean value of the post-test, there was an increase in scientific creativity among subjects exposed to Edusatlectures. The obtained 't' values between the pre-test and post-test mean scores of the experimental group on fluency, flexibility, and originality dimension of scientific creativity were 12.66, 12.51, and 10.46respectively. This indicates that EduSat assisted instructions had registered significant improvement in the selected dimensions (fluency, flexibility, and originality) of scientific creativity. Based on the results, the first null hypothesis, "After the exposure to EduSatlectures, there is no significant difference between pre-test and post-test levels of scientific creativity among high school students" was thus rejected. Therefore, it can be concluded that teaching through EduSat lectures is effective in enhancing scientific creativity among high school students.

Post-testing of the control group on the scientific creativity variable was done to analyse the effect of traditional classroom teaching without utilizing EduSat lectures on these particular variables. Results of the pre-test and post-test scores of the control group, regarding overall scientific creativity and its dimension, are presented in Table-3.

Table-3: Difference in the Mean Score of Control Group on Scientific Creativity Pre-Test and Post-Test

Variable	Group	Test	N	Mean	S.D	't' value	Result
Overall Scientific Creativity	Control Group	Pre-Test	100	40.3	14.88	17.4	Significant at 0.01 level
		Post-Test	100	47.71	13.13		
Dimensions of Scientific Creativity							

Fluency Dimension	Control Group	Pre-Test	100	17.47	5.30	11.11	Significant at 0.01 level
		Post-Test	100	19.71	5.09		
Flexibility Dimension		Pre-Test	100	13.11	4.88	7.85	Significant at 0.01 level
		Post-Test	100	14.99	4.42		
Originality Dimension		Pre-Test	100	9.98	6.41	9.03	Significant at 0.01 level
		Post-Test	100	12.62	5.88		

Table-3 shows that concerning the overall scientific creativity of the control group, the t-value was 17.4 which indicates a significant difference in mean scores of the control group during the pre-test and post-test stage. Table 3 also indicates that the calculated 't' values of the control group on different dimensions viz. fluency, flexibility, and originality were 11.11, 7.85, and 9.03 respectively. All these obtained 't' values reveal a significant difference between the pretest and post-test scores of the control group on varied dimensions of scientific creativity. The mean scores indicate an increase in the post-test scientific creativity level in comparison to the pre-test level of students who were taught using the normal chalk and talk method.

The results reveal that both the groups experienced significant improvement in fluency, flexibility, originality, and overall scientific creative ability from the beginning of the intervention to the end of it.

To analyse which method was more effective in enhancing the scientific creativity among high school students, post-test scores of the experimental and control group were compared and tested statistically as presented in Table-4.

Table-4: Difference in the Mean Scores of Control and Experimental Group on Overall Scientific Creativity Post-test

Test	Group	N	Mean	SD	t-value	Result
Post-test	Experimental Group	100	47	13.95	0.83	Not Significant at 0.05 level
	Control Group	100	47.71	13.12		

Table-4 demonstrates that after the exposure of the experimental group to EduSat lectures, the mean and standard deviation scores came to be 47 ± 13.95 while the scores of the control group for the mean and standard deviation for overall scientific creativity were calculated to be 47.71 ± 13.127. The obtained 't' value between the two groups was 0.83, which was not significant at the 0.05 level. It means that after the treatment phase, there was a marginal edge to the control group for overall scientific creativity. However, scientific creativity was increased in both groups after the treatment phase.

It can, therefore, be concluded that both the methods seem to be equally good in enhancing overall scientific creativity and the effect of EduSat lectures was not at all visible when compared to the conventional method. Based on results obtained from the analysis of the data, the second null hypothesis i.e. "After the exposure to EduSat lectures, there is no significant difference between the scientific creativity of experimental and control group students", is thus accepted. The analysis leads to the conclusion that EduSat lectures were not more effective than the normal classroom teaching in enhancing the scientific creativity of high school students. Further, the post-test scores of both groups were analyzed on various dimensions of scientific creativity and presented in Table-5.

Table-5: Difference in the Mean Score of Control and Experimental Group on different Dimensions of Scientific Creativity Post-test

Dimensions Scientific Creativity	Test	Group	N	Mean	S.D	't' value	Level of Significance
Fluency	Pre-test	Experimental	100	20.02	4.90	0.98	Not significant at 0.05 level
		Control	100	19.71	5.09		
Flexibility		Experimental	100	14.92	4.36	0.22	Not significant at 0.05 level
		Control	100	14.99	4.42		
Originality		Experimental	100	12.30	6.36	0.91	Not significant at 0.05 level
		Control	100	12.62	5.88		

Table-5 shows the dimension-wise effect of enhancing scientific creativity. The calculated 't' values are 0.98, 0.22, and 0.91 for different dimensions of the scientific creativity test. Based on the difference in mean scores on different dimensions of the scientific creativity test, it can be inferred that students of the experimental group and control group had shown an almost equal increase. It can be concluded that EduSat lectures and traditional methods were equally effective in increasing all three dimensions of scientific creative ability.

Discussion and Conclusion

The results indicate that EduSat lectures were not more effective than the normal classroom teaching in increasing the scientific creativity of high school students. In the absence of direct empirical research studies on the effect of EduSat lectures on scientific creativity, the present findings seem in agreement with the studies conducted on the effect of television on creativity. The study by Runco and Pezdek (1984) falls completely in line with the findings of the present study as they argued that the effect of watching television and listening radio on children's creativity is not different. Another study conducted by Keyne (2003) showed that television viewers with large screen time scored

lower than moderate viewers on the creativity test. Also, Kant (2012) found an insignificant relationship between creativity and viewing of television by secondary school children. In contrast to the findings of this study, MacBeth (1996) observed that watching television increases children's imagination and creativity. Singer and Singer (2001) found that technology improved the quality of creative products and it had a positive impact on the creativity of children. The present findings also do not support Yushau, Mji, and Wessels (2005) who found that exposure to modern technology enhances creativity and high-order thinking skills which are absent in the conventional pedagogy.

The results revealed that EduSat lectures proved to be not more effective than traditional classroom teaching in enhancing the scientific creativity of high school students. The possible reasons may be that the content presented and the methods adopted in the presentation were not able to enhance the divergent thinking of the students which is the foremost essential of scientific creativity. Science lectures transmitted through EduSat failed to assist the development of scientific creativity more than the normal chalk and talk method. Therefore, it is essential to make use of different learning approaches, methods, and techniques to ensure the development of scientific creativity among high school students. It was expected to achieve these objectives through the use ofEduSat technology, but the results are contrary to the expectations. The failure of EduSat lectures in bringing desired results for developing scientific creativity in comparison to the conventional method may be due to the reason as noted by Dalal (2016) that EduSatlacks trained manpower and proper monitoring. One other reason for the present findings might be the lack of two-way communication between students and the resource persons delivering the lectures. Usually recorded lectures are transmitted and there is no scope of students' active participation during the transmission of the lecture, which is very much needed to stimulate divergent thinking among the students. Moreover, scientific creativity requires motivation (Kocabas, 1993) but this study indicates that this component might be missing in EduSat lectures. It can be suggested that while developing these lectures immense power of media and technology should be utilized to stimulate divergent thinking of students along with developing their convergent thinking. Pedagogical changes in these lectures can make them helpful in inculcating scientific creativity among students.

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Research Article

COVID-19 Outbreak: eLearning Resources and Online Classes, Advantages and Disadvantages

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Abstract

The purpose behind this quantitative research was to explore the experiences of students in order to study how students assessed their ability to examine the physiological, cognitive and behavioural responses experienced by students during lockdowns. The research information was gathered by using Google online questionnaire. A total of 156 students from various regions of India were classified as Graduate, Postgraduate Ph.D.s, and Post-doctorate based on educational degrees. Information was collected, categorised as (1) Demographic data; (2) Activities during lockdown; (3) Resources used by students and the effects of it during COVID-19 and statistical analysis was used for the factual analysis of the data. According to the current study result, female respondents used to like watching television, reading /writing and using social media though male respondents were engaged with playing computer games, doing exercise and yoga and cooking. After the crisis, we need to continue our education that way.

Keywords: COVID-19, Pandemic, Crisis, Mode of study.

Introduction

It is a stressful time when schools around the world are shifting to a virtual teaching-learning mode in an attempt to fight the consequences of the pandemic. Besides that, there is nothing quite like confronting communication and participation by exchanging unique ideas and experiences from life, gatherings to create innovative thoughts in the classrooms. Staying secure at home is the dire necessity of the time. The unexpected change in the learning process into digital approaches has been implemented in order to maintain the university track even if trying to avoid people crowding and the significant threat of the spread of infection. Students and teachers work consistently to adjust and make the learning process enjoyable, productive and absolutely essential by means of online lectures ("COVID-19 lockdown: How students are coping with the online classes and syllabus").

Effect of Covid-19 on Educational Institutes

According to UNESCO, since the COVID-19 invasion began, school and

university shutdowns have impacted approximately 1.37 billion learners in 138 nations worldwide. The classroom is therefore no longer accessible to around 60.2 million school teachers and university professors. Italy was the very first European country to close down its universities immediately and switch online learning (Zubascu, 2020).

Emerging eLearning in India during Covid-19 Outbreaks

COVID-19 pandemic has broken an enormous part of India's education system. In consideration of the crisis caused by COVID-19, all courses, examinations, and public meetings of central and state universities have been scrapped by the MHRD.

It is also tough to anticipate how schools, colleges and universities will reopen. There are barely any alternatives apart from to keep moving from the typical face-to - face phase of academic learning to advanced digital platforms.

The new reality can be more troublesome for educational institutions that are not so accustomed to the digital manner. E-learning creates a challenge to creativity and accessibility for both teachers and students, but it ensures everyone involved with worksheets, online lectures and assignments. Students in urban areas and cities are centred on PCs and cell phones as educators take to online application for lectures, tutorials and evaluations ("Coronavirus: In the time of the pandemic, classes go online and on air").

In order to assist students, some organisations are transferring sessions to YouTube, whereas Kendriya Vidyalaya Sangathan is transmitting its Swayam Prabha portal, which has DTH and internet lectures. Andhra Pradesh is seeking to reach Doordarshan to minimize major obstacles to access. The Zoom application has been embraced by several organisations, others by Google Classroom. However, the teachers cannot say how productive these are because not all students are configuring ("Coronavirus: In the time of the pandemic, classes go online and on air").

The Most Common Problems during Online mode Study

University reports state that some departments are recently organising Zoom accounts, a possible direct form for video conferencing. In addition, the university is focusing on this initiative, amending its schedules to the latest teaching strategies (Zubascu, 2020).

- Poor internet connections with video sustained freezing are the technical issue, seeking to make for a rough course experience.
- While studying at home anywhere students might be, there seems to be more interruptions than expected, including to family.
- The rapid transition to online education has made some students concerned about some criteria for the curriculum whether they need to complete science classroom labs.
- The lack of confronting with both teachers and classmates can be especially challenging.
- The technique would have never

been mostly used by professors and students previously ("Tackle challenges of online classes due to COVID-19").

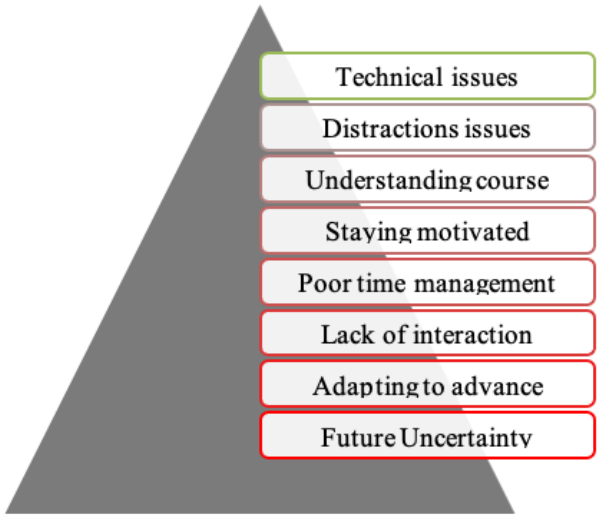

Figure-1: Problems during Online mode Study

Methods and Materials

A Google online survey questionnaire was developed to assess the online / e-learning study response of participants during the COVID-19 epidemic. The online survey was circulated to students from universities in various states of India.

Sample

The questionnaire had been sent to 200 students to gather all the relevant information, and 160 of them responded. There were 4 insufficient responses, so they were not included. A total of 156 participants from various parts of India were listed mostly on criteria of educational degrees as graduates, postgraduate, PhDs, and post-doctoral students.

Procedure and Survey Development

An informed consent was submitted by all participants. The self- structured questionnaire includes questions covering multiple areas: (1) Demographic data; (2) Activities during lockdown; (3) Resources used by students and their effects during COVID-19. Socioeconomic details were gathered throughout the covid for 19 pandemic days on gender, age, education, residential area.

Statistical Analysis

Statistical analysis using SPSS 21.0 was done. For results, descriptive statistics, means, and frequency distribution were used. To measure the relationships among gender and activities during lock down, Independent t-test was used, both analyses were two-tailed, with a statistical significance of $p < 0.05$. The relationship among the variables, mode of study and different conditions was assessed. With p-value, the degree of significance was obtained.

Results and Discussions

Responses from 156 respondents, belonging to different states of India were gathered. Overall, 156 respondents submitted the questionnaires within 10 days.

Demographic data

Table-1: Demographic Profile of Respondents

S. No.	Category	Frequency	Percentage
Age			
1.	15-20 years	10	6.4
2.	20-25 years	100	64.1
3.	25-30 years	24	15.4
4.	30-35 years	12	7.7
5.	35-40 years	10	6.4
	Total	156	100.0
Gender			
1.	Male	42	26.9
2.	Female	114	73.1
	Total	156	100.0
Degree			
1.	Graduation	24	15.4
2.	Post-graduation	86	55.1
3.	Doctoral	40	25.6
4.	Post docs	6	3.8
	Total	156	100.0
Stay with			
	Family	108	69.2
	Friends	20	12.8
	Alone	28	17.9
	Total	156	100.0

Table-1 summarizes students' demographic information. Majority of the respondents were aged 20-25 years (64.1 percent), followed by 25-30 years (15.4 percent), 30-50 years (7.7 percent) and 35-40 years (6.4 percent). There have been 114 (73.1 percent) female respondents in total and just (26.9 percent) males. The participants were from various states of the nation. Majority of the respondents were post-graduated (about 55 percent) followed by doctorate about 26 percent, followed by graduates 15.4 percent and only 4 percent respondents were post-doctorate. It shows the various places of stay where they are actually staying due to the pandemic of COVID-19. During COVID-19 pandemic outbreak, the highest majority of respondents (about 69 percent) lived safely with their family, approximately 18 percent lived alone in

rented rooms or hostels followed by living with friends (13 percent), nobody from the respondents stayed with their friends.

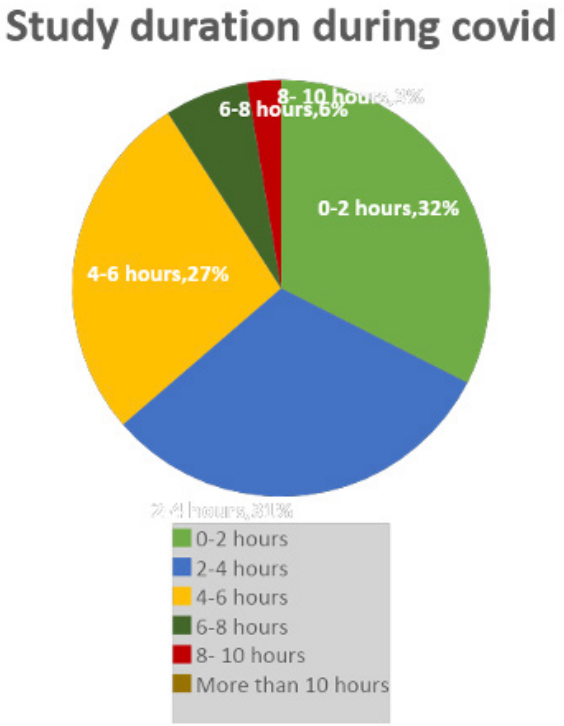

Figure-2: Study duration during COVID-19 outbreak

Figure-2 indicates majority of the participants (64.1 percent) studied 0-2 hours accompanied by the second majority studying 2-4 hours per day at home, out of them (27 percent) studying 4-6 hours, 6-8 hours (6 percent) and just a few of them (3 percent) studying 8-10 hours at home.

Table-2: Gender of the respondents affects activities during lockdown

S. No.	Activities during lockdown	Gender of the Respondents		F value	P value
		Male	Female		
		Mean ± S.D	Mean ± S.D		
1.	Watching TV	.57 ± .501	.70 ± .460	5.853	.017
2.	Playing Computer games	.33 ± .477	.18 ± .382	14.243	.000
3.	Reading/writing	.81 ± .397	.96 ± .185	47.053	.000
4.	Cooking	.86 ±.354	.82 ±.382	.974	.325
5.	Exercise/Yoga/Meditation	.76 ± .431	.72 ± .451	1.219	.271
6.	Social media and Internet	.90 ±.297	.95 ±. 224	3.600	.060

There is a strong gender disparity in time usage between work and household tasks – men are more prone to engage in jobs and females in domestic chores (Winn & Heeter, 2020). Participants were asked to estimate activities involved in different leisure and non-leisure activities. Non-leisure activities tasks comprised time spent at reading/ writing, playing computer games, doing exercise yoga meditation and cooking while leisure activities included watching television, using social sites, and playing games.

The association between the different activities during lockdown and the gender of the respondent has been examined in Table 2. As people face isolation time at home, this led to an ideal condition to be involved in watching television (Dixit et al, 2020). Female participants were found to watch T.V higher than male students, which indicates the important correlation ($p = 0.017$) that women are more likely to watch TV, whereas males ($\mu = 0.33$) were found to be even more interested in video games than female students ($\mu = 0.18$), and that's highly significant ($p = 0.000$) at the level of 0.01. Male gender seemed to be more active in playing computer games in another research finding (Winn & Heeter, 2020). The majority of the students were female, followed by male students ($\mu = 0.81$), who spent their full time reading and writing ($\mu = 0.96$). This also illustrates the highly significant relation through lockdown with female students and reading / writing activities. In developed countries, studies have shown that girls have less time for leisure activities than boys and have a higher workload at school and at home (Levison et al. 2001; Ritchie et al . 2004). It is evident from the data that male students did more activities such as exercise/yoga/mediation than female respondents in their spare time, although it was not considered to be significant. Networking sites and the internet naturally get quite relevant for the modern scenario. Almost nothing would be possible without the internet for the present generation. Nowadays, almost nothing is going to be possible without the internet. There has been an enhanced use of social sites in the current circumstances of the COVID-19 pandemic with an international quarantine state, as individuals have nothing else to do (Dixit et al, 2020). In our research, women have been observed to have much more exposure to social sites than male respondents whatever the reason behind it be.

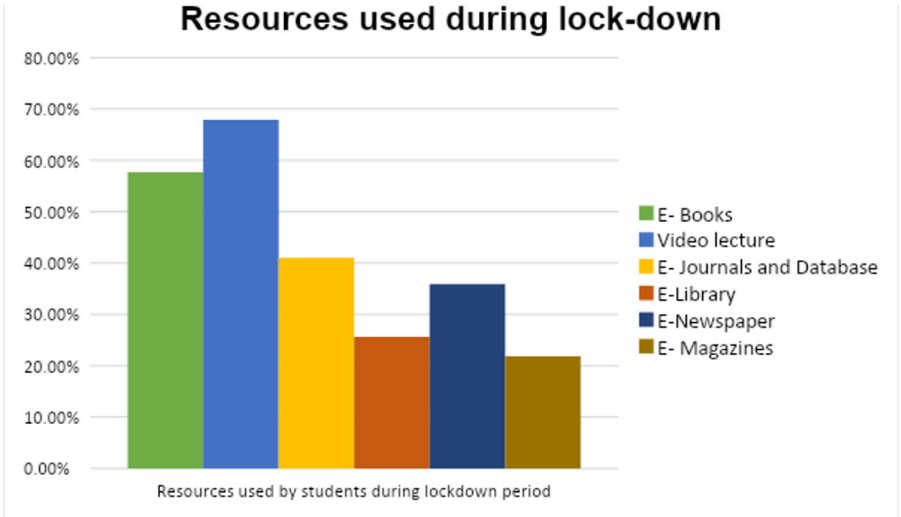

Figure-3: Resources used during lock-down

First, in order to maintain the effectiveness of education in governmental schools and universities, drastic steps are necessary. To encourage teachers to accomplish online teaching, open - source database user interfaces and training management software must be introduced ("E-learning: COVID-19 Pandemic: Impact and strategies for education sector in India"). The resources have been used during COVID-19 outbreak, presented in figure 3 which is helpful to learn something during the worst conditions. According to the results of the analysis video lecture, about 67.90 percent of the students have considered it effective preceded by e-books (57.70 percent), followed by e-journals and database (41 percent), and further followed by E-Newspaper (35.90 percent), followed by e-Library (25.60 percent) and the least used resources are e-Magazines (21.80 percent). This will assuredly change the academic system and improve teaching and learning quality, offering more choices to choose for students and teachers.

