iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** XII **Month of publication:** December 2021

DOI: https://doi.org/10.22214/ijraset.2021.39365

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue XII Dec 2021- Available at www.ijraset.com

E-Learning of Mathematics- A New Trend of Learning in 21st Century During Covid-19 Pandemic

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Abstract: ***The goal of this study is to highlight current breakthroughs in digital technology research in the subject of mathematics education. The Covid-19 outbreak in 2020 turned both private and public life on its head. Higher education institutions all across the world were forced to switch their teaching and learning online on very short notice.***
As a result, many types of software like Google Meet, MS teams, Zoom and WebEx, etc. have been developed to help teachers and students communicate more effectively. Problem-solving is a characteristic of mathematical activity and an essential component of the development of mathematical and analytical skills. The capacity to answer a broad variety of complicated mathematical problems is a major goal of mathematics education and learning. However, the process of problem-solving in online mode has not received the attention it deserves, because many professors are uncomfortable with it. As a result, problem-solving as a method and skill is not taught as an intrinsic component of the mathematics learning process by instructors. Qualitative methodology is a technique used for this study. The purpose of this study is to reveal the roles and significance of mathematics teaching and learning via the use of technology applications (E-learning).
Keywords: Mathematics, COVID-19, E-learning, Education

I. INTRODUCTION

The global COVID-19 pandemic, during which many governments around the world imposed severe restrictions on a variety of activities, including the complete shutdown of traditional lectures at schools and universities, affecting up to 85 percent of the world's total enrolled learners, or nearly 1.0 billion people, in the context of this work. In the education industry, especially in higher education, technology in the learning process is not a new concept. Technology had been used in the classroom. GeoGebra, Autograph, Desmos, and other similar programs Cabri-3D, which is used in math education; Duolingo is a great way to learn English. Microsoft PowerPoint and Microsoft Word are two of the most commonly used program. In practically every subject. Many colleges throughout the world began using online-based learning to replace lectures in the classroom by the year 2020. This is being done to slow the spread of the Covid-19 epidemic in the world. From the student's perspective, technology serves as a tool to help them comprehend abstract concepts and information by making them more visible. These helped students grasp and apply concepts to solve issues, while technology helps instructors as a vehicle for communicating information [7].

COVID-19's influence on educational institutions and projecting post-COVID-19 changes in the education sector have already been published in major international scientific journals, including papers from China, the United Kingdom, the United States, and a variety of other nations. Several of these reports have already begun to address issues like how technology is transforming remote learning, what the likely outcomes will be and how they will change over time, the likely impact of COVID-19 on the educational institutional marketplace, and clinical and post-lockdown perspectives for individual educational institutions. However, there is presently no evaluation of the early published literature, which would synthesize what has been learned from each research, immediately following the commencement of the epidemic [4]. Traditional chalkboard lectures or chalk talks, which involve the professor's gestures and facial expressions, are still a very effective way of teaching mathematics at the university level today. Mathematics teaching is a dynamic and creative process that necessitates the physical presence of students in the lecture hall as audience so that the professor can fine-tune the evolution of the lecture based on his or her perception of the students' level of attention and facial expressions, as well as the questions and comments made by the students [5]. For undergraduates, mathematics tutoring is a valuable informal learning experience. After controlling for earlier academic aptitude, studies show that tutoring improves students' final grades [3].

The following summary includes several past research that mentions the usage of e-learning before the advent of the COVID-19 pandemic: [14,4] discovered that incorporating e-learning into regular classroom instruction has a positive impact on mathematics teachers' positive attitudes and mathematical competence. According to Freiman et al. [6], e-learning applications have a real influence on helping students understand arithmetic issues in real-world situations. According to [12], 53.3 percent of students believe that the e-learning system has aided them since they have simple access to teaching materials everywhere and at any time.

The findings of Tawil et al.'s [13] investigation differed from those of earlier studies, indicating that face-to-face teaching and learning are more effective. Lecture-style learning is more successful in terms of increasing knowledge. comprehension of mathematics and statistics by students in comparison to the assistance of e-learning media.

Teachers' views have a significant impact on their students' behavior, and they play a critical part in shaping the way they teach. One of the oldest branches of the Indian higher education system is mathematics education. It is considered the foundation of several fields of study, including mathematics, calculus, geometry, mechanics, trigonometry, algebra, polynomial math, analytics, and business mathematics, among others. India's strong mathematical traditions may be required by the rest of the globe. Mathematical greatness Science Mathematics education is a multidisciplinary field. Inquiries can be addressed, and conditional responses can be looked into [14]. Education can be affected in a healthy and peaceful environment. mental disorder and psychological trauma faced due to The COVID-19 situations [7].

II. THE RESULTS FROM THE EXISTING STUDIES

There is a belief that there are numerous impediments to learning when online learning is implemented, particularly in mathematics education. Different type of studies and survey has been conducted all over the world related to E-learning Mathematics. The main studies in the literature address some research questions and obtained results.

