

Technology assimilation in Mathematicsteaching: A case study of Blackboard learning during Covid 19

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Abstract

The current pandemic situation completely changed the dynamics of Learning and teaching strategies. All government across the country, due to the spread of corona virus almost all schools and colleges were temporarily closed which impacted a lot in the learning and teaching processes. Education pattern mostly disrupted and with this change many teaching modalities have also been changed. During Post-pandemic environment, a huge shift in mindset is required. New shift in the existing structure of learning and teaching structure is the need of hour.

Learning and teaching have undergone continual transformation in recent years, with an increasing array of educational tools making their way into the classroom. With this changing need of the students' teachers need to mold themselves to new teaching methods. Traditional approach in education is shifting towards Blended teaching and e- learning which makes an adaptable instructive condition that can fulfill different adapting need and subsequently upgrade and extend instructive capability. At present there are many tools available for virtual learning environment and course management system. Blackboard learning is very fine gadget which provides an online environment to traditionally delivered course, which can be further developed and research application in research can be delivered along with E learning. The primary objective is to shed light on the teaching/learning possibilities provided by e- learning platforms in a blended learning environment.(Tisdell, 2019)

The present paper intends to thrash out the blended approach used by mathematician to teach math's in their classroom to make the subject more interesting to learn which till now often complained to be the toughest and unexciting among students. It then explore to responses of B.tech students of University of Petroleum and Energy Studies, Dehradun were recorded during course of research towards the advantage they feel of such used tools. Finally, a blended teaching model and suggestions are proposed for practitioners and educators.

Keywords: blended teaching, e-learning, blackboard learning, mathematics, traditional approach, education.

Introduction

Since 1200 BCE to the end of 18th century, India developed its own unique system of mathematics. Scholars like Aryabhata, Brahmagupta, Mahvra, Madhava of Sangamagrama, Bhaskara II, and Nilakantha Somayaji made substantial contributions to Indian mathematics throughout the classical era (400 CE to 1600 CE). India was the first country to record the decimal number system this is being practiced today. The study of zero, negative numbers, arithmetic, and algebra were all pioneered by Indian mathematicians. Indian

trigonometry, specifically the contemporary concepts of sine and cosine, was further developed in this country. Some of the most important breakthroughs in mathematics may be traced back to these mathematical notions that were first introduced in the Middle East, China, and Europe.

An important feature of ancient and mediaeval Indian mathematics literature was the inclusion of a section of sutras in which a set of rules or problems were explained succinctly and concisely in poetry to assist students' memories the rules or the problem set. And followed by a

second portion of prose observation (sometimes numerous comments by various academics) that described the issue in more depth and gave reasons for the proposed solution. Form and memory of sentences were regarded less significant than the concepts in this part. [1][9] All mathematical works were passed down verbally until about 500 BCE, when they began to be handed down in writing form. At least one Indian subcontinental mathematical text has been unearthed, and it is believed to date from the 7th century CE: the Birch Bark Bakhshali Manuscript, which was discovered in 1881 at Bakhshali, near Peshawar.

Trigonometric functions (sine, arc tangent and cosine) were further developed in 15th Century by Kerala mathematicians. The invention of series expansions for these functions. The earliest known example of a power series may be traced back to their work, which was finished two centuries before the development of calculus in Europe (apart from geometric series). [12] There is no clear evidence that their findings have been disseminated outside of Kerala, hence they did not construct differentiation and integration systematic theory.

The Use of Blended E-Learning in Mathematics Education and Its Impact

The Effects of Blended E-learning on Mathematics Education An open and remote learning course may be defined as a course in which the students and the teacher are not physically present in the same location. The use of electronic technology for the delivery of educational and training applications, the monitoring of students' performance as well as the reporting of students' progress, was characterized as e-learning by For example, It is an innovative technique for the delivery of an electronically well-designed, mediated, and interactive learning environment to everyone, anytime, through the digital technologies, according to Hedge and Hayward (2004) as mentioned in Ayandu, Eludior, Ashiru and Amassoma (2011). For the uninitiated, e-learning may be defined as the process of delivering instruction and providing online access to information resources via the use of a networked computer or mobile device (OECD 2005). Lecturers have more alternatives when it