Table-3: Mode of study influences different conditions

S. No.	Items	Mode of Study		F value	P value
		Offline	Online		
		Mean ± S.D	Mean ± S.D		
1.	Focus	2.56 ± 1.438	2.38 ± 1.154	8.984	.003
2.	Concentration	2.74 ± 1.242	2.46 ± 1.203	1.107	.294
3.	Flexibility	2.36 ± 1.395	2.59 ± 1.400	.000	.985
4.	Self-discipline	2.59 ± 1.472	2.46 ± 1.203	5.957	.016
5.	Teacher's input	2.79 ± 1.783	2.38 ± 1.198	26.448	.000
6.	Workload	2.59 ± 1.454	2.67 ± 1.500	1.495	.223

7.	Resource Availability (Internet)	2.36 ± 1.503	2.33 ± 1.101	10.022	.002
8.	Resource Availability (Gadgets)	2.23 ± 1.432	2.31 ± 1.120	4.014	.047
9.	Time Management	2.46 ± 1.203	2.69 ± 1.565	3.435	.066
10.	Distraction level	2.49 ± 1.246	2.64 ± 1.520	2.137	.146
11.	Self-evaluation	2.59 ± 1.472	2.33 ± 1.255	4.336	.039

After the official announcement of lockdown in India we have to rely on the online education system and have only paved the way to pursue our education despite the ongoing crisis. The online mode of study, focus has been reduced (μ = 2.38) relative focus in offline classes (μ = 2.56), and according to current study results (Table 3). Focus seems to be very significant (p = 40.003) aligned with offline mode of study in the classroom. As accompanied by concentration, which is also observed to be decreased in online mode (μ = 2.46) rather than offline mode (μ = 2.74), but also if we think about the flexibility, we observed that relative to the classroom study (μ = 2.36), it was more in online mode (μ = 2.59) of study. This could be owing to the freedom to choose options or use multiple resources at a time. Whereas self-discipline was noted to still be strong in offline study mode instead of virtual classrooms, this could be due to respect regarding teacher and the classroom environment, but nobody can judge their personalities in virtual. It's just about the information being learned. It also can be concluded from the data that teachers receive high input in the academic setting (μ = 2.79), but it has been noticed to really be reduced in the online mode (μ = 2.38). A lot of effort has to be done by oneself in the virtual classes. The study materials or other resources that were easily accessible on college campuses, such as books, notes, etc., but things were to be managed all on their own with online classes. Thus, relative to the offline mode (μ = 2.59), the workload seems to be very high in the online mode of study (μ = 2.67). As we realize, we have to have a reliable internet connection for the online study mode, however this is the biggest virtual study concern. Time management was quite good in online mode (μ = 2.69) as compared to offline (μ = 2.46) because once the meeting is scheduled at a time, no excuses can be set for moving anywhere but in classroom study students and teacher both have flexibility with respect to time. It seems that managing online learning requires much more effort than regular classes. So the distraction level was found to be too high in online mode of study but the self -evaluation can be properly done in offline classes rather than online mode of study and these were highly significant.

Conclusions

The focus of this research was to identify the factors responsible for learning difficulties of university education using online and offline lecturer's responses. Even as the country is fighting against the pandemic, educators and students haven't yet betrayed their primary

responsibility for improving teaching and learning. Universities and higher education institutions have immediately turned to implementing virtual courses, online assignment submissions and teacher-student interactions with the lockdown of suspending courses at all schools, colleges and universities. Classes are also being taught online at schools, colleges and universities. In general, the present analysis suggests that there are several factors that are responsible for the difficulty in learning.

The findings from this study, therefore, the attributes of the participants resist their specific ability to learn due to their undesirable behaviours, family and socio-economic circumstances, psychological issues like less attention, low focus and concentration, technological problems like lack of gadgets, low internet connectivity and self-evaluation .

The study was designed to find out the problems online lecturers and students face in teaching and learning approximation in primary colleges of education.

After the analysis of the data collected, the following findings are summarized:

1. Students felt lack of focus, concentration, self-evaluation etc.
2. The Attitude of students' towards learning is very poor.
3. Time management is very poor
4. The online teaching and learning environment are not productive as compared to offline studies.
5. Lack of resources either technical or print media.

Limitations

Consequently, when evaluating the research outcomes, there are several other limitations to be mentioned. First, the specific structure of the analysis, such as the sampling method, is limited to only individuals with web access and English knowledge; the analysis may also restrict generalisation. Second, the research was carried over within a lockout time, which often has its own psychological effect.

Acknowledgement

The authors appreciated all the participants who have contributed to this research. The focus of this paper was to connect with students directly or through online means in order to receive the information about their online study experiences during the COVID-19 quarantine.

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Research Article

Efficacy of Digital Self Learning Material (SLM) on Blogging developed for Teacher Educators and Student Teachers

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Abstract

Blogging is one of the modern Information and Communication Technologies (ICTs) which is establishing its role as an important pedagogical tool. If Blogging has to be used for the said purpose, one should know the 'how-to-do-it'. A Digital Self Learning Material (SLM) on Blogging has been developed by the researchers which was shared with the purposely selected Teacher Educators and Student Teachers as an intervention. A Single group Pretest Posttest design was used for this study. Mean, Standard Deviation and t values were computed for the statistical analyses of pretest and posttest scores. Means of posttest scores for Teacher Educators (M= 19.267) as well Student Teachers (M=14.970) were observed to be almost double of the means of pretest scores (M=8.600 for Teacher Educators; M= 8.000 for Student Teachers). Computed t values (-11.674 for Teachers Educators and -11.092 for Student Teachers) were found to be much higher that the critical t values at 95 percent and 99 percent Confidence levels. A significant difference between the means of pretest and posttest scores of the sample proved the efficacy of the Digital SLM developed by the researchers.

Keywords: ICT, Digital Self Learning Material, Blogging, Teacher Educators, Student Teachers

Introduction

History has never witnessed mankind's connections as much as today. These endless connections could have been made possible only because of the electronic infrastructure called Information and Communication Technologies. Human lives have transformed personally and professionally due to these ICTs.

Blogging, which stands for the practice of writing a blog, is one of booming ICTs which has a global impact. Weblogs, or simply blogs, have seen considerable growth lately on the Internet. Blogs can be considered as an online digital diary which is used for recording of one's thoughts (Ray and Hocutt 2006). Blogging is characterized by documenting ideas through frequent online posts. It gives ample opportunities for self-expression, sharing, collaboration, cognitive as well as professional development. In addition to text, Blogs can also have

graphics, images, audio as well as video content.

There is a growing body of literature on using Blogs as an effective pedagogical tool (Churchill 2009; Stiler and Philleo 2003). Using blogs, podcasts, wikis have enabled students to showcase their creativity with the help of technology (Mapuva, Stoltenkamp, & Muyengwa, 2010). Using blogs for teaching and learning a.k.a. educational blogging is not a new phenomenon but in India, it is still in its infancy stage.

To start using a new technology, one should have the knowledge of that technology. With this aim in mind, researchers of this study have created a Digital Self Learning Material (SLM) on Blogging which gives learners theoretical as well as practical knowledge of blogging.

Literature Review

The concept of Blogging is not new. This technology took birth in the 1990s but it progressed slowly especially in India. When the talk is about the role of Blogging in pedagogical practices, it is yet to blossom here. Some international studies which highlight the usefulness of Blogging for Teachers and Students have been mentioned below. Blogging will take time to establish its role in Indian Education context. Researchers of this study intend to contribute to this direction.

Sevilay Cirak Kurt and Ibrahim Yildirim (2021) in their research study explored the role of blogging on the reflective thinking and self- efficacy of pre-service teachers and in addition to confirming the positive role of blogging on the aforesaid variables, it was also pointed out by the respondents that blogging contributed to their personal and professional development as well.

The study by Katia Ciampa and Tiffany L. Gallagher (2015) revealed that the use of blogs to promote collective inquiry by teachers has both advantages and challenges. The blog was seen by the participants in this study as a platform to promote the exchange of information, teaching methods, and appraisal practices, as well as networking between colleagues. Teachers who were reserved, introverted, and reflective were more likely to benefit from blogs. Participants faced some challenges too. These included low amounts of perceived utility and perceived ease of use, lack or inadequate amount of in-service teacher training on the use of the blog, time constraints, technological problems, etc.

The use of blogs as a reflective platform in the training processes of English as a Foreign Language (EFL) student teachers from Taiwan was explored by Shih-Hsien Yang (2009). These student teachers were learning English as a requirement for their future employment. They used blogs to critically reflect on their learning processes and for their professional growth.

The noteworthiness of blogging in pre-service teachers' professional learning was also found by Keith Turvey and Mike Hayler (2017) in their study. They found this practice significant in two ways - firstly, through its potential for collaboration and secondly, through its compatibility with a narrative conception of professional learning.

Hashem A. Alsamadani (2018) investigated the effectiveness of online blogging for students' individual and group writing skills. This study highlighted the role of Blogging in revolutionizing EFL pedagogy. This study also recommended that blogging should be made a part of writing classes and school curriculum.

Similarly, Jasminka Kochoska and Josif Petrovski (2017) investigated the importance of classroom blogs and their role in strengthening the connections between home, school and the world.
Serhiy Boltivets, Soumen Acharya and Agnes Santos (2018) in their paper discussed how blogging in an educational setting produces several benefits and they explored the disadvantages of blogging too in this setting.

In the chapter 2.1 Blogging of the book titled 'The K-12 Educational Technology Handbook', Poth, Fernando, Okoye and Karlin (2020) have identified the skills required to start and maintain a blog, mentioned the characteristics of good posts, explored the dangers and have suggested guidelines for safe blog use and finally they have highlighted the benefits of blogging with students.

Digging deep into the literature on the effectiveness of Self Learning Materials on Learning and Achievement, researchers observed that numerous studies in different fields or subject areas have been done in India as well as abroad that prove the effectiveness of SLMs consistently. A majority of them highlighted the convenience and freedom these SLMs offer to learners.

Research Question

From the studies above, it has been concluded that Blogging can be used as a great pedagogical tool if the stakeholders of education viz. Teachers and Students are made competent in this technology. For this said purpose, the researchers have made an attempt to enlighten Teacher Educators and Student Teachers on Blogging through the creation of Digital Self Learning Material. Though there is a lot of technical content available on Blogs and Blogging on the Internet, still there was a need for customized content specifically developed and having demonstrations from the own subject area of Teachers Educators and Student Teachers.

The research question that guided this study was that – Is there any significant difference in participant's theoretical and practical knowledge of Blogging after going through the Digital SLM?

Objectives of the study

Objectives of this research study were:

1. To develop Digital Self Learning Material (Text Module) for enlightening about the theoretical background of Blogging.
2. To develop Digital Self Learning Material (Video Module) for demonstrating the 'how-to' of Blogging through Google Blogger.
3. To check the efficacy of developed Digital SLM through single group pretest posttest design.

Methodology

Research Design

The present study used a single group

pretest posttest design. A Digital Self Learning Material (SLM) on Blogging has been developed by the researcher as an intervention.

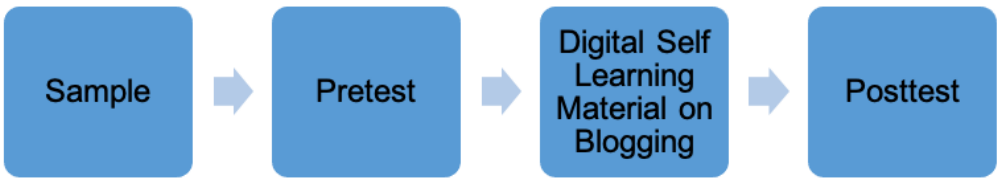

Figure-1: Experiment Design

Population

Teachers Educators and Student Teachers of Delhi NCR constituted the population for this study.

Sample

Sample consisted of 17 Teacher Educators and 52 Student Teachers (B.Ed. Students) from a Teacher Education Institute in Delhi NCR.

Sampling Technique used

Purposive sampling was used by the researchers to gather data. As Blogging is a Web 2.0 tool, the sample to be selected must have knowledge of Web 1.0. That was the reason for selecting the sample through purposive sampling.

Research Instruments

- Digital Self Learning Material: This consisted of a text module and two linked videos on Blogging as a pedagogical tool. Meaning & history of blog and blogging, types of a blog, structure and different components of a blog, Why should Teachers blog? – these all were covered in the Text Module and Part 1 of Video whereas Part 2 of Video demonstrated deeply how to create a blog, write a post, change the theme and layout of a blog and ultimately how to publish a post. This was demonstrated using 'Blogger' from Google. Selection of Google's Blogger for demonstration was finalized by researchers in another research study undertaken specifically to find the best representative application/ software/ service for the purpose.
- Pretest and Posttest: These were constructed using Google Forms. Both the tests have 20 equivalent multiple choice questions (Maximum Marks = 22) based on the theoretical and practical aspects of Blog and Blogging using Blogger from Google. Validity of the tests was established by experts and reliability of the tests was established by test-retest method.

Procedure

The duration of this study was three weeks. One week before the intervention, participants underwent a pretest. As a part of intervention, a text module having links to the videos on Blogging was given to the participants. They were asked to try their hands-on Blogging as demonstrated in the videos. At the end of the intervention i.e. after 2 weeks, participants were given the posttest.

Data Analysis

Pretest in the form of Google form was shared with the selected participants (17 Teacher Educators and 52 Student Teachers) one week before the intervention and all of them responded. But in the posttest, response rate was lesser. As a result, only the scores of those participants were considered who responded both to pretest as well as posttest (15 Teacher Educators and 33 Student Teachers). The same has been presented in Table 1 in the coming pages.

Figure-2 shows the pretest and posttest means for the group of participants (N=48) and more than double the increase is clearly visible in the posttest mean. In this case, the sample group was taken together as a whole.

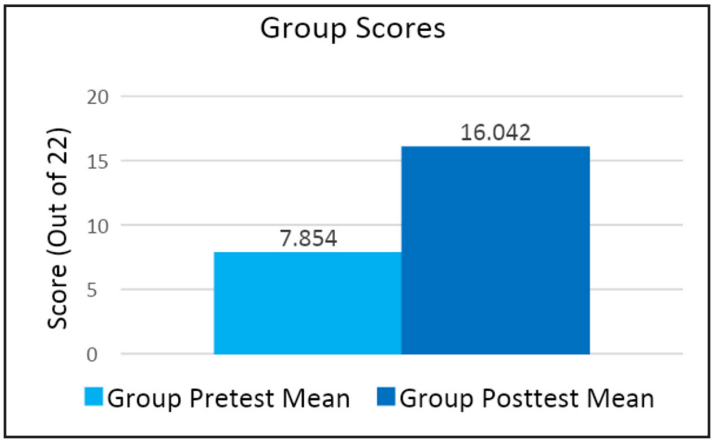

Figure-2: Group Pretest and Posttest Scores

Figure-3 represents the pretest and posttest means for the Teacher Educators (N=15). The pretest mean for Teacher Educators was 8.600 which increased to 19.267 in the posttest. This proves the efficacy of the intervention i.e. Digital Self Learning Material on Blogging.

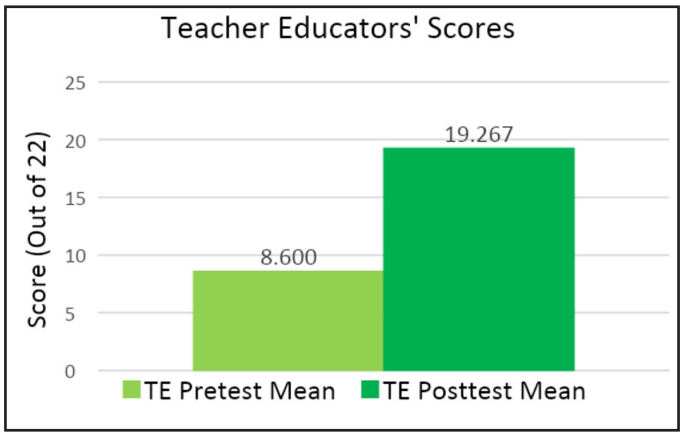

Figure-3: Teacher Educators' Pretest and Posttest Scores

Figure-4 shows the pretest and posttest means for the Student Teachers (N=33). The huge difference between the pretest mean (8.000) and posttest mean (14.970) point towards the sound quality of intervention.

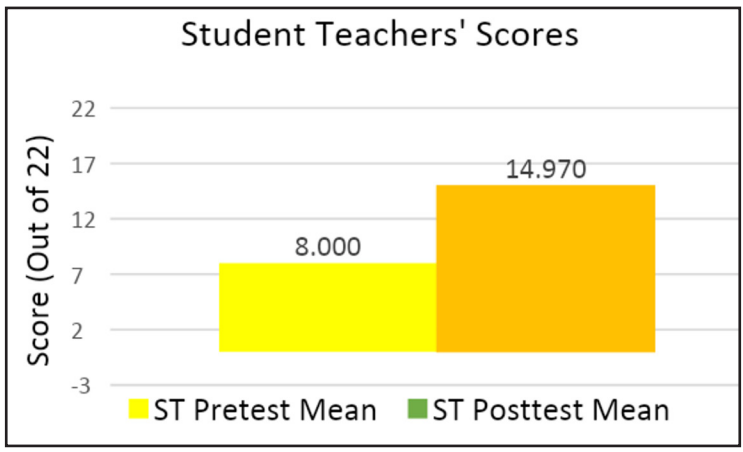

Figure-4: Student Teachers' Pretest and Posttest Scores

Figure-5 represents the compiled mean scores of the Group, Teachers Educators and Student Teachers. Increase in mean posttest scores is clearly visible in all the three cases.

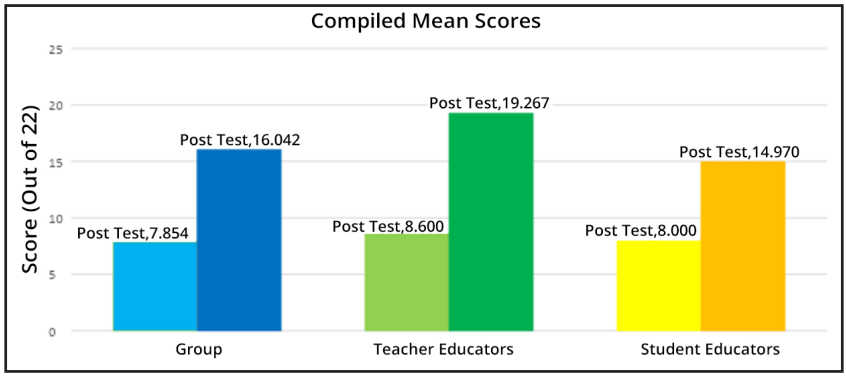

Figure-5: Compiled Pretest and Posttest Scores

Pretest and Posttest Mean scores and their Standard Deviations for the Group, Teacher Educators and Student Teachers are presented in Table-1. t values are computed for each and compared with the critical t values at 95 percent and 99 percent Confidence levels.

Sample	N	Pretest		Posttest		df	t value	Critical t value (at 95% Confidence Level)	Critical t value (at 99% Confidence Level)
		M	SD	M	SD				
Group	48	7.85	2.82	16.04	3.72	47	-14.899	+/- 2.011	+/- 2.684
Teacher Educators	15	8.60	2.52	19.26	1.98	14	-11.674	+/- 2.145	+/- 2.977
Student Teachers	33	8.00	2.79	14.96	3.48	32	-11.092	+/- 2.037	+/- 2.738

N= Number; M= Mean; SD = Standard Deviation; df = Degrees of Freedom

Findings

The researchers have developed a Digital Self Learning Material on Blogging and it was shared with a sample as an intervention. The efficacy of this Digital SLM is evaluated by the difference in the mean scores of pretest and posttest. Paired t test was applied to check the significance of difference of these means. Only the scores of those participants were considered who gave both pretest as well as posttest.

Data presented in Table-1 shows a clear and around double the increase in the mean scores of posttest over pretest in all the three cases of sample i.e. Group, Teacher Educators and Student Teachers. This difference in means can be credited to the efficacy of the Self Learning Material on Blogging developed by the researcher.