Alabdulaziz1 [1] address the following question and completed a survey from 120 teachers of mathematics. (1) Is COVID-19 the gateway for digital learning in mathematics education?

(2) What type of digital technology is being used in mathematics education during the COVID-19 pandemic?

The results show that 98% of participants believed that COVID-19 is the gateway for digital learning in mathematics education and 97% claimed that the use of online education by schools had expanded greatly following the coronavirus outbreak.

Harsha et al. [8] address the following research questions to survey 500 random participants who take undergraduate mathematics courses: (1) In comparison to emergency remote teaching, what gear and software were most typically used by mathematics instructors before the pandemic?

(2) During emergency remote teaching, why did lecturers opt to conduct live online sessions, pre-recorded sessions, or alternative approaches?

(3)What kind of hardware and software training and support did your employees receive?

(4) Are there differences in students' mathematics learning outcomes before and after online learning?

(5) Are there differences in students' positive responses to mathematics before and after online learning? Is there a relationship between the ability to use IT and difficulties in using e-learning when participating in distance learning of mathematics subjects during the COVID-19 pandemic?

The findings of this study do not imply that online learning in mathematics based on e-learning has no positive impact on students' learning outcomes.

Some different findings were discovered through investigation of the papers like demonstrates that one of the issues instructors confront during online learning is material delivery restrictions, particularly in pure mathematics. This is fair since specific software (such as MathType) is required to teach the content. Furthermore, there were issues with the computer programming course because lecturers found it difficult to verify the difficulties that students faced, and students found it difficult to communicate their concerns. This is because programming classes include grammar, computer specs, software, and algorithms. Of course, this becomes a little more complicated.

The findings of the study conducted in [9] are that learning management system-based platforms are the most popular (Google Classroom and Edmodo), with video conferencing (Zoom and Skype) coming in second. No one utilizes the Webex platform or Google meetings for research purposes. Subjects chose to utilize zoom and skype when learning maths through conferencing.

Second, rather than employing e-learning produced by institutions, instructors prefer to use generally accessible e-learning platforms (such as Edmodo and Google Classroom) or video conferencing (zoom or skype). This demonstrates that the teachers are dissatisfied with the university's e-learning features and services. The inclusion of video conferencing tools, as well as an attendance system that can be properly documented and exported in the form of Excel, are some of the suggestions made by lecturers [2].

The survey results of [10] show that only 13% of math center directors indicated they would not continue online tutoring if the pandemic limitations were gone, while 54% said they might continue online tutoring and 33% said they would certainly continue online tutoring. Low student utilization and a personal preference for face-to-face tutoring were the main reasons for not continuing online tutoring. Learning and communication technologies (ICT) play an important role in everyday life, including the teaching-learning process.

Mathematics is regarded as the most powerful of all sciences. For a long time, the Mathematical role was relegated to solely academic domain throughout time. However, at this time, Mathematics' importance extends beyond the academic realm. It has made its way into the realm of technology and business goes hand in hand. This paper will emphasize the significance of knowledge integration. Incorporating information and communication technologies (ICT) into mathematics teaching and learning in Teacher Training College and school level. Researchers [11] for more literature on E-learning education.

The following are the common summary of findings of the research :

1) Obstacles that students face when participating in online learning, such as non-smooth signals, limited quotas, and the teacher directly asking questions without providing any material or explaining how to solve problems, cause students to not understand the material and feel disturbed by noise in the home environment;
2) Students' efforts to overcome these obstacles, such as looking for a smooth internet/wifi network to neighbors or other places outside the home;
3) Online mathematics learning media, such as Whatsapp (WA), Google Classroom (GC), Zoom, E-learning schools, and e-mail; d. Online mathematics learning suggestions from students, such as teachers making videos or explaining subjects through videos.

This epidemic has forced us to adapt to a new way of life, which includes learning mathematics in college. The results of the studies cannot be utilized as a standard for learning in regular (non-pandemic) circumstances. This study also focuses on mathematics education, where the usage of e-learning provides lecturers with additional hurdles owing to the difficulty of communicating mathematical ideas online. According to the findings of the study, using e-learning, particularly mathematics learning, which comprises a lot of abstract and computational information, is a problem for both lecturers and students. The usage of e-learning has a good impact on learning implementation, but it also hurts learning implementation. What causes the usage of e-learning to have a positive or negative influence should be investigated further. Changes in the mathematics learning process that are traditionally carried out face-to-face are also encountering substantial difficulties in a situation where lecturers are obliged to work more in helping students understand mathematical concepts through e-learning. Although online education techniques aid and encourage teaching methods, there is a pressing need to balance the pros and downsides of technology and harness its potential. Disasters and pandemics, such as Covid-19, will create a lot of ambiguity and uncertainty, therefore amid such catastrophes, there is a critical necessity to properly explore the technologies while exercising appropriate prudence to address these worries and hostilities.