comes to their lectures when they employ e-learning technology since it allows them to provide more content and improve students' understanding. As a result, blended e-learning incorporates both traditional face-to-face instruction and newer, more technologically advanced methods of instruction (Wang, 2011). This kind of learning, according to Singh (2003), as quoted in Yushu (2006), incorporates multiple types of event-based activities, such as classroom, live ed and self-paced learning into an one experience. Traditional classroom education, synchronous online conferencing, training, or asynchronous self-paced study may be combined in this manner. However, despite the potential of e-learning to enhance the reputations of educational institutions, it increases the excellence of learning and teaching in mathematics and gives more flexibility for students in their study. Blended techniques, on the other hand, enable lecturers to save time and focus more on the course's content. E-learning and traditional classroom instruction may be improved by incorporating best practices from both mediums into a blended e-learning programme. In the opinion of Elesionye and Okolo (2011), e-learning assures that learning and teaching are based on ICT, and that it provides the following advantages:

It has given pupils the opportunity to compete with their peers from across the globe for the best jobs and educational possibilities. And it might be utilised to present a wide range of teaching materials to the students. Basic computer education skills are taught to students and instructors so that they can access the internet and find information for successful learning. There are several benefits for both instructors and students, including a better understanding of how to use information technology for teaching and learning. For example, it aids in the teaching, development and diffusion of knowledge at a college or university level.

Teachers are very positive after implementation of technology with traditional methods of teaching. Learners' capability of understanding of the concepts develops with pedagogical implementation of the traditionally driven courses. No doubt, there are many apprehensions but still it helps the systematic professional development for students as well as the teachers. (Appavoo, 2021)

Viewpoints on the Use of Blended E-Learning Tools in the Learning and Teaching of Mathematics Undergraduate mathematics is a globally recognised and comprehensive area, and its learning and teaching are critical nation development. (Ukpala & Nancy, 2012; Misfeldt & Sanne, 2012). (i.e., CD-ROM, VOD, lecture presentation using power point slides, simulation graphics, animated video-audio delivering system, e-book, video-conferencing, and e-learning) (Amassoma, Ayandu, Eludiora, & Ashiru, 2011). MOODLE, Blackboard Learning Management Systems and other advanced web-based or virtual Print media, private radio and television stations, e-mail (problem warnings), and different computer-assisted teaching methods have all been used to teach and study mathematics, but the usage of e-learning tools has surpassed all of these methods. e-learning environments like i-converges, WEBCT, MUMIE and WebALT are just some of the more advanced web-based or virtual learning environments that may be found in the mathematics/computer classroom (Albano, 2012; Awodele et al, 2010). In the words of Stuart (2004), referenced in Wang (2011), students now have the freedom to complete their assignments whenever it suits them, whether in real time or asynchronously. To put it simply, e-learning refers to the use of hardware, software, and/or the internet to provide and support Math education in a wide sense (Juan, Steegmann, Trenholm Huertas, 2011). In the learning and teaching of mathematics, these blended e-learning techniques serve as a catalyst for the development of new e-learning pedagogies and models. Mathematical education and its instructional design approaches must consequently be updated to reflect this current technological breakthrough.

Blended E-Learning Tools in Math Education

Blended e-learning technologies in the digital era are influenced by the philosophy of connectivism. Learning in the contemporary world is facilitated by network connections, according to Siemens (2008), since people exchange their interests and information in an online or virtual setting. In the words of Siemens, given in Dunaway (2011), In order to connect hundreds of networks, "Connectivism"

is a learning philosophy that makes use of several series of nodes. Digital technology is interwoven into all elements of learning, including classroom, distance, and e-learning education under this new learning paradigm. / (Kop & Hill, 2008). The hypothesis that information and knowledge are disseminated via networks and that learning is a process of establishing and traversing these networks, as explained by Downes, is based on this idea (Hung, 2014; Duke, Harper & Johnston, 2013). Knowledge is activated and the learning process starts when a learner joins and contributes information to a learning community. (Networks or nodes). Distributive learning is the act of detecting patterns in a network of knowledge that has been spread (Siemens, 2004; Downes, 2010). New options for learners and educators to interact on global networks, as well as a new ability to mix numerous information streams, may be responsible for these shifts.