In the first case when the entire sample was taken as a Group (N=48), t value was calculated as -14.899 at df=47 using SPSS. The computed t value was found much higher than the corresponding critical t values at both 95 percent (t value = +/- 2.011) and 99 percent (t value = +/- 2.684) Confidence Levels. This means that the difference in the means of pretest and posttest is significant and the Digital SLM on Blogging is effective.

When only Teacher Educators (N=15) were taken as sample in the second case, t value was calculated as -11.674 at df=14 using SPSS. Again the trend was the same and the computed t value was found much higher than the corresponding critical t values at both 95 percent (t value = +/- 2.145) and 99 percent (t value = +/- 2.977) Confidence Levels. This is considered as a significant difference and the efficacy of Digital SLM on Blogging is proved.

In third scenario, when only Student Teachers (N=33) were taken as sample, again the similar pattern was observed and the computed t value (-11.0920 was found much higher than the corresponding critical t values at both 95 percent (t value = +/- 2.037) and 99 percent (t value = +/- 2.738) Confidence Levels. This difference is considered significant statistically and the efficacy of Digital SLM on Blogging as an intervention is proved.

Discussion of the findings

As the computed t value was found higher than the critical t value in all

the three cases of sample studied, this shows that the Digital Self Learning Material (consisting of a text module and two demonstration videos) developed by the researchers is successful in achieving the objectives for which this was made. After going through this SLM, participants could create a blog on their own and they shared their blog address in the posttest as well. This Digital SLM is effective in equipping the sample with Blogging skills.

Implications of the study

The Internet has been the source of information for ages now. Each one of us has taken so much from it. The time has come when we should think of contributing back to the internet. This is possible through content creation. Blogging is one of the booming technologies which can help in that. Not only this, Blogging also connects Teachers and Students virtually.

For this study, the researchers have created a Digital Self Learning Material on Blogging. The effectiveness of the SLM was confirmed by Teacher Educators and Student Teachers who participated in the study. This SLM can be used by one and all to learn the skill of blogging. As this is a SLM, one can learn as per his or her own convenience and time. Happy Blogging!!!

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Research Article

Assessment of English Language Oral Production Using CALF: an Automatic Analytic Tool for Complexity, Accuracy, Lexis and Fluency

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Abstract

This paper shows the evident lack of ICT based oral language production assessment tools and how the English language assessment in the State school education system is limited to testing the listening, reading and writing language skills. This paper projects four important factors which are proven to be effective indicators of an individual's oral language proficiency. This research paper explores the use of ICT in language assessment and explains the usage of CALF tool in depth which is an automatic analytic tool developed by Gavin Bui and Peter Skehan (2016) to analyse the complexity, accuracy and fluency of spoken language for research purposes. The study was conducted primarily to pilot the CALF tool and test its functionality in the context of interest for a research project. The CALF tool was piloted in a Government school in Tamil Nadu and the participants were learners of English as a second language from VI standard. A total of 15 students were present for all the sessions. The speech data of the learners were recorded, transcribed, coded and uploaded in the CALF system for obtaining the indicative measures of complexity, accuracy, lexical and fluency in English language production. The recorded speech data was analysed twice and the Intraclass Correlation Coefficient (ICC) was obtained using SPSS to establish the reliability of the CALF tool. The obtained ICC value of 0.955 proved an excellent level of conformity in the Complexity, Accuracy, Lexical and Fluency measures derived from the CALF system. The study most importantly exhibits the potential of the CALF tool to be added as a significant online language production assessment tool with further advancement research on the transcription and coding stages.

Keywords: CALF tool, ICT in language assessment, English Language Oral Production

Introduction

The English language production skills are one of the least assessed and focused skills in English language teaching spaces in the school education. "In a society where English proficiency guarantees economic and social upward mobility, much greater investment in research that informs policy and practice is necessary but does not seem to be forthcoming" (Ramanathan, 2016). The Draft National Educational Policy (2019) clearly expresses the desire to promote high accessibility and quality in English language education in India

in all government and non- government schools "to help break the current divide between the economic elite and the rest of the country, in addition to teaching Indian languages" with the focus on functionality and fluency (p. 82).

There's a huge dissimilarity in terms of English language proficiency between the different types of schools (NCERT, 2006, p.2) which are primarily categorized on the basis of two factors such as teachers' English language proficiency (TP) and English in the environment for language acquisition (EE). Ignoring these two factors, the state government of Tamil Nadu prescribes a common English language curriculum for students from the English and Tamil medium schools. There is no compromise done in terms of syllabus planning and textbook designing for the lack of both exposure to the target language and opportunities to use the language among the students from the Tamil medium schools. With the given conditions of limited teachers' proficiency and students' exposure to English language, it needs to be made sure that the amount to which the students are exposed to the target language and the amount to which they are made to produce the target language inside the classroom space is optimum.

A general review of the Tamil Nadu Government's English language curriculum, syllabus and textbooks reveal that the teaching and learning processes are inclined towards developing the English language receptive skills. Under productive skills, writing skills are given more importance when compared to the speaking skills. English language assessment models in school education also reflect the same patterns of testing where maximum focus is given on content knowledge, the grammar and the writing skills of the students. The speaking skills of the students remain ignored throughout the school education both in teaching and assessment. Most common reasons cited for the absence of English language oral or speech assessment in the English language curriculum is the lack of time and effective oral assessment tools. As a result, the speaking skills of the students to a large extent develop implicitly depending on the amount of language input they are exposed to inside and outside English language classrooms.

There is a need for establishing the most suitable English language production assessment tool for applied linguistics research purposes to facilitate the examination of language teaching approaches or methods. In the present curriculum of Tamil Nadu State Syllabus, the idea of testing the production skills is non-existent. It is the need of the hour to explore the available speaking assessment models and to find if they can be adapted and be simplified to later develop something that would suit the English language classroom requirements. To achieve this, the assessment models need to be researched and piloted in the respective contexts. It is also important to establish the reliability and validity of these assessment tools to look for adaptation ways. This paper presents the piloting of CALF: An Automatic Analytic Tool for Complexity, Accuracy, Lexis and Fluency developed by Gavin

Bui and Peter Skehan in the year 2016 in a Government school in Tamil Nadu to measure English language oral production.

English Language Oral Production

English language production is the production of spoken or written language. The researcher would be using the speech output as the testing variable. The oral language output from the students would be used to measure the progress in language learning. Complexity, Accuracy and Fluency (CAF) are language performance descriptors and are widely used in second language research in recent times as an alternative to standardized proficiency tests. CAF are "dimensions for describing language performance, most frequently used as dependent variables to assess variation with respect to independent variables such as acquisitional level or task features" (Pallotti, 2009, p. 590). The task performance was defined by the dimensions of complexity, accuracy and fluency based on the Task-based language teaching approach (TBLT). It is important to establish the relationship between the teaching approach and assessment model to explain the suitability of the assessment model and also to project the constructs of assessment in an integrated manner. In simple terms it is to show whether the learners are tested based on what they were taught or exposed to in the language syllabus. The language teaching approach that is dominantly present around the world and specifically in the State government school syllabus is task-based language teaching. Skehan (1996) proposed a framework for the implementation of task- based instruction which was designed in such a way that it is highly favourable towards achieving complexity, accuracy and fluency (CAF). He stated that CAF are the most relevant goals for task-based instruction.

Constructs

Complexity

Complexity is essentially "the extent to which the language produced in performing a task is elaborate and varied" (Ellis, 2003, as cited in Housen and Kuiken, 2009, p.461). L2 complexity can be subdivided into cognitive complexity and linguistic complexity. "Both types of complexity in essence refer to properties of language features (items, patterns, structures, rules) or (sub) systems (phonological, morphological, syntactic, lexical) thereof" (Housen and Kuiken, 2009, p.463). Linguistic complexity in TBLT refers to how differently and distinctly learners are able to phrase their language based on number and length of clauses (t- unit) and a range of grammatical structures. "A T-unit is an independent clause and any associated dependent clauses, that is, clauses that are attached to or embedded within it" (Larsen- Freeman, 2006, p. 597). The linguistic complexity can be further divided into grammatical complexity and lexical complexity. Grammatical complexity is the "average number of clauses per T-unit" (Larsen- Freeman, 2006, p. 597) and lexical complexity is "a sophisticated type-token ratio, word types per square root of two times the words" (Larsen- Freeman, 2006, p. 597).

Accuracy

Linguistic accuracy refers to how well the learners abide by the structural rules of the target language. Accuracy is "the ability to produce error-free speech" (Ellis, 2003, as cited in Housen and Kuiken, 2009, p.461). "It is the degree of conformity to certain norms" of a particular language (Pallotti, 2009, p. 592). Grammatical Accuracy is defined as "the proportion of error-free T-units to T-units" (Larsen- Freeman, 2006, p. 597). There are many kinds of grammatical errors, namely the subject-verb agreement, tense usage, article usage and punctuations. There are accordingly specific measures to gauge these different types of errors and the general measures to produce one value which is representative enough of all kinds of errors in language production (Bui & Skehan, 2018).

Fluency

Linguistic fluency refers to the ease of communication and the smooth delivery of the intended message. Fluency is "the extent to which the language produced in performing a task manifests pausing, hesitation, or reformulation" (Ellis, 2003, as cited in Housen and Kuiken, 2009, p.461). It is also defined as the "capacity to produce speech at normal rate and without interruption or as the production of language in real time without pausing or hesitation" (Pallotti, 2009, p. 591). Fluency is measured as the "average number of words per T-unit" (Larsen- Freeman, 2006, p. 597). Linguistic fluency can further be divided into cognitive fluency and uttered fluency. Cognitive fluency refers to the extent to which the learner has a clear understanding of the message to be delivered and the extent to which it is planned and structured in the learner's before the delivery of the speech. Utterance fluency is the actual language performance and that is the component that can be measured. The utterance fluency is gauged using the indices such as number of words per T-unit or minute, the frequency and length of speech, repetitions, reformulation, replacements and false starts.

CALF: An automatic analytic tool for complexity, accuracy, lexis and fluency

The CALF tool which is an automatic analytic tool for analyzing the complexity, accuracy and fluency of spoken and written language was developed by Gavin Bui and Peter Skehan (2016). The written or spoken language data need to be transcribed and coded in a specific way and then be updated on the CALF main system. On the system, the coded files will be processed and give an output of a range of measures of complexity, accuracy, lexis and fluency. It is important to note that the CALF measures are not accurate measurements of learners' oral language proficiency. These measures are only indicative of the English language proficiency based on the transcribed data. These measures can primarily be used for research purposes in applied linguistics and also can further be developed and automated for efficient gauging of English language production.

A detailed demonstration of the way in which the spoken data is transcribed

and coded is provided in the data analysis and interpretation section.

Participants

The participants in the study were sixth grade students from the government higher secondary school in Tamil Nadu, India. The number of participants was 15 and the medium of instruction is Tamil. In conversation with the students it was observed that the students understood what was being said to some extent when communicated slowly and with repetitions. When the students were involved in general everyday conversations they were hesitant to reply and communicated certain messages only through the utterance of words with no grammatical structure. The learners' vocabulary size was observed to be very limited and there were severe punctuation problems where groups of sentences were uttered without any pauses by the end of each sentence. Errors were committed in areas of subject-verb agreement and tense usage.

Procedure

The pilot study was conducted in a Government Higher Secondary Tamil Medium School in Coimbatore with the permission of the City Educational Officer. The researcher got the consent of both the teacher and the students to record the class and informed them how it would be used for research purposes. The pilot study happened over three weeks' time and the researcher got to interact with the students during the English language classes. Each period was for duration of 40 minutes. In the first two classes the researcher was present in the English language classes to get acquainted with the students and the teacher. The researcher even assisted the teacher in the transaction of a prose lesson in Term III. In the third class (in the absence of the English language teacher) the researcher individually developed conversations with the students to obtain a general idea of their proficiency level. The casual conversation was staged to also break the ice in order to create a favorable environment for language production in the latter classes.

In the next class the students were asked to assemble in the verandah where some of their classes usually happen and were asked to sit together. The change of setting was carried out to bring down their effective filter levels. The researcher sat along with them and introduced herself to the learners. To provide the students a little of content clarity and fluency they were guided with what topics can be covered in their self- introduction. The students were asked to talk about their city, family, friends, favourite food, favourite stars and hobbies. The students were asked to talk in random order and the entire class was recorded.

Procedure for CALF Analysis

The complexity, accuracy, lexis and fluency of the spoken data were measured using the CALF tool through the following four stages.

i) Recording

The researcher recorded the entire class sessions and the participants' oral speech. The students were given identification numbers and their audio

speech files were categorized and labeled with their roll number. A total of 15 audio files were segregated (1 each participant) and were stored in folders according to the participants roll numbers. Later the oral speech of each of the participants was transcribed into plain texts.

ii) Transcription

The next stage was the transcription of the spoken data using the CHAT (Codes for Human Analysis of Transcripts) (MacWhinney, 2000). The CALF system requires the spoken data to be transcribed in the CHAT format to process the input in an efficient manner. Brian MacWhinney (2000) developed a specific transcription format for transcribing child's talk which was one the two components of the CHILDES project which aimed to develop tools for analyzing talk. The CHAT system prescribes a set of coding features which facilitates the analysis of data using the CLAN software. The three main components of the CHAT format are the file headers, the main tiers and the dependent tiers. The headers give important information of the transcribed data namely the participants, the setting, the time and the details of the coder and the participants. The header files are followed by the four block tiers where the students' speech is transcribed into individual AS-unit tiers. The three tier block for single utterances is

*ID: <tab>- "The pruned line. Utterance transcribed into words without dysfluencies or pauses or any grammatical marking." (Bui & Skehan, 2016, p. 4)

%snd: <tab>- "The duration line. This line indicates the start and end of the utterance in that AS- unit." (Bui & Skehan, 2016, p. 4)

%ID: <tab> - "The main working line. This line includes all dysfluencies and pauses in the actual speech recorded, and syntactic marking." (Bui & Skehan, 2016, p. 4) The main working line is coded using the CHAT format.

The second line which is an automatically generated one will be explained in the next section.

iii) Coding

The main line is coded for fluency (including repairs, fillers, pseudo filled pauses, timing), complexity, accuracy and lexis following the user manual provided by Bui and Gavin (2016). The coded transcription (*ID, %snd, %ID in the AS-unit tiers) is then uploaded in the CLAN software to obtain the %mor. The second line in the four block tier is %mor and is generated automatically by the CLAN software when the transcription is run on CLAN with the command (see Appendix A). The %mor line produces the part-of-speech (POS) to each and every word in the transcription from the pruned line. Since it is automatically generated, the authors advise the POS tagging needs to be manually checked for ensuring accuracy in the result.

iv) Output

The final stage in the analysis is to drop the completed CLAN (txtin.cha) file in the CALF system. The system produces a range of results under Complexity, Accuracy, Lexis and Fluency. The output from the CALF tool is derived in five sections (see Appendix B). The first

section is called the 'Basic Statistics' where the total words, total pruned words and total time is listed down. The rest four sections are Complexity, Accuracy, Lexical and Fluency measure sections. The complexity section based on the coding done on the speech data produces information such as number of AS units, total number of clauses, number of independent and dependent clauses, number of before and after clauses, ratio of clauses per AS unit, number of pruned words per AS unit and number of words per clause. The Accuracy section provides data on the ratio of error- free clauses, errors per 100 words, syntactic, morphological, lexical, phonological discourse and pragmatic errors per 100 words.

The lexical section of the CALF system provides data on the significant F- score and lexical density. The fluency measures that are derived out of the output are raw speech rate, pruned speech rate, mean length of run, phonation time, number of mid-clause pauses and silences per 100 words, number of independent and dependent clause pauses, clause silence and average clause length. It also provides data on number of filled pauses, pseudo filled pauses, false starts, reformulations, repetitions and replacements.

For this study, the researcher has chosen the distinctive indicative measures of Complexity, Accuracy, Lexical and Fluency as defined in the 'constructs' section of the paper. Under the complexity section, the two measures that are taken into consideration for the analysis are number of AS Units (T- units) and the ratio of clauses per AS unit. The accuracy of the speech data is assessed by the ratio of error- free clauses and number of errors per 100 words which is comprehensive of syntactic, morphological, lexical and phonological errors. The F- score stands as a whole representative of the lexical measure and the raw speech rate stands for the fluency in the speech.

Reliability of CALF tool

The CALF tool being a measurement tool of the complexity, accuracy, lexis and fluency of the language data, the data was coded twice at an interval of two weeks and the results were tabulated. Since the nature of the measured data is of continuous type and because the speech data sample was the same in two different administrations, Intraclass Correlation Coefficient (ICC) was used to establish the reliability of the CALF tool in SPSS (see Table-1). The model adopted in the correlation is model 3 as the raters of interest were of only the researcher and it was two-way mixed.

Table-1: Details of Respondents

	Intraclass Correlation[b]	95% Confidence Interval			F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2	Sig

Single Measures	.914a	.765	.970	22.317	14	14	.000
Average Measures	.955c	.867	.985	22.317	14	14	.000

As seen in Table 1, a high degree of reliability was found between the CALF measurements. The average measure ICC was .955 with a 95% confidence interval from .867 to .985 (F (14, 14) = 22.317, p<0.001). ICC value of 0.75 and upwards shows excellent level of conformity.

Discussion

The data obtained from the CALF system could be of great significance for measuring the oral proficiency of the participants for research purposes. In cases of development or proposal of specific pedagogical methods targeting improving the students' language oral proficiency, CALF tool could indeed be a great way to establish its effectiveness. Though the present study is highly limited in terms of sample size and context, it is safe to state that the CALF tool has the potential of replacing the numerable speaking rating scales which are qualitative, subjective and generic in nature when compared to the distinct indicative measures obtained from the CALF system.

The CALF tool cannot be taken to classroom spaces directly as the process involved in transcribing and coding the speech data is extensive. However, the CALF tool with further research can be made into an essential assessment tool in English language school education by automating the transcribing and coding stages in deriving the oral proficiency measures. In that way, the present lack of oral production assessment in the curriculum design could also be at a later point bridged through optimization of the CALF tool. A tool like CALF is very much in alignment with the National Education Policy 2020 where the organized education system is taking steps forward in this digital era by promoting virtual classes. In such a scenario CALF could prove to be an immense value in the ICT integrated online assessment of the English language production.

Conclusion

Oral speaking assessment of English language in school education is a topic that has been ignored in education policies and has resulted in severe repercussions on the English language proficiency level in the students and inequity in English language education in the country. This paper introduced the four main oral language constructs which are globally approved by the applied linguistics research fraternity. The relatively new automatic analytic tool for measuring the complexity, accuracy, lexis and fluency of oral production is piloted in a context of interest in the study. The CALF tool was piloted in the Government schools in Tamil Nadu among the sixth standard students over a period of three weeks. The students' speech data on a specific

topic was recorded, transcribed, coded and analyzed twice to obtain the indicative measures of complexity, accuracy, lexis and fluency. The Intraclass Correlation Coefficient (ICC= 0.955) was obtained from SPSS on the CALF measures and the results showed excellent level of conformity (0.75 and upwards), thereby establishing the reliability of the tested tool. The research paper has in detail demonstrated the use and reliability of an ICT based resource for testing the efficacy of oral language proficiency target teaching and learning English language education pedagogies for research purposes. It also has established the need to bring in advancement in the CALF tool which could possibly be an effective tool for instantaneous oral language assessment tool for school education and professional language eligibility examinations.