III. CONCLUSION

The year 2020 may serve as a wake-up call, demonstrating that higher education institutions are still not fully prepared to take advantage of digital technology's potential for learning and instruction, especially for Mathematics. Perhaps the current issue can serve as a springboard for developing supportive communities of practice around artifacts connected to online teaching and learning that will become commonplace in the future. learning? Regardless of the influence of COVID19, a moment of crisis provides an opportunity for all education systems to look to the future; there is immense potential for digital technology in mathematics instruction. We are currently in the midst of the Covid-19 crisis, but it will eventually come to an end. Lessons learned about online teaching and learning in crises should not be forgotten, but should be remembered for future occasions, utilized to develop and improve digital education in crises times. To do so, we must take a broad approach. The study also included a discussion of the significance that such digital technologies may have for research in the area of mathematics academia and research, as well as recommendations for future research directions on the subject. The results of research on the use of e-learning in learning before the COVID-19 pandemic are similar to those of its application during the pandemic. Much of the research included in the studies come from developed or stronger emerging countries, with essentially little research published regarding less-developed but developing countries or underdeveloped countries. A crucial topic of research that has still to be investigated is how those nations have reacted to the COVID-19 situation and how they have responded in terms of education. Comparing the experiences of teachers, students, and other education stakeholders in different locations and/or nations will be fascinating.

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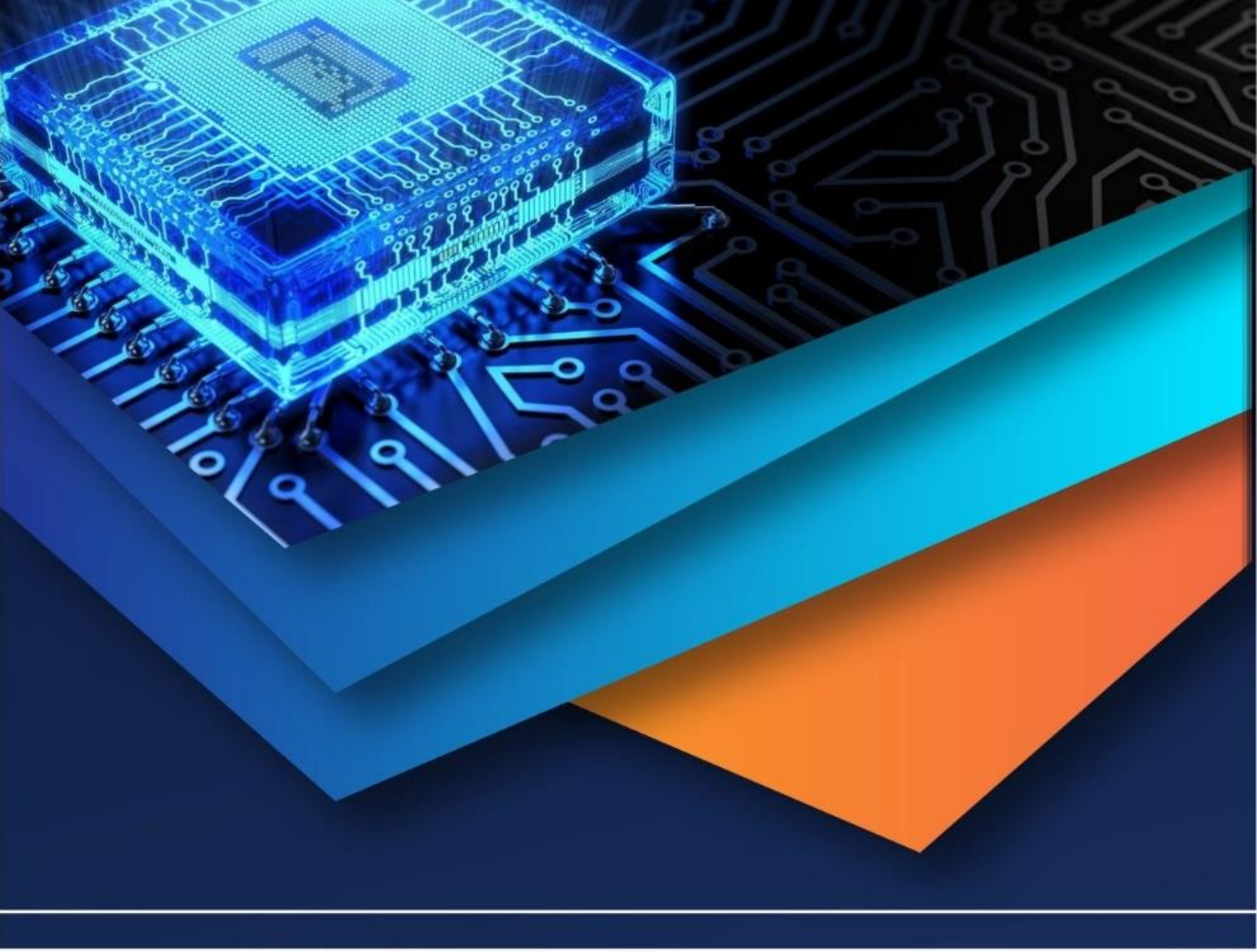

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