Challenges for Blended E-Learning

Students in the classroom experience issues with math that are difficult to address in a classroom setting for beginners. The desire and drive to learn the fundamentals of mathematics may be lacking in some students, and others may not be planning to pursue a career in math at all (Abramovitz, Berezina, Berman & Shvaetsman, 2012). Blended e-learning in mathematics is now facing issues due to the present level of communication technologies. The limitations associated with e-learning technologies have prompted an effort to merge conventional mathematics education teaching and programmes with the virtual learning system in mathematics education. Therefore, the full potential advantages of this procedure are not achievable at this time. The challenges that e-learning in mathematics education faces today include technological divides and limitations such as a lack of computers with high-speed internet or intranet connections, a lack of computer peripherals, a lack of a functional computer/mathematical laboratory, content management software that is not secure (i.e., internet security), and/or other related ICT incompetence among students and educators (Jarvis, 2012; Misfeldt & Sanne, 2012). The effect of this is that it may be essential to explain that the instructional design models for blended e-learning technologies are difficult to compare

to the conventional classroom setting. For example, there might be issues with entering mathematical calculations and notations in the e-learning models that are built. Because of this, students are encouraged to use words rather than established mathematical notations to express their work in mathematics.

Session planning for Blended teaching in Mathematics

Content design Models

E-learning content design models may be based on these primary elements, according to Bellas, Romero, Marona, and Becerra (2010). Students' needs and capacities must be adequately addressed. Secondly, the quality and clarity of the information provided. If it is to be properly understood and absorbed, an appropriate framework is required. Interaction with the pupils is a fourth factor. The Study's Purpose University of Uyo undergraduates' views on obstacles posed by blended e-learning technologies in mathematics were examined as part of this research project.

Advantage of Blended E-Learning

- I. Apply their expertise in contemporary industry or education, or get admission to top-tier graduate programmes in mathematics and related subjects such as mathematical computing, quantitative/mathematical finance, , statistics, and actuarial science.
- II. Effectively communicate both verbally and in writing
- III. Collaborate successfully in groups
- IV. Demonstrate ethical and professional conduct.

Objective of the study

- Assessment of feeling of the students about blended e-learning technology available in mathematics.
- Assessment of feeling of the students about the accessibility of blended e-learning technologies in mathematics.
- Opinion's assessment of graduate students' ICT abilities in connection to the usage of blended e-learning tools in Mathematics.

Sessions	Topics
Session One	Exact differential equations
Session Two	Exact differential equations
Session Three	Linear differential equations with constant coefficients
Session Four	Linear differential equations with constant coefficients
Session Five	Linear differential equations with constant coefficients
Session Six	Cauchy-Euler differential equation, Legendre linear differential equation
Session Seven	Solution of second order differential equations when a part of complementary function is known
Session Eight	Solution of second order differential equations by reduction to normal form
Session Nine	Solution of second order differential equations by changing the independent variable
Session Ten	Solution of second order differential equation by variation of parameters
Session Eleven	Solution of second order differential equation by variation of parameters
Session Twelve	Discrete and continuous random variables
Session Thirteen	Moments, Skewness and Kurtosis
Session Fourteen	Moments, Skewness and Kurtosis
Session Fifteen	Probability mass and probability density functions
Session Sixteen	Moment generating functions and their properties
Session Seventeen	Binomial distribution
Session Eighteen	Poisson distribution
Session Nineteen	Normal distribution
Session Twenty	Bisection method
Session Twenty-one	Regula Falsi method
Session Twenty-two	Fixed point iteration
Session Twenty-three	Newton-Raphson method
Session Twenty-four	Gauss-Jacobi method

Perquisites in mathematics Blended learning and teaching process

Along with computer and English proficiency students should have the basic Knowledge of Differential Equation, Probability & Statistics, Numerical Methods, and Basic Knowledge of Posets & Lattices is essential.