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Appendix A

A Sample of the Coded Speech Data

@Begin
@Languages: eng
@Participants: ARV Participant
@ID: eng|text|ARV||male|||Participant|||
@Time Start: 00:00:00
*ARV: My name is Aravind .
%mor: n:prop|My n|name cop|be&3S n:prop|Aravind .
%gra: 1|2|MOD 2|3|SUBJ 3|0|ROOT 4|3|PRED 5|3|PUNCT
%snd: <00:00:00><00:01:00>
%ARV: My name is Aravind .errfr ::: |
*ARV: VIth standard Kurichi School .
%mor: n:prop|VIth n|standard n:prop|Kurichi n:prop|School .
%gra: 1|2|MOD 2|0|INCROOT 3|4|NAME 4|2|APP 5|2|PUNCT
%snd: <00:01:00><00:03:00>
%ARV: VIth standard Kurichi School .err_a_s ::: |
*ARV: Mother name Jaya .
%mor: n:prop|Mother n|name n:prop|Jaya .
%gra: 1|2|MOD 2|0|INCROOT 3|2|APP 4|2|PUNCT
%snd: <00:03:00><00:06:00>
%ARV: er (1.0) Mother name (0.90)) Jaya .err_s_s ::: |
*ARV: Dad name John .
%mor: n:prop|Dad n|name n:prop|John .
%gra: 1|2|MOD 2|0|INCROOT 3|2|APP 4|2|PUNCT
%snd: <00:06:00><00:11:00>
%ARV: er (1.0) Dad {name} * name er (2.0) John .err_s_s ::: |
*ARV: Age eleven.
%mor: n:prop|Age .
%gra: 1|0|INCROOT 2|1|PUNCT
%snd: <00:11:00><00:27:00>
%ARV: er (10.0) Age # eleven .err_s_s err_m_p ::: |
*ARV: Friends Santhosh, Guruprasad, Hariharan, B Santhosh, Saran, Aravind .
%mor: n:prop|Friends n:prop|Santhosh cm|cm n:prop|Guruprasad cm|cm n:prop|Hariharan cm|cm n:prop|B n:prop|Santhosh cm|cm n:prop|Saran cm|cm n:prop|Aravind .
%gra: 1|2|NAME 2|0|ROOT 3|2|LP 4|2|ENUM 5|2|LP 6|2|ENUM 7|2|LP 8|9|NAME 9|2|APP 10|9|LP 11|2|ENUM 12|11|LP 13|2|ENUM 14|2|PUNCT
%snd: <00:27:00><00:39:00>
%ARV: er (6.0) Friends er Santhosh er Guruprasad er Hariharan B er Santhosh Saran Aravind .err_s_s ::: |

*ARV: Rasagulla .
%mor: n:prop|Rasagulla .
%gra: 1|0|INCROOT 2|1|PUNCT
%snd: <00:39:00><00:43:00>
%ARV: (3.0) Rasagulla . err_a_s ::: |
*ARV: Cartoon .
%mor: n:prop|Cartoon .
%gra: 1|0|INCROOT 2|1|PUNCT
%snd: <00:43:00><00:54:00>
%ARV: (4.0) Cartoon . err_a_s ::: |
*ARV: Police miss .
%mor: n:prop|Police n|miss .
%gra: 1|2|MOD 2|0|INCROOT 3|2|PUNCT
%snd: <00:54:00><00:58:00>
%ARV: er(2.0) Police er (2.0) miss . err_a_s ::: |
@End

Appendix B

A Sample of the Output Derived from CALF Tool

Basic Statistics

1	Total words	36
2	Total pruned words	27
3	Total Time	0.966667

Complexity Section

4	Number of AS Units	9
5	Total number of clauses	9
6	Number of independent clauses	9
7	Number of dependent clauses	0
8	Number of before dependent clauses	0
9	Number of middle embedded dependent clauses	0
10	Number of after clauses	0
11	Ratio of clauses per AS unit	1
12	Number of pruned words per AS unit	3
13	Number of words per clause	3

Accuracy Section

14	Ratio of error-free clauses	0.111111
15	Errors per 100 words	18.51852
16	Syntactic errors per 100 words	14.81481

17	Morphological errors per 100 words	0
18	Lexical errors per 100 words	0
19	Phonological errors per 100 words	3.703704
20	Discourse errors per 100 words	0
21	Pragmatic errors per 100 words	0

Lexical Section

22	F-score	52.5
23	Lexical Density	18.51852

Fluency Measure

27	Raw Speech Rate	37.24138
28	Pruned Speech Rate	27.93103
29	Mean Length of Run	1.588235
30	Phonation Time	0.45
31	Number of Mid-Clause Pauses per 100 words	37.03704
32	Average Mid-Clause Pauses Length	0.8613
33	Mid-Clause Silence Total per 100 words	118.1481
34	Number of Independent Clause Pauses per 100 words	0
35	Average Independent Clause Pause Length	0
36	Independent Clause Silence Total per 100 words	0
37	Number of Dep. Clauses Pauses per 100 words	0
38	Average Dependent Clause Pause Length	0
39	Dependent Clause Slience Total per 100 words	0
40	Number of Filled Pause per 100 words	0
41	Number of Pseudo Filled Pauses	0
42	False Starts per 100 words	3.703704
43	Reformulation per 100 words	0
44	Repetitions per 100 words	3.703704
45	Replacements per 100 words	0

Research Article

A Moodle Based Case Library to Foster Ability to Solve Classroom Management Problems for Beginner Teachers

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Abstract

Knowingly or unknowingly, teachers use problem solving skills in the classroom for a range of ill-structured problems as that of classroom management. The researcher was interested to find out whether Case Based Reasoning to foster Ability to solve Classroom Management Problems hosted on a Moodle based virtual learning environment is beneficial to the in-service teacher training of beginner teachers or not? In the present study the Case Library consists of prior experiences as Cases in the form of stories enriched with scaffolds which include cartoons, hint questions, excerpts of underlying theory and expert solutions that help the learner to understand the problem and design their own alternate solutions to the problem. The present study is an experimental study in which pre-test post-test non-equivalent group design is used. The population for the present study is high school teachers teaching in Government and Government-aided schools of Kerala, India. To conduct the experiment, 46 teachers with an experience of 10 years or below were selected conveniently. Out of which 20 teachers were in the control group and 26 were in the experimental group. The teachers in the experimental group were required to take part in an online course on Case Based Reasoning using a Case Based Library on a Moodle platform. The findings of the study revealed that, there was a significant mean difference in Ability to solve Classroom Management Problems between experimental and control groups. The present study suggests the use of Case Based Reasoning instructional module for solving Classroom Management Problems.

Keywords: Moodle, Case Based Library, Ability to solve Classroom Management Problems, Case Library

Introduction

Problem solving is a difficult and an intricate way of learning (Jonassen & Serrano, 2003). It is a cognitive ability in which correct or appropriate processing of mental information is critical to successful performance (Carroll, 1993). Cognitive tasks are mental processes that function to produce a thoughtful response. These tasks may be reasoning, problem solving, planning, organizing, abstract thinking, etc. Therefore, problem solving ability is a person's cognitive capability to understand the nature of problems and take actions to solve them accordingly.

Classroom management, including both instructional and behavioural

management, is a significant issue for teachers, school leaders, system administrators and the public (Egeberg, McConney& Price, 2016). Classroom management is the process of ensuring that classroom lessons run smoothly despite disruptive behaviour by students (Al-Zu'bi, 1988). It is important that teachers need to be trained in managing classroom processes as well as content.

Classroom management is all of the things that a teacher does to organize students, space, time and materials so that student learning can take place (Wong & Wong, 2014). Effective teaching and learning cannot take place in a poorly managed classroom. Marzano, Marzano and Pickering (2003) called teachers as 'classroom managers' who solve numerous problems ensuring successful knowledge transfer. Knowingly or unknowingly, teachers use problem solving skills in the classroom for a range of ill-structured problems as that of classroom management. Case based reasoning could be one of the wonderful ways to tackle ill-structured problems. "Case-based reasoning means using old experiences to understand and solve new problems" (Kolodner, 1992). Case Based Reasoning (CBR) addresses issues in memory, learning, planning and problem solving (Slade, 1991). Kolodner (1992), explained that the efficient way to solve ill-structured problems is through Case Based Reasoning.

As Jonassen (2011) explains, "Cases, (a) as problems to solve are instances of problems that will be the focus of learning, (b) as worked examples are instances of the process for solving well-structured problems, (c) as case studies are instances of how others have solved ill-structured problems, (d) as analogies are instances of structurally similar problems, (e) as prior experiences are descriptions of previously solved problems that are reminded by the problem to be solved, (f) as alternative perspectives are instances of different perspectives on the problem to be solved, (g) as simulations are interactive instances of the problem to be solved that can be experimented with by learners".

Cases are stories and to solve these Cases certain scaffolds are necessary such as theoretical inputs, prior experiences, worked examples, expert opinions, etc. which create a Problem-Solving Learning Environment.

The researcher is interested to find out whether Case Based Reasoning to foster Ability to solve Classroom Management Problems hosted on a Moodle based virtual learning environment is beneficial to the in-service teacher training of beginner teachers or not? The reason why the researcher chose the Moodle platform is that Moodle has a greater reach and could teach Case Based Reasoning to solve Classroom Management Problems without organizing face to face learning sessions. Therefore, Moodle platform will allow these beginner teachers scattered geographically to access the instructional materials at their own time. Also, teachers need not be taken away from their classes.

The study will focus on these following research questions:

1. What effect does online Case Based Reasoning have on the abilities of in-service teachers in solving the Classroom Management Problems?
2. What will be the attitude of beginner teachers towards employing online Case Based Reasoning in solving Classroom Management Problems?

Jonassen (2011) explains Case Library as, "stories that are made available to learners. The stories in the library are indexed in order to make them accessible to learners when they encounter a problem. Those indexes may identify common contextual elements, solutions tried, expectations violated, or lessons learned. Each experience in a case library represents the experiences that others have had while trying to solve problems". In the present study the Case Library consists of prior experiences as Cases in the form of stories enriched with scaffolds which include cartoons, hint questions, excerpts of underlying theory and expert solutions that help the learner to understand the problem and design their own alternate solutions to the problem.

Cases are instances of anything from a sentence-level or pictorial example to a complex, multi-page case study to a complex simulation of a problem. Problems, worked examples, case studies, structural analogues, prior experiences, alternative perspectives, and simulations are all examples of cases (Jonassen, 2011). In the present study, a Case is a real-world classroom management experience elicited from a beginner teacher and crafted carefully into the structure of an intriguing story snippet.

According to Kolodner (1992), "Case-based reasoning can mean adapting old solutions to meet new demands; using old cases to explain new situations; using old cases to critique new solutions; or reasoning from precedents to interpret a new situation or create an equitable solution to a new problem".

A Classroom Management Problem is the felt difficulty of teachers when they attempt to realize instructional objectives in the classroom, when; (a) a teacher cannot control emotions while students misbehave, (b) a teacher cannot manage a student who misbehaves, (c) a teacher cannot manage students owing to lack of moral development, (d) a teacher cannot manage a group of students who misbehave, (e) a teacher cannot manage students owing to ineffective teaching-learning method, (f) a teacher cannot manage students with psychological problem, (g) a teacher cannot manage students owing to lack of infrastructure.

Methodology

The present study is an experimental study in which pre-test post-test non-equivalent group design is used. The experimental and control group consisted of beginner teachers who were identified purposefully from different schools of the State of Kerala, India. The population for the present study is high school teachers teaching in Government and Government-aided

schools of Kerala, India. To conduct the experiment, 46 teachers with an experience of 10 years or below were selected conveniently. Out of which 20 teachers were in the control group and 26 were in the experimental group.

To develop the Case Library, the investigator interviewed beginner teachers (with a teaching experience of up to10 years) from Aided and Government High Schools of the State of Kerala, India. For this a semi-structured interview schedule was constructed to elicit real life experiences from the beginner teachers that could be turned into Cases of Classroom Management Problems.

The researcher interviewed 150 beginner teachers from 6 out of 14 districts of the State of Kerala, India. All the teachers were interviewed individually. The average time taken to interview a beginner teacher was around 25 to 30 minutes. The researcher audio recorded the interview only after the consent from the beginner teacher. The interviews were conducted in a closed room where the beginner teachers were given absolute privacy from their co-workers and superiors, so they could without fear share their uneasy experience with the researcher. These cases were crafted into engaging stories without losing the reality of the case but enriching the readability, and often reserving the climax of the problem to appear in the last paragraph of the story.

The researcher after discussions with experts and review of literature understood that for a Case Based Reasoning system to work properly, a Case Library is necessary to store all the Cases (Stories) and its associated paraphernalia. Therefore, the investigator designed this Case Based Problem Solving Learning Environment on the principles and theories put forward by Schank (1982), Kolodner (1992), Aamodt and Plaza (1994), Jonassen (2007, 2011) and others.

After collecting relevant Cases during the first phase, the investigator defined the raw and scattered information given by the beginner teachers into Cases (Stories). Later, the investigator indexed these Cases into several themes and identified teaching moments and associated cases. The investigator identified seven themes on which all the Cases on Classroom Management Problems could be grouped into. The seven themes were:

Theme 1: A teacher who cannot control emotions while students misbehave. Theme 2: A teacher who cannot manage a student who misbehaves. Theme 3: A teacher who cannot manage students owing to lack of moral development. Theme 4: A teacher who cannot manage a group of students who misbehave. Theme 5: A teacher who cannot manage students owing to ineffective teaching-learning methods. Theme 6: A teacher who cannot manage students with psychological problems. Theme 7: A teacher who cannot manage students owing to lack of infrastructure.

All the elicited cases from beginner teachers were unresolved problems. Only experts in the field could give guidelines to solve them using their year long experience and problem solving skills. The case library is incomplete

with solutions. Therefore the researcher interviewed experienced teachers and teacher educators to draw out solutions on the Cases collected from the beginner teachers. The reason for this is, the researcher argues that, during their exceptionally long years of service until now, the experienced teachers may have encountered similar cases earlier and may have been successful in applying the solution. Even if they have not encountered a similar Case in the past, they can use their experience to solve the problem defined in the Case.

We selected connoisseurs with long years of experience (at least 30 years), presidential or state government awardees in teaching, experienced teachers with exceptional repertoire of contributions to the society, one who is or had been involved in the training of in-service teachers, one who has served in various capacities as members of curriculum and textbook development in the State, etc. to hear the cases we elicited from beginner teachers and we sat with them to craft solutions or guidelines to solutions.

These expert solutions were attached to the associated cases, so that the beginner teacher could take insights, inspirations and understand the characteristics of a solution while learning to solve the problem in the teaching moment.

Thereafter scaffolds were added into the Case Library. The scaffolds here are those which help the learner to get acquainted with the teaching moments and the associated cases. It also helps in understanding the problem to be solved. The three scaffolds are:

Hint Questions: These multiple-choice questions were asked after reading the teaching moment where it set the tone for solving it. There were six hint questions which the beginner teacher had to answer. The questions are: (1) According to your viewpoint, what is the nature of the teacher in this Case? (2) How did the problem begin in the Case according to your viewpoint? (3) Were there any symptoms of the Classroom Management Problem? (4) Was there a critical incident which was related to classroom Management? (5) Who is the real problem maker in this case? (6) How did the teacher think to act in this case?

Cartoons: The cartoons should depict the critical situation contained in the problem. They also help the learners to align themselves with the problem situation. A visual, especially comic in nature, makes the problem solver at ease and helps to keep his/her cool while attempting the problem.

Underlying Theories: The underlying theories are those psychological theories that are associated with the teaching moment. While embedding the theories into the Case Library, it was kept in mind that statements were neither technically worded nor were they realistically simple to suggest the solutions straightaway.

Finally, there were seven Problem-Solving Learning Environments (PSLEs). Each PSLE meant one introductory case used as the teaching moment along with scaffolds and three associated cases with expert solutions. According to Jonassen (2011), Problem Solving Learning Environments (PSLEs), "assume that learners must engage

with problems and attempt to construct schemas of problems, learn about their complexity, and mentally wrestle with alternative solutions" (p. xxi).There are seven Problem Solving Learning Environment (PSLEs) based on the seven Themes. Figure-1 depicts one of the Problem Solving Learning Environment (PSLE). "assume that learners must engage with problems and attempt to construct schemas of problems, learn about their complexity, and mentally wrestle with alternative solutions" (p. xxi).There are seven Problem Solving Learning Environment (PSLEs) based on the seven Themes. Figure-1 depicts one of the Problem Solving Learning Environment (PSLE).

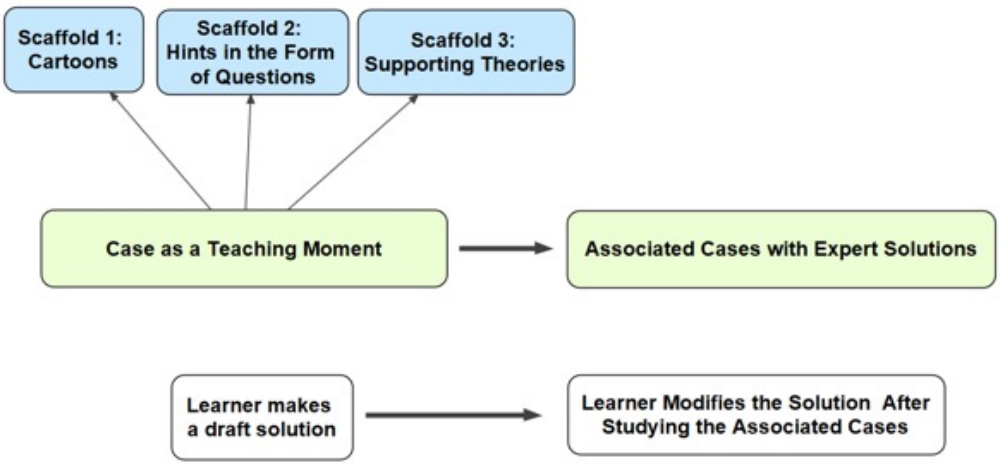

Figure-1: Problem Solving Learning Environment of Theme 1- A teacher who cannot control emotions while students misbehave.

Developing a Module with a Set of Seven Themes on Moodle Platform

Moodle is a Virtual Learning Environment (VLE) that is based on open source principles and the educational philosophy called social constructivism. It is a free learning management system that enables you to create powerful, flexible, and engaging online learning experiences. The Moodle platform lets one assume either of the three roles of administrator, teacher or student. The teacher role allows one to customize the course by adding subject content and other resources. It also allows one to create activities such as assignments and quizzes to evaluate the students.

In the present study, this test was administered as a pre-test to post-test to the beginner teachers to find out their problem solving ability. This test was administered to beginner teachers with up to 10 years of experience.

The beginner teachers were presented with seven Cases from seven different themes on Classroom Management Problems with associated questions. Also, attached to each Case is three associated questions which must be answered by beginner teachers. The first question is 'What is your assessment of the situation?' Here, the expected response of the teacher is to explain how they identify the problem situation,

understand the problem situation and help them think about the situation so that they may be warmed up to answer the next questions. The second question is 'What could have been done to avoid this problem?' The third question is 'What should be done after the problem has occurred?' In the present study, a 5-point Likert Scale to find out the attitude towards Moodle based Case Based Reasoning was administered to the experimental group. This attitude scale contains eight statements to be rated and three open-ended questions to be subjectively answered. The rating is divided into five categories, i.e., Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree.

A rubric was developed to assess solutions of Classroom Management Problems. The criteria of the rubric serve as guidelines to frame and report solutions in a standard format. However, the rubric does not serve as a final say on the solutions to the problem situation in the classroom as common sense is also given importance. The rubric was developed as a guide to assess the solution to the problem and has five criteria. Each criterion hints to assess the solutions to Classroom Management Problems. The hints to assess the solutions to Classroom Management Problems are ranked as Excellent, Good, Satisfactory and Poor. The essence of each criterion has been explained below:

This tool, even though it was for assessment, also served as a template for redefining thought processes towards solving problems. The tool was administered to both the control and experimental group as one of the interventions. The experimental group were administered this tool after completing the Moodle course and while attempting the post-test, to craft their solution. The control group also administered this tool while attempting the post-test, to craft their solution.

The Research Design

A flow chart describing the steps of the research design is given in figures-2 and 3.

Figure-2: The symbolic representation of the study

G1	O1	X	O2
G2	O3	C	O4

O_1 , O_3, - Pre tests
O_2 , O_4, - Post tests
O_2 - O_1,- Gain Score
O_4 - O_3 ,- Gain Score
G_1 - Experimental Group
G_2 - Control Group
X -Application of Experimental Treatment
C -Application of Control Treatment

The researcher conducted a pilot test before entering the actual intervention. The pilot test was conducted on 10 beginner teachers. The researcher found that giving seven Cases in Classroom Management Ability Test took a lot of time for the beginner teachers to answer in a day. Therefore, the investigator decided to reduce the number of Cases from seven to four. In the first stage of the experiment, the beginner teachers were given a Classroom Management Ability Test. The pre-test included four Cases and were given to teachers over two days. The experimental group was taught through a Moodle Based module employing case-based reasoning. The intervention was only through online mode. The control group was not given any online course or face to face courses on classroom management. The control group was however, given a Rubric to think how to solve Classroom Management Problems. The Rubric was given when they were attempting the post-test. The Classroom Management Problem Solving Ability Test was re-administered after the completion of the treatment period.

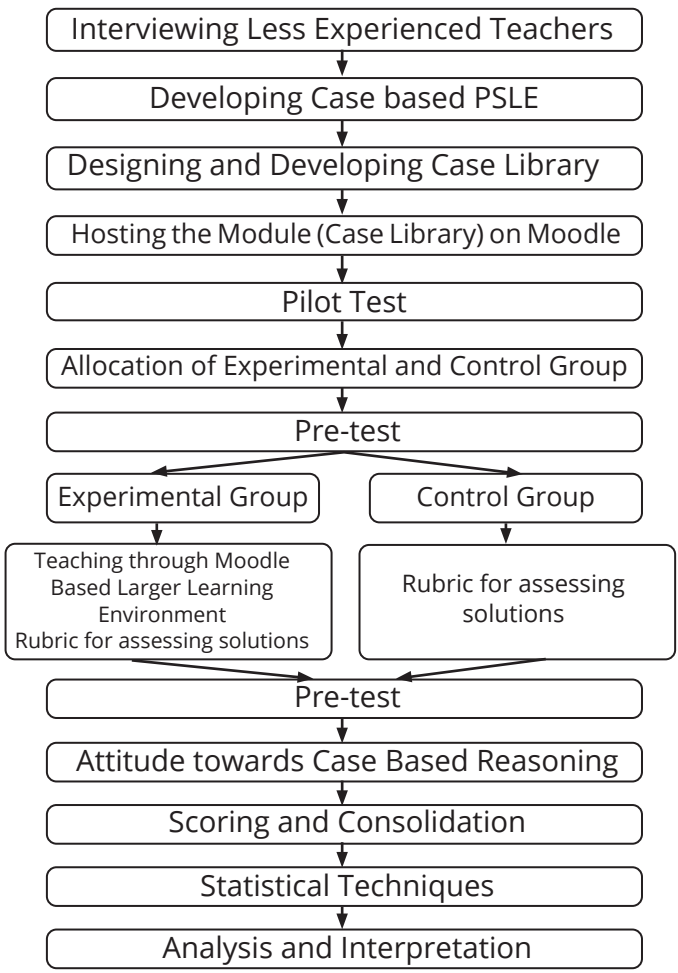

Figure-3: Design of the Study

Statistical Analysis, Interpretation and Findings

The effect of the Case Based Reasoning on the ability to solve Classroom Management Problems was tested using t test. A t test for small sample was performed to determine if a statistically different significance existed between the experimental group using a Case based Library and the control group with no case-based reasoning strategies on Ability to solve Classroom Management Problems. Table-3 shows the result of the t test performed for the total sample.

Table-3: Summary of t test on the gain scores of Ability to solve Classroom Management Problems

	Group						95% CI for Mean Difference		
	With Case based Reasoning			Without Case based Reasoning					
	M	SD	n	M	SD	n		t	df
Ability to solve Classroom Management Problems	6.98	4.32	27	0.10	1.94	20	4.79, 4.98	6.63*	45

* $p < .01$.

There is a statistically significant mean difference in Ability to solve Classroom Management Problems between experimental and control groups. The 27 beginner teachers who received the case based reasoning intervention (M = 6.98, SD = 4.32) compared to the 20 participants in the control group (M = 0.10, SD = 1.94) demonstrated significantly better ability to solve Classroom Management Problems, $t(45) = 6.63$, $p = .003$.Results show that (Figure-4) beginner teachers who received the case based reasoning intervention tend to have a higher Ability to solve Classroom Management Problems than do beginner teachers who did not receive the case based reasoning intervention.

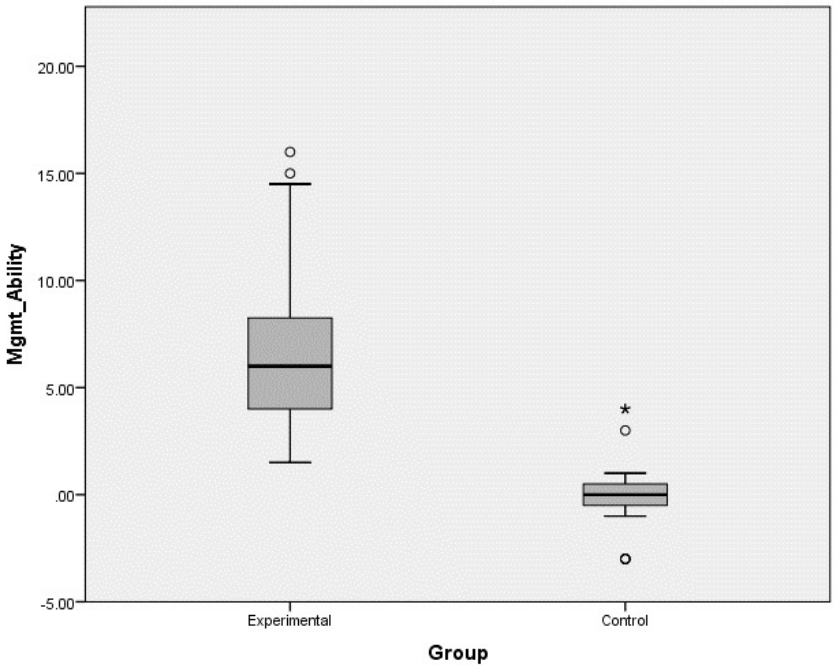

Figure-4: Categorized Box Plot for the experimental and control groups for the dependent variable: Ability to solve Classroom Management Problems

This result reveals that Case Based Reasoning is effective in increasing the ability to solve Classroom Management Problems among beginner teachers at high school level. The box plot with very few outliers in both groups reveals the obvious advantage of the experimental group who used case based reasoning by a higher mean on gain-scores of ability to solve Classroom Management Problems.

Conclusion

The study aimed to find out the effect of Case Based Reasoning on the ability to solve Classroom Management Problems among beginner teachers at high school level. The findings of the study revealed that, there was a significant mean difference in Ability to solve Classroom Management Problems between experimental and control groups. Also, there were no significant main or interaction effects of gender and attitude towards using Case Based Reasoning on the ability to solve Classroom Management Problems among beginner teachers at high school level.

Educational Implications

The present study suggests the use of Case Based Reasoning instructional module for solving Classroom Management Problems. As we are in a digital era and as computer facilities become more and more available, it is necessary to offer courses through the internet. More and more learners are joining online courses in India. As of today, India has the third largest online learners in the world (Businessworld, 2020). Therefore MOOCs based on case based reasoning to support the teacher

community to equip them to solve classroom management problems are a must in this era of multiplicity of classroom management problems. This study also suggests teaching of classroom management with case based reasoning in teacher preparation courses as real life problem solving is the need of the hour in pre-service teacher education.

(Acknowledgement: The investigator acknowledges ICSSR for providing funding for this research project vide F. No.- 02/135/2017-18/RP/Major Dated 29-12-2017)

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Research Article

Comparative Study of Effectiveness of Fishbowl Strategy in Synchronous and Asynchronous Mode of Online Learning

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Abstract

Educators have used Online Learning modes extensively to stimulate and nurture the process of learning. However, Online Learning sometimes may lead to one-way lecturing. This can leave the online learners experiencing loneliness, low self-motivation, lack of interest, etc. Educators need to create opportunities for learners to interact with their fellow learners. This generates the need to explore different pedagogical approaches which keep them engaged in the learning process. Cooperative Learning (CL) offers a solution. CL has been proved to impart academic, psychological, and social benefits to learners when implemented. However, more focussed studies should be conducted to understand its effectiveness in the online environment, particularly in India.

This paper revolves around a study aiming at finding effectiveness of Fishbowl Strategy in Online learning. It is a discussion oriented, unique strategy with the potential of imparting rich learning experience to the learners. Here it is essential to remember that both synchronous and asynchronous modes of online learning offer different ways for interacting with peers. Thus, it is essential to study if both the modes can support the strategy and help learners to get maximum benefit from it. In order to study this aspect, 'Two Experimental Groups Pretest-Posttest design' was used. The study was conducted on higher education teachers across the country. Learners were expected to participate in the discussion willingly hence the purposive sampling technique was used. WizIQ Virtual classroom and Google Groups were used as Synchronous and Asynchronous platforms respectively. Statistical analysis of the achievement test scores indicated effectiveness of strategy in both the modes equally. Thus, this paper will give insight to readers regarding planning CL activity using online learning platforms for better learning experience. Also, it will give some perspective regarding utilizing both Synchronous and Asynchronous modes of Online Learning with equal ease.

Keywords: Cooperative Learning Strategies, Synchronous Online Learning, Asynchronous Online Learning, Fishbowl Strategy

Introduction

Today's educational approach has become more learner-centred and technology driven. Also, the diverse nature of today's classroom has increased demands on the teachers. It emphasizes on use of a variety of teaching methodologies favouring active participation of learners by means of online learning tools. To face these challenges teachers need to equip themselves with different educational approaches.

Considering these aspects, one cannot ignore the blooming field of 'Online Learning'. It is one of the fastest growing trends in the 21st century. It is the new face of teaching-learning. Online learning offers flexibility to the learners in terms of course selection, time, nature of the course, resources available, etc.

Online Learning

Online learning can be grouped broadly into two categories: Synchronous (Sync) and Asynchronous (Async) Learning. During Synchronous learning, learning experiences are delivered in real time, whereas asynchronous learning happens without real-time interaction. A more effective synergy of synchronous and asynchronous interaction is required for enhancing quality of learning experiences.

Both the modes have their own benefits and limitations. Many hybrid learning models include a blend of asynchronous as well as synchronous online learning. However, models which use a strictly synchronous or asynchronous learning approach have some distinctly different features (Best_Schools, 2020).

Synchronous online learning offers benefits like active discussion, immediate feedback, and a personal familiarity that one can only get through real-time interaction. It also provides more dynamic exploration of topics, ideas, and concepts (Lawless et al, 2020). Video conferencing tools like Zoom, GMeet, Skype, WizIQ, Chatrooms can come handy to deliver enriching learning experiences (Trach, 2018).

On other hand, some of the methods of asynchronous online learning include self-guided lesson modules, streaming video content, virtual libraries, posted lecture notes, and exchanges across discussion boards or social media platforms. Thus, it is completely based on the learner's understanding.

The major limitation of this mode is lack of personal touch resulting into lonely experience (Lawless et al, 2020). Asynchronous platforms include email, Google groups, discussion forums, social media groups, collaborative documents in the cloud, etc. (Trach, 2018).

The quality and integrity of the educational process in distance learning largely depends upon sustained, two-way communication (Kung-Ming, 2005). Thus, it is very essential to provide more opportunities to learners to connect with each other to exchange ideas and to construct knowledge. Cooperative learning is the good solution to bring elements of organised interactivity in Online Learning.

Cooperative Learning

Cooperative Learning consists of two words; "Cooperation" and "Learning". So, collectively it focuses on working together to achieve desired goals.

Cooperative Learning is process driven, i.e., those involved engage in a social process and must pay attention to that process for them to achieve their desired end point. It usually involves people working in groups (at least two people are involved, usually more). There may be "group products" towards which learners are working and there may be "individual products" which are achieved through the people in the group helping each other deal with their own individual learning concerns (Agarwal and Nagar, 2011, p.19).

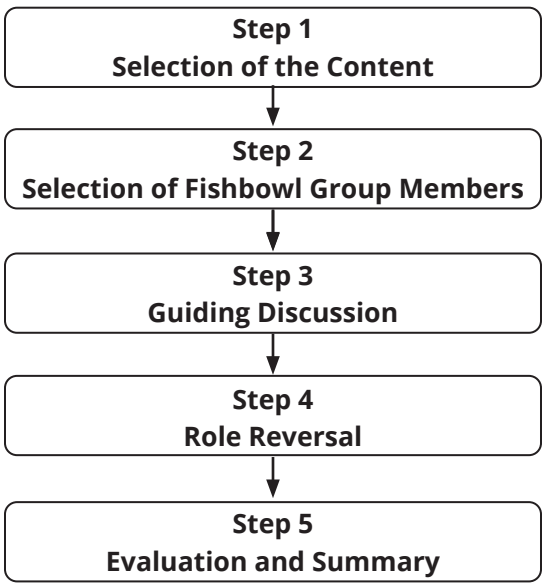
Cooperative Learning allows learners to negotiate, plan, investigate, evaluate their learning outcome together. Rather than working individually and in competition with each other, learners are given the responsibility of creating a learning community where all learners participate in significant and meaningful ways.

Fishbowl Strategy

During Fishbowl, the facilitator chooses a group of learners to discuss a given topic. The rest of the class watches, listens, and observes the discussion. A secondary discussion occurs concerning the outcomes and process of the first.

Steps of the Fishbowl strategy are depicted in Figure-1 (Yabarmase, 2013, Fishbowl, n.d.).

Figure-1: Steps of the Fishbowl strategy



Cooperative Learning in Online Environment

Cooperative learning strategies lend themselves easily to the online learning environment. They are found to impart a variety of benefits when implemented in online learning. These strategies are known to enhance language proficiency, intrinsic motivation of students (Yoshida, 2014), social interaction (Duckworty, 2010), Communication skills (Soh, 2011) and academic achievement when implemented using discussion forums (Kupczynski, 2012). They are more suited to Web 2.0 applications. The prerequisite for incorporating CLS in online learning is 'technical and interpersonal skills' of the learners (Stape, 2009).

Over the period various CLS are tested for their effectiveness. Strategies such as Jigsaw strategy (Yashavantrao, 2010; Lin, 2010), team – pair – solo strategy (Nair, 2010) and Students Teams – Achievement Division (STAD) strategy (Adesoji, 2009) are studied to test its effectiveness in the online environment. In one study, fishbowl strategy was used in online learning to understand roles played in the courtroom by law students. In the process, learners observed role played by their group members in online set-up and shared their opinion (Douglas, 2010). In another study, researcher used Webdialogos tool to conduct online Fishbowl discussion in collaborative environment (John Peter, 2018). In a comparative study (Miller, 2008) effectiveness of online thread discussion and fishbowl discussion was studied. Both the approaches were equally appreciated by learners in collaborative environment.

Thus, the researcher felt the need to have focused and strategy-oriented studies using various online learning tools. Also, she felt the need to find effectiveness of these CLS in both the modes of online learning. As technology is evolving every day, new ICT tools are introduced at an alarming rate. Thus, the researcher sensed the need to explore various tools and see which tools will be best suited to implement interesting CLS.

Objectives

The objectives of the study are as follows:

1. To test effectiveness of Fishbowl strategy in Synchronous mode of Online Learning in terms of Academic Achievement
2. To test effectiveness of Fishbowl strategy in Asynchronous mode of Online Learning in terms of Academic Achievement
3. To compare effectiveness of Fishbowl strategy in Synchronous vs. Asynchronous mode of Online Learning in terms of Academic Achievement

Methodology

It was decided to use the Experimental Method for the said study. The True experimental method was used for the present study and 'Two experimental group Pre-test Post-test Design' was used. Table-1 presents the research design used for the study.

Hypotheses

The following hypotheses were formulated to test the objectives:

1. H_0: There will be no significant difference between pre-test and post-test scores of the participants for Fishbowl Strategy in Synchronous mode of Online Learning
2. H_0: There will be no significant difference between pre-test and post-test scores of the participants for Fishbowl Strategy in Asynchronous mode of Online Learning
3. H_0: There will be no significant difference between post-test scores of the participants for Fishbowl strategy in Synchronous mode and Asynchronous mode of online learning

Table-1: Research design for 'Two experimental group Pretest-Posttest design' Variables

	Pre-test	Treatment	Post-test
Experimental group 1	O_1	XT_1	O_2
Experimental group 2	O_1	XT_2	O_2

The variables of the study were as listed below:

Independent Variables:

1. Fishbowl Strategy in Synchronous Mode of Online Learning
2. Fishbowl Strategy in Asynchronous Mode of Online Learning

Dependant variable:
Academic Achievement

Sample

Higher Education Faculty members across India with at least one year of teaching experience were selected as a sample. It was essential for the participants to take part in the activity willingly and join the discussion actively. Hence, 'Non-Probability-Purposive sampling technique' was used. Initially, eighty participants registered for the program. Seventy-eight participants appeared for the pre-test which was based on the selected content. None of the participants scored 80 percent or more, so all were selected as a sample. By the end of the study, seventy-four participants completed the activity and appeared for post-test. Sample, therefore, comprised 74 participants containing 42 female participants and 32 male participants with their teaching experience in higher education ranging from 1 year to 29 years. Sample was from the nine states of India.

Selection of Content

"Cooperative Learning" was selected as the content for the study which focused on 'Concept of Cooperative Learning'. The details of the module are as listed below:

Topic:

Concept of Cooperative Learning

Sub Topics:

a. Meaning and Definition of Cooperative Learning

b. Elements of Cooperative Learning

c. Cooperative Learning Vs Collaborative Learning

Resource Identification

A variety of online resources were identified for the selected content. These resources were in the form of Videos, Web pages and PDF of information, Case-based learning material, etc.

Selection of CLS

It was decided to select one CLS and implement in both synchronous as well as asynchronous mode of online learning. Many CLSs were studied extensively before finalizing one CLS for this study. After extensive referencing, it was decided to use Fishbowl Strategy for learning the selected content.

Rationale for selecting Fishbowl Strategy

Fishbowl Strategy is most suitable for learning discussion-oriented content. It helps learners to analyse the content, listen and understand opinions of others, rationalize and put-forth their views and opinions.

In addition, Fishbowl allows learners to understand perspectives of their group members and develop empathy and tolerance. It also helps develop much needed social skills like team-work, conflict-resolution, effective communication, respect and active listening.

Thus, the Fishbowl strategy was selected to give a fulfilling learning experience to the learners.

Development of Tools

Parallel achievement tests based on Revised Bloom's Taxonomy were developed. Pre-test and Post-test consisted of objective type questions.

Formation of two experimental groups

The main objective of the pre-test was to form two parallel groups for the study. It was also necessary to eliminate samples already possessing mastery over the content. The pre-test was administered to all registered participants. All participants scored less than 80 percent.

Two parallel groups formed based on criteria mentioned below:

a. Scores were sorted and Matching of Mean was used for the final formation of groups.

b. 'Institution of affiliation' was another level of sorting. It was essential to avoid the problem of contamination.
Thus, care was taken to add participants from one institution in the same group.

Lottery method was used to assign labels 'Group A' and 'Group B' to two experimental groups.

Implementing Fishbowl Strategy in Synchronous and Asynchronous Mode of Online Learning

Two separate courses were created on Moodle LMS. All learning resources and announcements were posted on two individual courses created for two experimental groups. Two separate WhatsApp groups were

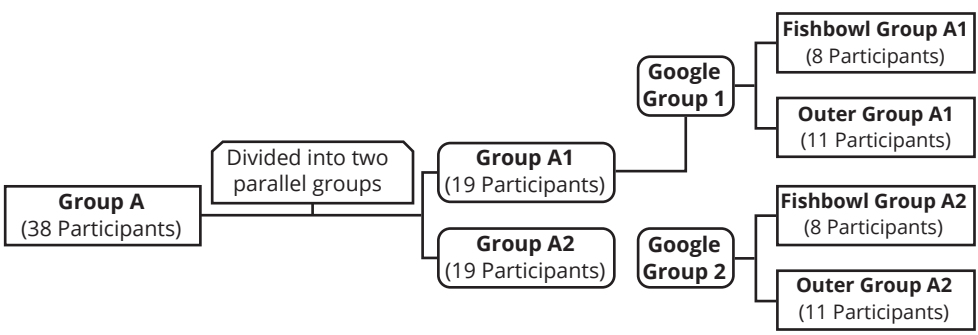
created for troubleshooting. No academic deliberations were allowed or encouraged on these WA groups, ensuring use of selected ICT platforms for participating in the activity.

The Group A was treated through asynchronous mode for the selected topic and vice versa. Google Group discussion was used for Group A where activity was conducted in asynchronous mode. WizIQ Virtual classroom platform was used for Group B to discuss in the synchronous mode.