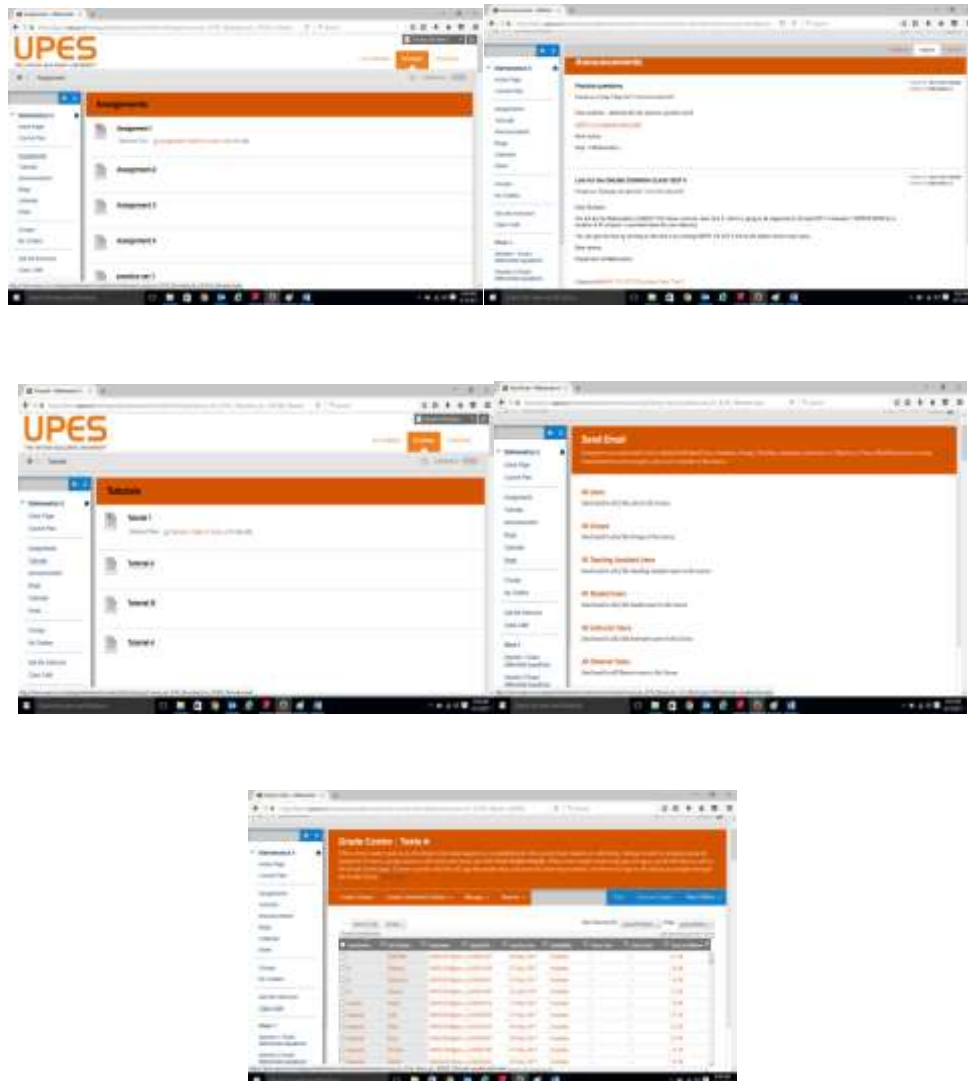
Course outcomes associated with blended learning and teaching process in Mathematics:

Students should be able to solve linear ordinary differential equations at the conclusion of this course. The ability to interpret technical and scientific data using basic statistical methods and to solve nonlinear equations and initial value problems of ODEs is required. Students will be