Implementing Fishbowl in Asynchronous mode of online learning

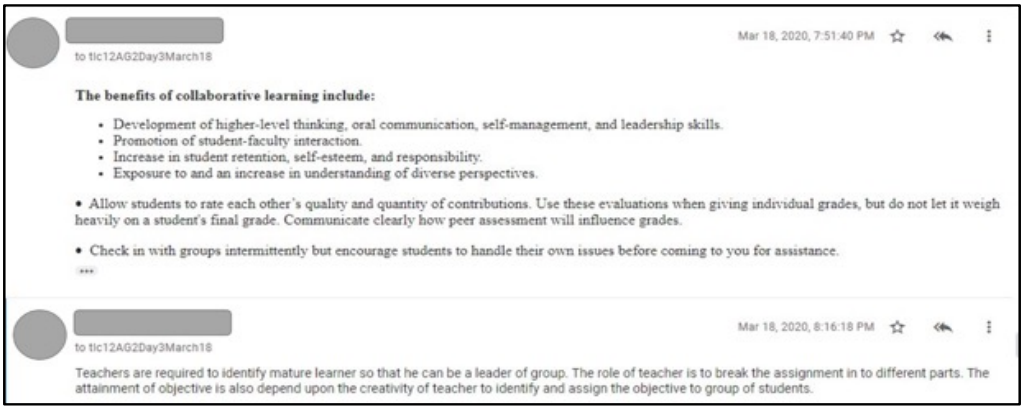
Two Google Groups were formed for conducting the discussion on the topic. Specific Google groups invites were sent to participants for joining the respective group. All the details regarding the activity were posted as a Google Group thread. Group A participants were divided in 2 sub-groups viz. A1 and A2, each having 19 participants. The grouping was done on the basis of Pre-test scores. The scores were sorted initially and then means were matched. Further 8 participants were selected randomly from each sub-group based on their pre-test score. This sub-group was termed as 'Fishbowl group'. Care was taken to maintain balance between high achievers, mid achievers, and low achievers in the group. Thus, the Fishbowl group contained two high achievers, two low achievers and four mid achievers selected randomly by chit method. Details of grouping strategy are shown in Figure-2.

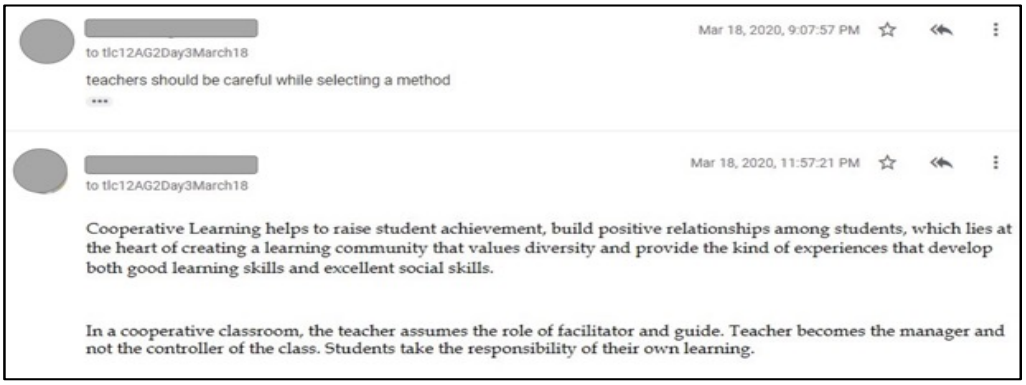
Figure-2: Grouping for 'Asynchronous Fishbowl Strategy'



During the first phase of the Fishbowl Strategy, Fishbowl group participants discussed the topic 'Concepts of Cooperative Learning'. Meanwhile, Outer group participants observed the discussion and they were suggested to take notes of points they would like to opine on in the second phase. They did not take active participation in the discussion. Outer group participants had given only viewing rights to ascertain that the discussion would take place amongst Fishbowl Group members only. Three hours were allotted for the first phase. Participants were given the deadline, but were given freedom to login anytime during these hours as per their own convenience. Figure 3 represents discussion threads for Fishbowl activity in Asynchronous Mode.

Figure-3: Fishbowl Activity in 'Asynchronous Mode' of Online Learning





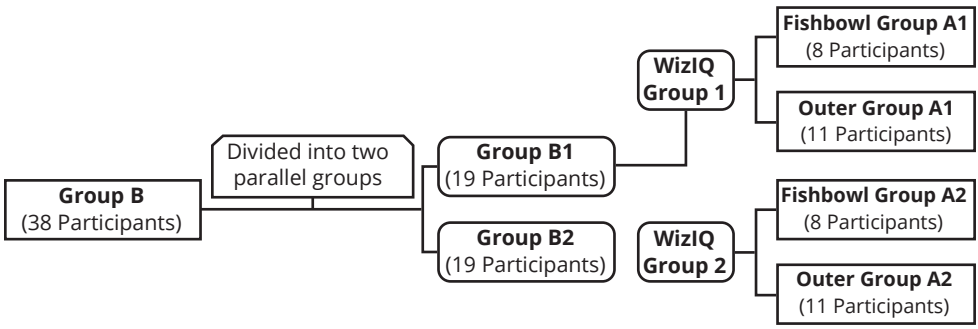
After the time out, phase two began. During Phase two, Outer group members were given editing rights. This enabled them to post their views, opinions, observations, and comments on discussion that happened during phase one between Fishbowl group members. The forum was kept open for the Outer group participants throughout the night. All participants were encouraged to check discussion threads as per their convenience.

Implementing Fishbowl in Synchronous mode of online learning

Fishbowl strategy was implemented in 'Synchronous Mode' of Online Learning for Group B. The synchronous session was implemented using 'WizIQ' Virtual Classroom platform. Two WizIQ sessions were scheduled. Participants of Group B were divided into two sub-groups. Groping is done by following the same procedure described for Asynchronous Fishbowl Strategy.

Details of grouping for the activity are shown in figure-4.

Figure-4: Grouping for 'Synchronous Fishbowl Strategy'



WizIQ Virtual Session link was shared with the respective participants through email. 'Whiteboard' was used to post instructions. During phase one, Fishbowl group participants initiated the discussion while Outer group participants played the role of silent but vigilant observers. 'Chat' feature of WizIQ was used for conducting the discussion. It was observed that the Fishbowl group completed their discussion in about 20 minutes. The outer group participants then started sharing their views, opinions and observations related to the earlier discussion. It was the second phase of the strategy. At the end of the second phase, the session was summed up by randomly selected participants.

Role of facilitator

During Cooperative Learning activity, facilitators let learners take change of their learning process and intervene wherever necessary. During the complete process, the researcher played the role of a facilitator. She encouraged participants to design their own learning and conflict management strategy. She focused on giving constructive feedback to group members if required, to avoid any misinterpretation of the resources or incorrect conceptual understanding.

Results and Discussion

Three objectives were formulated and tested for the purpose of comparing effectiveness of Fishbowl strategy in

Synchronous Vs Asynchronous mode of online learning.

The result and corresponding discussion are given below:

Objective 1:

The objective of the research was 'To test effectiveness of Fishbowl Strategy in Synchronous mode of Online Learning in terms of Academic Achievement'.

The corresponding null hypothesis "There will be no significant difference between pre-test and post-test scores of the participants for Fishbowl Strategy in Synchronous mode of Online Learning" was tested by calculating t-ratio.

Table-2 depicts calculation of t-ratio of Pre-test and Post-test scores for Fishbowl Strategy in Synchronous mode of online learning.

Table-2: Calculation of t-ratio of Pre-test and Post-test scores for Fishbowl Strategy in Synchronous Mode

	Mean	SD	SEM	N	SED	Critical Value	t-Value
Pre-test scores	5.22	1.69	0.28	36	0.293	2.03*	2.1791
Post-test scores	5.86	1.22	0.20	36			

*at 0.05 level of significance

Calculated t-value > Critical value of t at 0.05 level of significance.

Thus, the null hypothesis is rejected.

The two-tailed P value equals 0.0361

By conventional criteria, this difference is statistically significant.

The result of the t-test indicates that there is a significant difference between pre-test and post-test scores of the participants participating in Fishbowl Strategy in synchronous mode of Online Learning in favour of post test scores.

Objective 2:

The objective of the research was 'To test effectiveness of Fishbowl Strategy in Asynchronous mode of Online Learning in terms of Academic Achievement'.

The corresponding null hypothesis "There will be no significant difference between pre-test and post-test scores of the participants for Fishbowl Strategy in Asynchronous mode of Online Learning" was tested by calculating t-ratio.

Table-3 depicts calculation of t-ratio of Pre-test and Post-test scores for Fishbowl Strategy in Asynchronous

mode of online learning

Table-3: Calculation of t-ratio of Pre-test and Post-test scores for Fishbowl Strategy in Asynchronous Mode

	Mean	SD	SEM	N	SED	Critical Value	t-Value
Pre-test scores	5.05	1.58	0.26	38	0.322	2.71*	4.0041
Post-test scores	6.34	1.19	0.19	38			

*at 0.01 level of significance

Calculated t-value > Critical value of t at 0.01 level of significance.

Thus, the null hypothesis is rejected.
The two-tailed P value equals 0.0003.

By conventional criteria, this difference is statistically significant.

The result of t-test indicates that there is significant difference between pre-test and post-test scores of the participants participating in Fishbowl Strategy in asynchronous mode of Online Learning in favour of post test scores.

Objective 3:

The third objective of the research was 'To compare effectiveness of Fishbowl strategy in Synchronous vs. Asynchronous mode of Online Learning in terms of Academic Achievement'.

The corresponding null hypothesis "There will be no significant difference between post-test scores of the participants for Fishbowl strategy in Synchronous mode and Asynchronous mode of online learning" was tested by calculating t-ratio.

Table-4 depicts calculation of t-ratio of Post-test scores for Fishbowl Strategy in Synchronous Vs Asynchronous mode of online learning.

Table-4: Calculation of t-ratio of Post-test scores for Fishbowl Strategy

	Mean	SD	SEM	SED	N	Critical Value	t-Value
Fishbowl Sync Mode	6.34	1.19	0.19	0.281	36	2.000*	1.7137
Fishbowl Async Mode	5.86	1.22	0.20		38		

*at 0.05 level of significance

Calculated t-value < Critical value of t at 0.05 level of significance.

Thus, the null hypothesis is retained.

The two-tailed P value equals 0.0909.

By conventional criteria, this difference is not statistically significant.

There is no significant difference between post-test scores of the participants participating through Fishbowl strategy in Sync mode and Async mode of online learning. Therefore, Fishbowl strategy was found to be equally effective in both Sync mode and Async mode of Online Learning in terms of Academic Achievement.

Conclusion

Fishbowl strategy was found to be effective in Online Learning. This strategy can be implemented effectively in both Synchronous and Asynchronous Mode of Online Learning in order to improve academic achievement of learners. When compared for effectiveness in Synchronous vs Asynchronous Mode of Online Learning, Fishbowl strategy was found to be equally effective in terms of academic achievement.

Along with the significant increase in the achievement, Fishbowl strategy helps enhance higher order thinking and other cognitive abilities of the learners. It allowed participants to interact with each other, understand different perspectives and analyse group discussion before precisely expressing their own view points. They were engaged in interactions and negotiations, even in an online environment. The joy and satisfaction of learning on your own and learning together could be created by these activities.

It is suggested that more cooperative learning strategies can be tested in online learning environments in synchronous as well as asynchronous environments. Qualitative analysis of the user-generated data can further be analysed to understand patterns of knowledge generation and learner dynamics in Online Learning Environment.

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Review Article

Digital Inclusion in Education: Mapping and Management

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Abstract

Digital technologies have an impact on transforming learning and literacy in combination with other social and economic factors. This impact implies future complexities in relation to digital inclusion. Digital inclusion in education is understood as a blend of issues on digital literacy, digital skill, and the digital divide. In this paper, mapping and management of issues of digital inclusion in education are discussed. Reviews related to access to technology and outcomes of the internet and technology used to obtain the skills are discussed to understand the grounds of digital inclusion. Digital-related determinants such as ICT experience, ICT use, and ICT training are mostly covered in 21st-century digital skills studies. Mapping of digital inclusion is strongly related to socioeconomic background, race, and gender as one dimension, the gap between capacities, abilities among low and high educated students as second dimension and the differences in outputs among students in terms of access, usage, motivation, and skills as the third dimension. Management of digital inclusion needs to be undertaken on why students are not able to evaluate and integrate digital information effectively, to critically judge the suitability of a large amount of information online, to understand the ethical and social usage of information, to interpret the reference to a paper and journal, to search databases effectively, to determine the validity of the information found online and understanding copyright issues.

Keywords: Digital literacy, Digital Skills, Digital Divide, and Digital Inclusion

Introduction

Technology has revolutionised the way we work & think and give opportunities to access the world. The power of technology is being experienced by the increasing number of educators. The increase of digitalisation in its various spheres like information, communication, social relations, entertainment, education, and economy is producing what several authors have called 'industrial revolution' (Clark, 2005). There is a rapid growth of industry due to digital interference. The focus is on making technology central to enabling change (NDLM, 2019).

In this technologically loaded world, students need to acquire more skills, adaptability to prepare them for the future workplace. So, the future of education is digital. The rapid diffusion of new technologies impacts the nature of learning and literacy. Digital technologies have an impact on transforming learning and literacy. Technology transforms learning and literacy not only by itself but also in combination with other social and

economic factors. This transitional stage implies that the future of learning in the 21st century will be quite complex. One of the complexities relates to digital inclusion.

Digital inclusion along with related terms such as digital equality and digital equity is used to emphasise the interrelated processes in determining the extent to which students are digitally included. The issues through interconnected means of digital inclusion are mapped in figure 1. Digital inclusion in education is understood as a blend of digital literacy, digital skill, and the digital divide. In this paper, mapping and management of issues for digital inclusion in education are discussed.

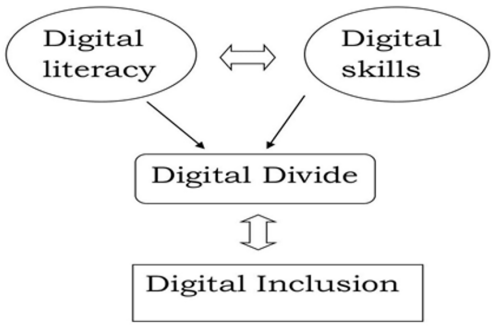

Figure-1: Interconnected Means of Digital Inclusion (Author's Conceptualisation) Digital Literacy (DL)

Digital literacy is defined as the skills and knowledge regarding the fluent use of digital tools and resources in real life situations. It is identified with the use of digital devices and websites and is included in learning and teaching activities (Lindstrom & Niederhauser, 2016). DL refers to the use of digital tools to create meaning and communicate effectively with others. DL behaviours include icon identification, digital navigation, technical operations of devices, knowledge of digital terminology, user control methods like scrolling, storage and retrieval and use of hyperlink. In addition, coding skills, scanning, creating digital texts and critical skills such as analysing, evaluating online information, blogging, online social networking, accessing and synthesising online sources are predicted as digital literacy skills.

Mapping Digital Literacy

Digital generations are engaged with technologies. Accurate knowledge of the level of current digital skills and competencies are required. Digital literates deal with the basic knowledge, skills, and attitudes needed to participate in society through online engagement. Digital literacy is developed through digital participation and situational embedding of basic digital competencies. Nevertheless, students lack the inadequate digital literacy skills needed for digital learning (Muresan & Gogu, 2013). This may be due to the fact that students are using technology for social media or

entertainment but not for learning (Shopova, 2014). Nevertheless, access to technology and outcomes of the internet and technology used to obtain the skills are the grounds of digital literacy. The following three factors guide the conceptualisation of digital literacy: access to technology, working skills, and behavioural skills (Figure 2).

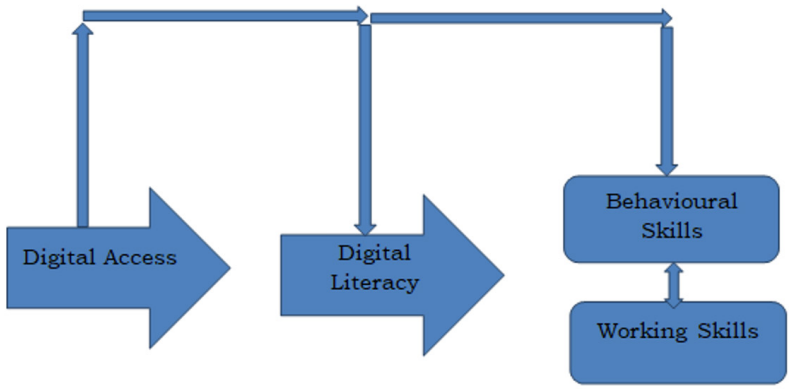

Figure-2: Three-Factor Conceptualisation of Digital Literacy
(Author's Conceptualisation)

Access to technology is essential to determine students' access to computers, internet connection, tablets, and smartphones. Working skills are based on computer basics, internet navigation, communication, and information search and management (Table 1). The elements of behavioural skills are manifested in day-to-day activities (Table 2).

Table-1: Working Skills

Fundamentals of Computer	Install software on a computer, Prepare a PowerPoint presentation
	Rename a folder, Empty the recycle bin
	Scan a document
Internet Navigation	Connect to a wireless device, Set a website as the home page
	Protect private data, Create a safe password
	Online shopping
Communication	Identify fraudulent email, Open an attachment
	Create a personal profile on a social network website, Interact with other users on an online forum

Information Search and Management	Search for information, Collect information
	Compare information from several sources, Determine the reliability of data
	Organise information for present and future use, Save a document in a specific location
	Reproduce content (i.e. copy and paste)
	Present information through a video, Understand graphical display

Table-2: Behavioural Skills

Critical Thinking	Recognise and address the originality of digital content, Autonomy, Real time thinking
ICT in Daily Life	Online participation, Internet for communication, Frequently back up files and important data, Name folders meaningfully to facilitate information retrieval
Social Interaction	Interact with online communities, Willingness to collaborate with others, Respect the norms of social conduct
Online Security	Legal and ethical issues of digital environments, Comply with the legal rules of digital content, Aware of copyright issues, Report inappropriate online activity

Managing Literacy for Digital Inclusion

A requisite for participation in the global learning society is digital literacy. So, digital participation to manage the following necessities is suggested for an inclusive learning society.

- Universal equitable and open access to digital enabled learning environments, tools, and digital resources for all.
- Development of local and vernacular quality digital content with the partner of teachers and students.
- Critical use of shared digital resources.
- Enable sharing of ICT infrastructure for the learning community.
- Promote research, evaluation, and experimentation using ICT tools
- The ethical use of ICT needs to be infused in the curriculum.
- Integration of ICT tools and Free & open-source software for content preparation
- Development of digital learning resources including audios, videos, interactive multimedia, e-books, virtual as well as augmented learning resources.
- Creation of Learning Management System (LMS)
- Creation of Management of Information System (MIS) to enable assessments, monitoring, regular feedback and enhanced learning of students.

Digital Skills

Society is shaped by technologies. Digital

information is accessed universally. The increasing importance of digital platforms has brought modifications in the skills and knowledge of digital learning. So, digital skills are important for educational systems. Digital skills determine information and technical skills. Digital skills are the abilities to use computers or smartphones allowing students to share similar knowledge among their peers. Van Laar et al. (2107) addressed digital skills as so-called twenty-first century skills. Use of information and communication technology shows more open access to a computer and internet. This demands a higher command of ICT skills and the ability to work with the internet. Such experience establishes digital skills. The digital skills determine high-level skills which are covered under 21st century skills. OECD recommends that identifying and fostering the development of 21st century skills are either supported or enhanced by ICT and digital skills (OECD, 2010). Nevertheless, during technology-enhanced settings, learners interact to learn by giving explanations or making communication on each other's contributions. Learners' online collaboration consists of meaningful interaction between peers. Thus, working through the internet highlights their collaboration and communication skills.

Mapping of 21st-Century Digital Skills

Digital skills are necessary to equip the education systems with high-level skills. In literature, these skills are mostly called twenty-first-century skills or digital skills. According to Van Laar et al. (2017), 21st-century skills include (i) communication and collaboration (ii) critical thinking, creative thinking, and problem-solving. These skills are generally about what students can do with knowledge and how they can apply that knowledge in school and social life (UNESCO, 2017). Although different definitions and classifications of 21st-century skills have been put forward so far, Ferrari (2013) states that these skills include information, communication, content creation, safety, and problem-solving competencies. Information skills are the ways of browsing, searching, filtering, evaluating, storing, and retrieving information. The communication skills include interaction, sharing information & content, engagement, and collaboration through digital technologies. Creation of content consists of developing content, integrating and re-elaborating it, copyright and licenses, and programming using technologies. Safety involves protecting devices, managing & protecting personal digital data, and protecting the environment. Online problem-solving skills are resolving tasks by using digital tools, collaborative problem-solving, innovating, and creatively using technology.

The knowledge, skills, and attitudes needed to use digital technologies to search, select, and organise digital information and content are the digital skills and competencies. Basic Digital Competences encompass digital problem solving, digital citizenship, digital information seeking and organising, digital content creation, digital communication, and collaboration. It consists of fundamentals of familiarity with hardware and software, and all the

basics needed for operational usage of the most common digital tools used to interact in the digital world.

Many terms are used to reveal the level of digital skills: IT skills, ICT skills, computer skills, digital competence, or digital literacy. UNESCO (2017) has defined the term digital skills as a range of different abilities, many of which are not only 'skills' per se, but a combination of behaviours, expertise, know-how, work habits, traits, dispositions, and critical understandings. Van Laar et al. (2017) viewed digital skills as part of digital literacy. Besides the skills to operate digital devices, the skills required to perform tasks and solve problems in a digital environment are known as digital skills (Ng, 2012).

An Individual's skill in using ICT includes technical knowledge and cognitive skills required to handle hardware and software environments. Many research findings emphasise the need to focus not only on technical mastery aspects and on the conceptual understandings of technology but also on the higher-order cognitive skills and socio-relational knowledge (Calvani et al., 2012). The digital literacy of students falls in two ways: Information Literacy and Multimedia Literacy. Learners who are developing their information literate skills define different types of ability, such as subject expertise, societal participation, use of research tools, and indicators to determine the credibility of sources, and understand publications that are widely considered "standard". Multimedia literacy refers to the ability to interpret, design, and create content that makes use of images, photographs, video, animation, music, sounds, and texts (Frau-Meigs et al., 2017).

Researchers believe that students must develop the necessary digital skills for the meaningful use of the internet (Jenkins et al., 2009). Litt (2013) focused on the uni-dimensional aspect of internet skills for the arguments about digital skills. Students' digital skills are categorised under many resources: material, intellectual, social, and cultural. Inequalities are seen in the demographic, socio-economic, and psychological dimensions of individuals. The demographic variable includes age, gender, and social background; the psychological dimension covers an individual's trait and intelligence; Education, economic status, and income position of individuals are classified under socio-economic dimensions. Digital skills studies are largely limited to demographic and socioeconomic determinants (Scheerder et al., 2017). Factors such as age, gender, socioeconomic status, personality traits, intelligence, and ICT experience are responsible for determining digital skills. The intellectual determinants of skills depend upon students' learning styles, motivation, intelligence, and other fundamental skills. Similarly, social determinants concern social networking using digital media. Attitude towards culture and tradition of one's society are also determining factors of possession of digital skills.

Managing Skills for Digital Inclusion

Universal access requires that all students should have access, affordability, and the ability to avail and use the internet. These factors are essential in response to human rights

(UNESCO, 2018). The management of 21st century digital skills is vital for members of the learning society to ensure the practice of accessibility. This involves carrying out meaningful activities in a program of media and information literacy. The universal use of digital tools and the internet is an essential requirement for creating, communicating, problem-solving, and socialising for both formal and informal learning. For creating a digital environment, it involves understanding how to use, design, edit, and create pictures, audios, and videos. Managing online applications for students' learning are based on the following dynamics:

- Understand the basic ICT concepts of hardware, software appliances, and networks.
- Know the fundamentals of operational usage of digital tools.
- Awareness of the commonly used digital devices and applications
- Use digital device and internet
- Structure your own digital environment depending on accessibility, and settings.
- Identify needs and select an appropriate digital solution and apply it.
- Solve technical problems.
- Develop self-efficacy using digital technologies.

Digital Divide

The digital divide is characterised by distinguishing those who 'have' technologies from those who 'have not' got them. This describes observed inequalities of access to computers, to the internet and associated digital technologies. The digital divide is reduced by the goal of universal access to information and acquiring actual skills with the availability of technology.

Mapping Digital Divide

Inequalities in the availability of technology and internet access in different parts of the country are major considerations of the digital divide. These considerations are strongly related to socioeconomic background, race, and gender. Jones (2013) stated the digital divide in referring to technology-related social stratification based on racial, gender, and class distinctions as a gap of both access and uses of technology. This is termed as the first level of the digital divide. The second level of the digital divide is the phase of inquiry to know the actual differences in usage and skill outcomes. The majority of the students' population having access to technology possesses insufficient skills. This causes digital exclusion among them. Research shows that low-level educated individuals spent more hours on the internet but were unable to benefit out of that (Van Deursen and Van Dijk, 2014). It is due to the fact that they tend to engage more in social networking and gaming. On the other hand, high proficiency students take maximum benefits in minimum use of the internet. They use the internet for their development of knowledge and skills. This explains the gap between capacities, abilities among low and high educated students. This is the third level of the digital divide which concerns the

differences in intangible outputs among students. The gap influences digital inclusion in terms of access, usage, motivation, and skills.

According to Norris (2003), the digital divide stands for every discrepancy within the online community. He distinguishes digital divide in three ways: First, "global divide," referring to the divergence between the developed and the developing countries in the use of the internet; second, "social divide," the division between the information-rich and the poor in every nation; third, "democratic divide," a gap that exists between those who engage in social life through on-line and those who do not. He argues that socio-economic factors control on-line technology.

Seong-jae (2010) identifies the digital divide as disadvantages of those who are unable to make use of technologies in their day to day life. The less privileged groups tend to use ICT for entertainment purposes whereas the educated employ for learning effectively. Jenkins (2009) termed the 'participation gap' to describe basic inequalities and lack of opportunities for participation in access to technologies. Besides, the digital divide is viewed as educational and social inequity among the oppressed and less privileged of the society. Clark and Gorski (2002) mentioned that educationally oppressed are one of the dimensions of the digital divide. The digital divide refers to both the gap of access to technology and learner usage of technology. This creates a gap in pedagogical practices. By which, the students are excluded by the curriculum, pedagogy, assessment, and other facets of formal schooling. This is an alarming situation in India and around the world.

Managing the Digital Divide towards Inclusion

The digital divide entails differences in access based on socioeconomic divisions (Van Deursen & Van Dijk, 2014). Inequalities in the availability of technology and internet access are due to issues of socio-economic background. Most studies on the digital divide are based on basic demographic and socioeconomic predictors of access such as gender, age, education, income, and employment status (DiMaggio et al., 2004). When individuals gained access to the technological infrastructure, their lack of skills and usage habits were noticed for the cause of digital exclusion. The digital divide approach based on inequalities in internet access has evolved into a divide that includes variation in skills to use the internet (Fuchs, 2009; Selwyn, 2004). The gaps in student's capacity for accomplishing learning outcomes in turn influences digital inclusion. Several studies have demonstrated that once access to technology is equal, the differences in how effectively it is used relate to economic, cultural, and social variables (Jara et al., 2015). Institutions should manage future literacy for the global knowledge society by teaching digital literacy, knowledge assessment, and skills of digital communication & cooperation. Digital learning opportunities as well as competencies and skills related to problem-solving, communication, and critical thinking are the magnitudes of digital equity and inclusion.

As more computers and internet access

become available, the differing uses and effects of technology that characterize the digital divide have become the focus of inclusiveness. The steps to bridge the digital divide are as follows:

- Providing integrated and global solutions through e-government reaching out to all rural students.
- Efforts to bridge the digital divide through various means such as infrastructure development, setting up e-governance, Community Information Centre, e-libraries, partnership with academic institutions
- Innovative projects to use technology for rural development
- CT infrastructure, creation, storage and retrieval of digital resources, use of software, technical support, networking using telecommunication and satellite-based communication to enhance learning

Digital Inclusion in Education

Technology pervades digitalisation. Information is offered through the internet which increases the outcomes of digitalisation. Therefore, students need to update their ICT knowledge and skills continuously. They need to strive for their renewing of skills through both formal and informal learning environments. In the education sector, students need to learn, unlearn, and re-learn to retune and upskill themselves throughout their lifetime (Anthonysamy et al., 2020). The diversity in using ICT represents the socio-cognitive motivations of students. Their interest in ICT, perceived ICT competence, working autonomously and social relatedness plays a major role in digital education.

Mapping

The context and purpose of using ICT are many: for socialisation, entertainment, leisure time activities, and learning. ICT skills for learning are a major component of achieving digital equity among the masses. Many students do not master ICT use; they have only basic levels of competence in information literacy, they do not have problem-solving skills in technology-rich environments (OECD, 2013). The variation of use by students in the extent of availability of ICT is due to variations in pedagogical and technical support. Technology-based learning facilitates in organising & evaluating information, argumentation, and presentation of knowledge (Spektor-Levy and Granot-Gilat, 2012). ICT knowledge and skills are understood as an essential requirement of basic education. Using ICT successfully to solve information-related tasks requires specific technical knowledge as well as generic cognitive skills.

Students fail; causing digital exclusion:

- not able to evaluate and integrate digital information effectively (Tang & Chaw, 2016)
- not able to critically judge the suitability of a large amount of information online (Ng, 2012)
- not able to understand the ethical and social usage of information
- not able to interpret the reference to a paper and journal
- not able to search databases

effectively (Shopova, 2014)

- not able to determine the validity of the information found online
- not understanding copyright issues when using digital information for sharing purposes.

Digital inclusion is important for those who understand the role of the internet and digital technologies in the emerging knowledge-based society (Norris, 2003; Selwyn, 2004). However, many students do not have access to the internet and related technologies. This results in them being digitally excluded.

Managing Digital Inclusion

The issue of socio-economic status is a challenge for students' learning. The educational institutions should identify their students' level of competence and take steps to minimise the gap in their ability differences. These challenges, summarised from literature, can broadly be classified into the following areas:

- Institutional and financial factors including availability, affordability, and access to resources, and socio-economic status
- Socio-cultural factors including societal, institutional, and family support
- It establishes dispositional and attitudinal elements; developing a 'mind-set' towards technological innovations.
- Language and cultural barriers
- Individual factors such as schooling experiences and performance, aspirations and expectations, self-confidence, and self-esteem.

Diverse students with digital diversity can be recognised through critical pedagogy. Premises of critical pedagogy interrogates education in exploring economic, linguistic, and institutional barriers to digital inclusion. Teemant and Hausman (2013) recommended critical pedagogical practices that focus on the potential for democratizing effects and strengthening learner activity. The shift is articulated towards inquiry-based, student-centred learning that promotes higher-order technology uses and study of issues relevant to learner lives and situations.

Conclusion

An analysis of the digital divide highlights how digital inequality compounds the discrimination faced by the poor and the technologically illiterate. Education technology is accessible, available, and affordable only to certain privileged sections of the society in the education system. The deprived section excludes from the information society causing digital exclusion. The majority of the student population does not get access to the internet as they live in remote and interior villages. Therefore, ICT technology is inaccessible, unavailable, and unaffordable to the rural poor and the marginalized. This results in the gross neglect of the needs of the neediest. This is the challenge of digital inclusion and equity. Research on performances in ICT skills of students is, therefore, turned into research on the digital divide and digital inclusion.

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General Article

Digital Learning in Primary Schools: Mauritius Making Great Strides in Early Education

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Abstract

The landscape of teaching and learning has been evolving with the inception of technologically advanced solutions in education. Digital tools are playing a huge role in how to learn, teach, and share knowledge in classrooms. The adaptation of digital learning has become an integral part of modern education. The study aims to analyze the various initiatives undertaken by the Republic of Mauritius to encourage digital learning in primary education in the last 10 years. Policy documents and research papers concerning digital technology have been examined under the literature review to set the context. The Ministry of Education (MoE), through the latest reforms of "Nine Year Continuous Basic Education (NYCBE) Programme emphasises the importance of technology. Early digital learning is considered as a key focus area in transforming the country to future growth and development. Digital Education is encouraging the Mauritians to raise their standards and be on par with the developed countries. The success of these national initiatives in light of primary educational reform policy will encourage other mainland African countries to implement similar projects customized to their requirements.

Keywords: Early Digital Learning, ICT Integration, Technology enhanced Primary Education, Teaching and learning in Mauritius.

Introduction

"Education is the most powerful weapon which you can use to change the world "- Nelson Mandela

The Republic of Mauritius is a beautiful small island nation in Indian Ocean. The people of Mauritius are highly diverse in ethnicity, culture and faith due to historical connection from Asia, Africa and Europe. The country is categorized as "High" in the Human Development Index and more than 90 percent of the population is literate. Mauritius provides 11 years of free compulsory schooling with open access for all children aged between 5 to 16 years.

Digital learning in education generally means technology-based teaching and learning tools in schools. Technology plays an integral role in every aspect of our lives, changing how we access education, how we work, and how we engage in everyday transactions (World Bank, 2020). Moreover, the application of technologies in modern education is playing a crucial role to support teachers and students in innovative forms of learning. In particular, ICT (Information and Communication Technology) can enrich and transform education

through universal access to education, bridging learning divides, supporting the capacity building of teachers, enhancing the quality and relevance of learning, strengthening inclusion, and improving education administration and governance (UNESCO, 2015).

In view of the above, the Mauritius government knows that Education is a pillar of any country. Therefore, the present paper made an attempt to study various initiatives taken for integration of ICT and digital tools in the learning and teaching process of primary schools in Mauritius. There are 277 government primary schools with Gross Enrolment Ratio as 100 percent and the pupil to teacher ratio as 27.

The adoption of ICT in education is not a one time affair but a multi-year continuous process to fully support teaching and learning in a school environment. Digital learning tools provide necessary help and support for both teachers and students. These tools do not act as replacement for quality teachers but instead they are considered as an add-on supplement needed for better teaching and learning. Enabling quality primary education lays the foundation upon which the talents of a nation's youth can grow. Therefore, the Mauritius government is giving huge emphasis on early digital education programs.

Objectives of the Study

- To study major initiatives taken for enhancement of digital learning in primary schools
- To discuss and analyze the desired outcome of Digital Learning Projects at national level
- To discuss on limitation and future direction

Research Methodology

The information for this study has been collected through secondary sources. Multiple reports, documents available on Mauritius government websites, journals, news and publications have been referred in order to make an in-depth analysis. Considering objectives of the research, descriptive research design has been adopted to come to a conclusion.

Journey of Digital Education Initiatives in Primary Education Sector

ICT is making dynamic changes in our society as how people think, work and live. Countries across the world are integrating digital learning in curriculum that will prepare them for life after school. The MoE, Mauritius has been bringing changes in primary education to make their human resource competitive with new trends. This section provides a broad overview of major Digital Education initiatives and education reform taken up in primary education by the Mauritius Government. The digital initiatives can be divided into two era i.e. Pre and Post education reforms 2017 in 2017as country has launched major education reforms in 2017.

a. Digital Initiatives before Major Education reforms in Year 2017

b. Digital Initiatives after Major Education Reform in Year 2017

The MoE started embedding technology in the education system by equipping the schools with IT facilities and digital learning pedagogy in 2000. The wave of change began in 2002 with the recruitment and training of 220 ICT educators in primary education. By 2003, ICT had been integrated as a subject in the primary curriculum. The aim was to expose the young learners to modern technology and train educators to use digital tools in the classroom.

1. Computer Laboratory

The emphasis on integration of ICT in primary education of Mauritius dates back to 2006. National ICT Strategic Plan 2006 of GoM stated that IT would be taught in schools as a subject and integrated into teaching across the curriculum in primary schools (Shafika Isaacs, 2007). MOE made sustained efforts to improve the ICT infrastructure in primary schools from 2008 onwards. All primary schools had an ICT room with at least 10 computers, 2 printers and 1 scanner. Training sessions of the educators have been carried out to equip them to teach and make full use of the ICT. There were approximately 4,300 computers in all primary schools (Education Reforms in Action, 2013). The capacities of the ICT rooms were gradually increased in highly populated schools (Fig-1). The labs were also provided with internet facilities. Total of 22 primary school students were accessing one computer (Statistics Mauritius, 2017). This makes ICT penetration for pupils approximately 4.5 percent.

Fig-1: Computer Lab

Source: MoE, 2016

2. Sankore Project

MoE introduced the Sankore project in 2011. The project was a spinoff of the Franco-British summit. The leaders of France and the United Kingdom then decided to promote education in Africa through the provision of digital classroom equipment and digital resources to schools (Oojorah, 2011). Subsequently, Mauritius was chosen as the platform for the Franco-African countries with an objective to

provide an education for pupils for all through digital empowerment and use of innovative technologies. The project was launched in 2011 with the commissioning of interactive projectors and laptops in primary schools. The second and third phases of the project were implemented in 2012 and 2013, respectively. This has marked a new horizon in implementing technology in the Mauritian education system (Education Reform in Action 2008-2014) and laid the foundation for a digital culture. Key initiatives have been summarized as below:

a. The project covered Grade IV to Grade VI of all primary schools of Mauritius.

b. Mauritius Institute of Education (MIE) was responsible for the elaboration and digitization of educational contents.

c. Educators were trained on the use of ICT tools to enhance teaching and learning.

d. CT support officers were recruited to assist in the promotion of a digital culture in primary school.

3. Digital Youth Engagement Programme Project (DYEP)

The National Computer Board (NCB) operating under the aegis of Ministry of Technology, Communication and Innovation (MTCI) has been running various ICT initiatives at national level. In 2017, Mauritius Government announced DYEP which comprises an introductory course on coding to youngsters from Grade IV and Grade V. The learners were provided with a 15-hour training delivered in the Cyber Caravans, which would proceed to various primary schools around the island (IST-Africa, 2017). Each Cyber Caravan is equipped with 25 laptops, 2 Dashboard Display Screen, 18 tablets and broadband internet (NCB, 2018). The objective of introducing coding at an early age is to spark interest among young learners for STEM (Science, Technology, Engineering and Mathematics) subjects.

Over these years, MoE Mauritius made efforts to ensure that digital education becomes an important tool for teaching and learning in the classroom. However uptake of the ICT in the primary education encompasses number of issues, including access of computer hardware and software in primary education, provision of relevant digital learning content and limited options for educators for exploring innovative ideas for pupils

The MoE launched a comprehensive review of the education system in Mauritius in 2016-17. In order to raise the education standard and government introduced major reform through the Nine Year Continuous Basic Education (NYCBE) Programme. NYCBE blueprints was based on Sustainable Development Goal-4 (SDG-4: Quality Education) of the United Nations i.e. “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”. NYCBE highlights the development of 21st century competencies that reinforce the holistic education offered by the curriculum (MoE Mauritius, 2016). The use of digital education is an important part of NYCBE programme, to help learners acquire necessary skills required for a highly technological and information-based

economy. The salient points are:

1. The programme was based on six pillars of the reform i.e. Curricular Change, Innovative Pedagogies, Assessment, Continuous Professional Development, Conductive Learning Environment, and System Governance and Accountability.
2. It covers the new education structure in detail including Primary education from Grade 1 to 6 and Secondary School from Grade 7 to 9.
3. There are three curriculum stages, each representing a block of three years: Foundation Stage (Grades 1, 2 3), the Consolidation Stage (Grades 4, 5 6), and the Orientation Stage (Grades 7, 8, 9).

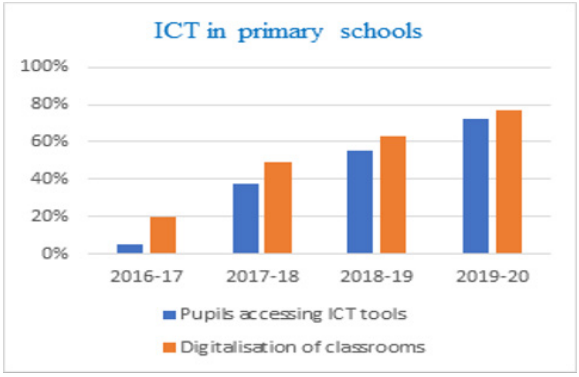
The NYCBE will ensure that all youth reach at least basic skills levels as per the international benchmark by 2030. To achieve this desired goal, the government rolled national level personalized learning initiatives in Primary education.

4. Early Digital Learning Program (EDLP)

EDLP is a flagship project of the Ministry of Education, Tertiary education, science and technology (MOETEST), Mauritius as a part of the innovative measure of NYCBE. The main aim of this program is to move from traditional classrooms to 21st century digital classrooms. The new era of personalized digital learning started in Mauritius through the EDLP Project. The project was rolled out in the year 2017-18 as a part of the bilateral relationship between Mauritius and Indian Government.

The project began with commissioning of high definition projectors in classroom, portable student device i.e. Tablet, Specialized charging card, Digital Content for all students in Grade I and Grade II (EDLP, 2019). Subsequent on receiving positive feedback the project was progressively extended to d Grade IV in 2019-20. The government has plans to cover Grade V and VI in coming years. Hence, each student will be empowered with student device i.e. Tablet as a part of personalized digital learning in all 277 primary schools of Mauritius. This will result in ICT penetration to all students (100 percent) in primary schools. The growth can be summarized as given in Fig-2.

Fig-2: Growth of personalized learning in Primary Schools



The main reasons for selection of Tablets in the education system are its usability and effectiveness. Tablets are easier for kids to use than Desktop PCs or Laptops. It uses a touch screen interface. Small Form factor (Shape and Size) similar to Books and makes it portable. Several applications and learning content are available for teaching and learning on Tablets (Michel Trucano, 2015).