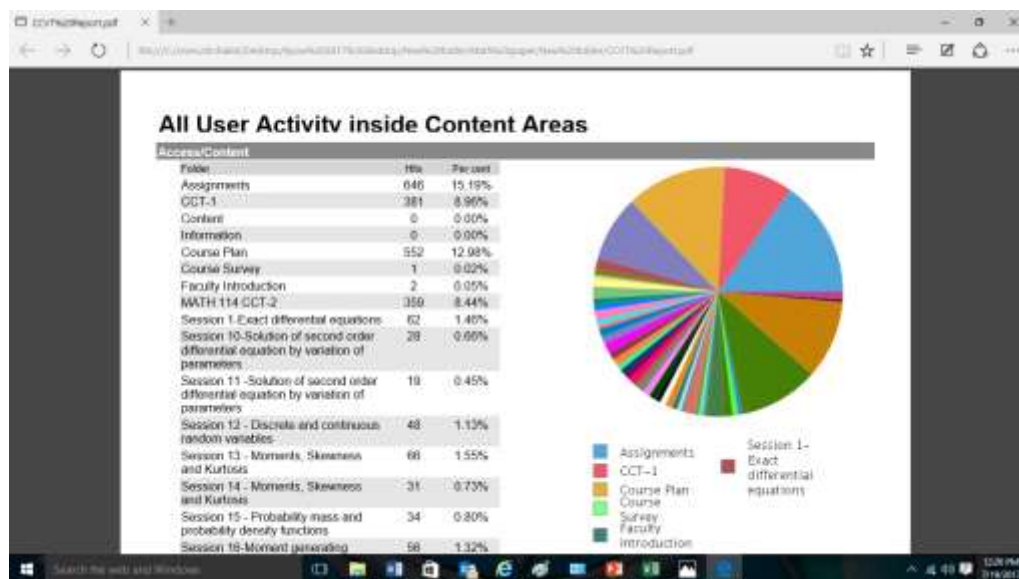
able to execute numerical interpolation, differentiation, and integration using finite difference calculus on discrete data. Posets and lattices, which have a wide range of applications in computer science, may also help students understand the significance of order and precedence connections. Pre-service math teachers' knowledge and academic performance may be improved via the use of a blended

learning strategy. Adaobi Ubah and colleagues (Adaobi Ubah et al., 2020). First-grade female students in intermediate school are the focus of this study, which intends to examine the impact of blended learning on kids' arithmetic proficiency and critical thinking abilities.

Screen shots from the course as done by students:



User activity inside content area



Student's activity feedback given by faculty

Feedback of MRINAL JANA (40001499) for B.Tec-CS-BAD II - Mathematics II

Feedback Name: Faculty Feedback April-2017 Students on rolls: 122 Feedback date: 03-04-2017
 Feedback given by: 12 Av. Rating: 73.71 % Points: 3.69

Group A (Score >= 75%)			
S. No	Comments (Questions)	Score	%
1	The presentation on the board was good	90	75.00
2	The Instructor was responsive to the student's difficulties	88	73.33
3	Evaluation of the exam script was fair and transparent	88	73.33

Group B (Score >= 60% & Score < 75%)			
S. No	Comments (Questions)	Score	%
1	Visual aids (PPTs, etc.) were useful	46	73.33
2	The Instructor's motivation/encouragement was good	46	73.33
3	The pace of coverage was satisfactory	46	73.33
4	Instructor taught with enthusiasm and acted as a source of inspiration	46	73.33
5	The fundamentals were well emphasized	47	73.33
6	The Instructor was well prepared with the subject	47	73.33
7	Overall rating of the Instructor on a 1-5 scale	47	73.33
8	The subject was made clear/understandable	46	73.33

Group C (Score < 60%) No records to display

Conclusion

Through the analysis and feedback received from the project studies using e-learning practices in Mathematics classrooms, many dimensions have been emerged and The revolution of the information Communication Technology (ICT) in contemporary teaching is influential method which has brought enchanted

retort around the world. E-learning has numerous insinuations but in traditional Mathematics class it may be used as support of the traditional face to face lecture. Blending e-learning traditional old methods, going to open many effective approaches towards understanding of the concepts and disseminating information effectively. (Kazemi et al., 2021)

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