5. Digitations of Content and Online Portal

The digitization of content with interactive features for primary education started in Mauritius since the inception of the Sankore project in 2011 (Oojorah, 2011). The CODL of MIE has been actively engaged in designing the digital curriculum. The digital content for primary grades with progressive updates were made available on the portal of MIE and in all the student devices of Grade I to IV. As in 2020, the digital contents were accessed publicly from http://mie.ac.mu/curriculum.html. MIE has been using the online Moodle learning platform in their teachers education since 2010 (Pudaruth, Moloo, Mantaye and Jannoo, 2010). It is an open source Learning Management System (LMS) to disseminate knowledge to educators. The Online content includes training sessions for primary educators in their capacity building. The platform is accessible http://miemoodle.southindia.cloudapp.azure.com/.

Classroom Management Software (CMS) with advanced features has been introduced in Grade IV to meet the present-day requirements. E-assessment, feedback on learner's console, online and offline access, and analytics form the basis of the software and its equivalent application.

6. Internet Connectivity, SchoolNet Project

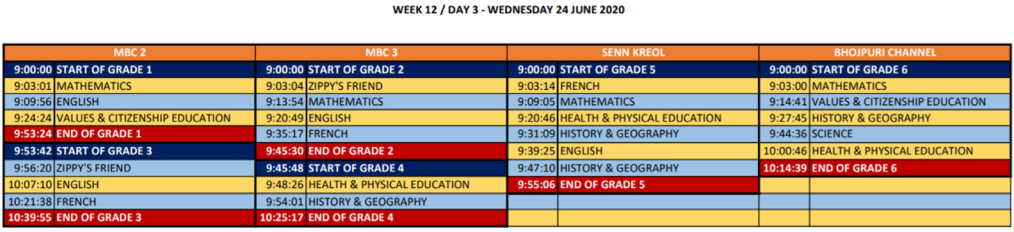
The high speed internet ensured that all students and educators could access educational resources through the World Wide Web including resources available at the websites of MIE and MGI. In 2017, through the SchoolNet project GOM planned to provide high speed connectivity to primary schools. By mid 2019, all primary schools were made available with high speed broadband internet connectivity of 10 Mbps.

7. Digital Learning Initiatives during COVID-19

Despite multiple projects being implemented for digital learning, the COVID-19 pandemic revealed vulnerabilities of the system in particular for primary education. Technical tools and supports were not readily available when students were confined to their home due nationwide lockdown.

To mitigate the challenges in facilitating remote learning, the MoE set up numerous educational programmes on television channels of Mauritius Broadcasting Corporation (MBC) for primary and other students in mid 2020 (MoE, 2020), a sample of the schedule can be seen in fig-3.

Fig-3: MBC Broadcasting Schedule for Students of Primary Schools



WEEK 12 / DAY 3 - WEDNESDAY 24 JUNE 2020

MBC 2		MBC 3		SENN KREOL		BHOJPURI CHANNEL	
9:00:00	START OF GRADE 1	9:00:00	START OF GRADE 2	9:00:00	START OF GRADE 5	9:00:00	START OF GRADE 6
9:03:01	MATHEMATICS	9:03:04	ZIPPY'S FRIEND	9:03:14	FRENCH	9:03:00	MATHEMATICS
9:09:56	ENGLISH	9:13:54	MATHEMATICS	9:09:05	MATHEMATICS	9:14:41	VALUES & CITIZENSHIP EDUCATION
9:24:24	VALUES & CITIZENSHIP EDUCATION	9:20:49	ENGLISH	9:20:46	HEALTH & PHYSICAL EDUCATION	9:27:45	HISTORY & GEOGRAPHY
9:53:24	END OF GRADE 1	9:35:17	FRENCH	9:31:09	HISTORY & GEOGRAPHY	9:44:36	SCIENCE
9:53:42	START OF GRADE 3	9:45:30	END OF GRADE 2	9:39:25	ENGLISH	10:00:46	HEALTH & PHYSICAL EDUCATION
9:56:20	ZIPPY'S FRIEND	9:45:48	START OF GRADE 4	9:47:10	HISTORY & GEOGRAPHY	10:14:39	END OF GRADE 6
10:07:10	ENGLISH	9:48:26	HEALTH & PHYSICAL EDUCATION	9:55:06	END OF GRADE 5		
10:21:38	FRENCH	9:54:01	HISTORY & GEOGRAPHY				
10:39:55	END OF GRADE 3	10:25:17	END OF GRADE 4				

Source: MoE, 2020

Live and at times recorded lessons were broadcast for all subjects at different intervals. The programmes were uninterruptedly broadcasted. These multimedia videos were available online to educators and learners.

Discussions

Several studies have been conducted to concur that "use of Digital learning captures student attention and keeps them actively engaged in the lessons". It is important to focus on building the ecosystem in which teaching and learning can happen in a digital mode. The MoE, Mauritius has been investing on large scale national level digital education projects in the last 10 years. To measure the effectiveness of these projects is certainly a complex task. A high level measurement of effectiveness has been tabulated based on the three key parameters for each project and summarized in the table below

Table-1: Key parameters of digital education project

Initiatives	Main objectives	Project Phase	Measurement of effectiveness		
			Usage of tools	Difficulty level	Learning outcomes
Computer Laboratory	ICT introduction	At maturity & declining	Occasionally	Difficult	Moderate
Sonkore Project	Digital interactive	At maturity & declining	Occasionally	Ease of Use	Moderate
DYEP	Coding	At maturity & declining	Regular	Ease of Use	Marginal
EDLP	Personalised learning	Growth	Regular	Ease of Use	Significant
Digitations of Content, MIE	Audio 7 video content	Growth	Regular	Ease of Use	Significant
SchoolNet	Internet connectivity	Growth	Regular	Ease of Use	Significant

COVID-19 initiatives	Remote learning from home	At maturity	Regular	Difficult	Modetrate

The various inferences that can be drawn are:

1. EDLP and Internet connectivity (SchoolNet) initiatives are the most influential projects taken up for digital learning in primary schools.

2. ICT labs and Sankore projects have been implemented 10 years back and their influence is not comparable to the current scenario.

3. The initiatives taken during COVID-19 pandemic may not be as influential as others as per our defined parameters. However its significance is relatively higher due to the short term quick response generated during emergencies.

The policy maker's decision to bring personalized learning into early childhood is making students digital savvy. EDLP has played a pivotal role in reforming the basic education of the Republic of Mauritius and subsequent socio-economic development. This project is meeting three out of six basic pillars of NYCBE i.e. Innovative Pedagogies, Assessment and Learning Environment.

Finally, the integration of ICT in the classroom is increasing the competency of the country's education system. This improves their world ranking of national education and produces a future ready workforce. In order to enhance the use of ICT in the classroom, the government needs to improve and change the teachers' belief about the integration of ICT in the classroom. Teachers play a key role in making any of the new policies to be implemented efficiently and successfully. Teachers should have good skills and knowledge in using ICT to improve their teaching methods that will meet the demand of 21st century teaching skills.

Summary, Limitation and Future Research

Mauritius government has remarkably scaled up digital learning infrastructure in recent years with implementation of high impact projects. The present paper made an attempt to study various initiatives taken for integration of Digital Tools in learning and teaching process in primary schools of Mauritius. The education system is going through a rapid transformation due to which, the children of this generation are not limited to traditional textbooks. Their thirst for knowledge cannot be quenched using the age – old methodologies and pedagogies. Their hunger for ever increasing information can be satisfied by the use of the digital tools and internet in the form of e-learning, digital textbooks, interactive animation videos and integrating the ICT in the classroom room. The traditional classrooms are getting transformed to "Next Generation SMART Classrooms". The Mauritius government is focusing on grooming the young generation and investing in digital learning. The primary schools have been upgraded with national level digital initiatives such as Computer Labs (Cyber Caravan), Smart

Projector based learning (Sonkore) and personalized learning using tablets (EDLP).This Investment in education makes their human resources well equipped to meet the demand of the digital economy.

The nascent EDLP Project has stood out as one of the most impactful projects in meeting the mission of reform agenda in Mauritius. It may have far reaching implications with its potential growth in coming years. Today by incorporating digital technology in primary education, Mauritius can be termed as torch bearer, shining star among African countries

These national initiatives have limitations which should be ratified to fully utilize the technology resources deployed in the schools. The issue ranges for educational change management, Infrastructure maintenance,educational courseware development and teachers training. The Mauritius Government has to bring changes in online content, e-books, platforms for assessment, and curriculum. Educators and master trainers need to be trained thoroughly and frequently. The EDLP project should be extended to Grade 5 and 6 to maintain the continuity and ICT penetration almost 100 percent in primary schools.

It is worth mentioning that in spite of numerous steps, the year 2020 exposed that teaching and learning in Mauritius has been impacted due to Covid-19 pandemic. It leads to 'learning losses for many months. Therefore, the digital infrastructure needs to be redefined for making it immune to similar threats in future.

This study can further be expanded to explore the factors that are affecting the effective usage of the recently implemented national projects like EDLP, Internet connectivity in primary schools. This will help in analyzing the impact of digital learning initiatives in Mauritius from users' perspective using quantitative data. This will give a better view of the success rate of government policies and programs.

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Opinion Article

Divulging the Emerging Technology for Pre-service Teachers' Field Experience during COVID-19

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COVID-19 is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that has been declared as a pandemic as the results of the clinical analysis showed person-person transmission (Li et al., 2020; Paules et al., 2020; Wang, and Cheng, et al., 2020). The outbreak of coronavirus resulted in sudden closure of all types of educational institutions including kindergartens, schools, colleges and centers of higher education are forced to shut down their academic activities. The lockdown has had a negative impact not only on the schools but also on the higher educational institutions, especially, among the colleges of teacher education in India.

In the curriculum of teacher education, pre-service training practices have been incorporated to provide authentic experiences for teaching in classrooms. According to the new regulations of National Council for Teacher Education (NCTE, A statutory body of the Government of India), student teachers should undergo the training for four weeks during the first year and for sixteen weeks in the second year. Usually, the practicum begins in August and ends in November. Due to the pandemic situation, student teachers are unable to undertake teaching practices in schools. Currently, nationwide lockdown is in force with some relaxation, the schools and colleges still remain closed. Besides, the provision of NCTE guidelines mentioning that internship and field engagement shall be followed as per the direction of the affiliating universities under the prevailing situation. Hence, Tamil Nadu Teachers Education University, Tamil Nadu and Pondicherry University, Puducherry have announced to commence online classes from 1st week of August 2020 to its affiliating colleges of education. But, no instruction was found about the internship of second-year student teachers. In such a situation, it is of dispute that they could resume the program with internship activities.

The colleges of education in Tamil Nadu and Puducherry region shifted the teaching mode from traditional classrooms into online learning platforms in which the internship programs have been excluded. Consequently, teacher educators had concerns about practical experiences on teaching, in order to prepare the student-teachers' to be trained and qualified. Moreover, educationists suggest that gaining teaching experience through online mode among the peers and teachers

will make student-teachers learn the online teaching methods and strategies which are considered as a valuable and required commodity in today's context (Schmidt and Ramot, 2020). Despite the fact that they can practice through synchronous and asynchronous modes to receive feedback, the absence of real classroom essence such as teacher-student interactions, analysis of student behaviors and classroom management skills will lead the teaching to be less intensive. In such conditions, engaging the student-teachers through a virtual learning environment is one possible solution to encounter the issue. Employing a blend of artificial and human intelligence inclines learners to immerse in realistic experiences. Artificial Intelligence (AI) is one such emerging technology, termed as immersive simulation, where teachers find more opportunities working with Virtual Reality (VR). Mursion is a virtual reality simulation training software, which provides simulated classrooms where the student teachers can upskill their own teaching competence by interacting with on-screen student-avatars in real-time (Dieker, Hughes, Hynes, and Straub, (2017). Furthermore, the secured and harmless learning environment will scaffold the students for effective teaching and learning (Voelkel, Johnson, and Gilbert, 2016; Hudson, Voytecki, and Zhang, 2018).

Many researchers have also found that Mursion is an efficacious tool for novice student teachers to engage in teaching practice (Thompson, et al. 2019). Initial research regarding the effectiveness of Mursion software reported that more than seventy five universities in the United States had significant and positive effects (Voelkel, Johnson, and Gilbert, 2016). In addition, a study reported that the simulated version has increased student teachers' higher-order questioning strategies (Dieker, Hughes, Hynes, and Straub, (2017). Results of another study evidenced that it was used as an effective practitioner tool for graduate students at the university level (Voelkel, Johnson, and Gilbert, 2016). Similarly, a research reported that the student teachers had significant and huge improvements in their teaching skills with the help of the software (Cohen, Wong, and Krishnamachari, 2020). Likewise, another research was conducted to evaluate the effects of teaching experiences using Mursion for the undergraduate special education student teachers' to test their readiness in managing classrooms. Results indicated that they have learned to manage undesired behaviors in the classrooms. Interestingly, Mursion was found as an effective tool to practice new skills and the student avatars seemed like real students (Hudson, Voytecki, and Zhang, 2018).

Mursion, the most innovative and emerging technology is an essential requirement for the student teachers to gain the field experience in teaching particularly during the pandemic. Regardless of the multiple benefits of the advanced technological software, challenges will also be taken into concern while incorporating in-service training programs, as it is cost effective. The implementation of such advanced technological software in developing countries like India is possible when there is a collaboration between the

statutory bodies of higher education and private software companies like Mursion. For instance, the American Association of Colleges for Teacher Education (AACTE) associated with Mursion provided access to the institutions to practice teaching during COVID-19. Such efforts in India will definitely take a step further in the path of Teacher education and the student teachers will also be benefitted from the immersive experiences.

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Book Review

Life 3.0: Being Human in the Age of Artificial Intelligence (ISBN-9781101970317) By- Tegmark, Max, Published by Penguin, 2018

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"When looms weave by themselves, man's slavery will end." —Aristotle, 4th century BC

The notion that Artificial Intelligence (AI) will augment instead of replacing humans has become a prevalent idea and an influential one in the study of AI today. It is a reassuring argument, albeit a deeply misguided one. Max Tegmark, author of Life 3.0, writes about what life will be like for humans as and when AI starts to dictate the terms of our daily lives. His book discusses various nuanced societal implications with respect to measures that can be undertaken by humans in their capacity to maximize the chances of a potential that future holds for humanity, technology and an amalgamation thereof.

An interesting online activity that one comes to notice is that at times we don't need to solve CAPTCHA's (Completely Automated Public Turing test to tell Computers and Humans Apart) every now and then. This is precisely because now AI, forming a fairly niche arena of human lives, has exploded in the last decade. Substantially more rapidly than many had foreseen, Machine Learning (ML; a subset of AI) frameworks have overtaken the best human Go players, are guiding self-driving vehicles, translating texts, naming your photographs, understanding your discourses, etc. This has prompted gigantic interest in AI by organizations and governments, with each showcasing that progress will proceed. This book is about what occurs if and when it does.

The book begins by taking the reader through a hypothetical situation wherein AI has exceeded human intelligence and becomes all powerful in the society. However, before delving deep into AI, we need to understand its meaning. It is understood as the intelligence that is possessed by machines. This also includes a machine's ability to learn as it solves problems with each stage of learning to make itself capable of replicating and improving upon the previously acquired knowledge. Acting like the Human brain, Tegmark also uses the term AGI (Artificial General Intelligence) to denote the ability of machines to learn an intellectual task as good as a human.

An astonishing thought that emerges from this discussion is when Peter Diamindis points out that AI holds a bigger potential than fire or electricity in impacting human conditions. In this way AI is out there to transform society, culture and discourses relating to our

bodies and human identity. Most of our conceptions of technology and AI are shaped by what is showcased in popular culture and Hollywood films and the narrative resembles more or less to the machines taking over human jobs, the robots as a clan are out to overtake humans and rule them. However, Tegmark takes a nuanced and academically rigorous stance to answer the big question of what happens when the human race ceases to be the smartest species on the planet.

Tegmark in the first chapter, helps the reader visualize bacteria as an example of what he terms Life 1.0. Life where both hardware and software underwent evolution and were not formed by design. This is what he called the biological stage. Life 2.0 on the other hand has Humans as an example, whose hardware that is the bodies evolved through natural processes but whose software that is the mind was largely developed through acquired learnings like knowledge and algorithms used to process information using our senses and the ability to absorb knowledge through reading, writing, singing and even telling jokes. However, mankind reached a stage which the author terms as Life 3.0 in which ability to not only design but also evolve and develop both its software and hardware is achieved. This is the technological stage.

Even though the term AI has often been thrown around by tech giants, it surely has many facets that are yet to be explored. The term AI is most often used in conjunction with ML, however they carry their differences. For a simpler understanding, AI is the ability of machines to carry out functions that we may consider as smart, while ML is the application of AI where in the very machines get hold of significant data and allow them to learn with each and every successive bit of information they receive. The application phase of AI poses broader possibilities than ML. Natural Language processing, biometric scanning and recognition, speech to text are some of the various nuances that surround us but go unnoticed due to the fool-proof and sophisticated technology that it uses.

Except for Isaac Asimov's 'three laws of robotics' which was a part of his short story 'Runaround', little interest has been assimilated around AI, its potential and its threats. In India NITI Aayog released a policy paper titled National Strategy for Artificial Intelligence in the year 2018, which took into account the importance of AI in varied sectors. Even when these developments are taking place heavily on the technological front globally, on the regulation front, no major comprehensive plan of action has been prepared yet.

Taking a leaf from other popular science fiction books, Tegmark opens the book with a fictional but probable story concerning a super intelligent AI named Prometheus. Rightly named, Prometheus under Greek Mythology was said to have moulded humans out of clay and taught them the basics of sciences and humanities thereby, proving themselves more capable than the humans. From here the author takes us onto a non-fictional ride of one Future of Life Institute co-founded by himself and his wife and others.

In continuation with this, the author takes us into in depth analysis of every

possible outcome AI might construct. These multiple avenues include, but are not limited to, “Gatekeeper” AI, one which is super intelligent and safeguards humanity from being disparaged by further more sophisticated superintelligence; “Zookeeper” AI, one which tames humans in a similar fashion as zoo animals; “Enslaved Gods” AI, one which keeps humans as slaves and lastly “Benevolent Dictator” AI which on the surface attempts to be caring for the human race but intrinsically aims to rule it.

With his background in the discipline of physics, Tegmark next treats us to a dream of things to come, "our infinite enrichment" he calls it, that anticipates either ourselves, our artificial plunges, or some cyborg combination thereof. While visiting such obscure thoughts as ‘Black hole Farming’ and ‘Uploading of Brain’, Tegmark's narration stays comprehensible and precise, with rundowns of key ideas toward the finish of every part. The eye-catching part from the book is the last section's conversation of cognizance, including Guilio Tononi's integrated information theory. This becomes all the more interesting as the idea of cognizance has not been dealt with in depth in other books that discuss AI. Tegmark argues that in case AI is used to expand into the cosmos, it's important that there is an availability of conscience and has a more moral and ethical value to creating the artificial intelligence explosion. Although he doesn't hold a firm view, he only covers multiple vantage points from where artificial intelligence can pose to be a boon or a bane to mankind. Life 3.0 is about AI and what we can do today to create the best possible future with it. The author deliberately avoids use of jargon as he believes that this is a conversation which everybody needs to join in with. We have traditionally thought of Intelligence being limited only to biological beings such as humans. But for the author here, intelligence is only a form of information processing performed by elementary particles moving around in conjunction with the laws of Physics. However, Tegmark suggests the laws of Physics do not talk of Machines being able to be more intelligent than biological beings.

There are multiple levels of questions that the book tackles ranging from the career advice children need to be given in this day and age of AI, to the more extraneous one’s of whether we should start an arms race of Lethal autonomous weapons in the near future. However, the most important of all questions that the author raises is what kind of future do we want to be a part of. Because, and as the author puts himself, if we don't know what we want then we are much less likely to get it.

Self-driving AI vehicles are as of now confronting moral predicaments that we don't have the foggiest idea how to tackle. Who should bite the dust in an unavoidable auto collision? The passer by who heedlessly bounced into the road? Or then again the driver, when the vehicle dodges the passer by by crashing into a utility pole? As Tegmark cites from thinker Nick Bostrom, we are currently confronted with "Philosophy with a deadline."

At no other time has a discussion about something that could end human life

felt so intriguing. Be that as it may, AI isn't a diversion, nor is Tegmark's book. Before human level AI debuts, we should consider the qualities we need machines to have. We don't yet have the appropriate responses. Be that as it may, Tegmark has the inquiries. The discussion begins now.

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