

Teaching and Learning Techniques

A New Paradigm



Government College Zirapur Dist-Rajgarh
"Accredited by NAAC"
Department of Higher Education
Government of Madhya Pradesh



Editor-in-Chief
Dr. V. B. Khare
Editor
Prof. Sakshi Kasanya
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Webinar Proceedings

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ABOUT THE COLLEGE

Government College Zirapur, Rajgarh, Madhya Pradesh is a co-education college affiliated to Barkatullah University Bhopal and administered by the Department of Higher Education, Government of Madhya Pradesh. This college was established on 1st December 1989 and located at a very peaceful remote area of Zirapur, which is a very old, and heritage town and has an eco-friendly campus. As a government institution, the main objective of the college is to make higher education accessible to everyone as a public utility service. The college runs mainly UG & PG courses in Arts and Science. UG in Commerce governs by Janbhagidari.

Aim of the institution is to create student friendly teaching learning environment and to promote awareness among students on ecological and environmental issues. To ensure the holistic development of the students, various departments of the college also conduct enrichment programs. Such program's aim to focus at community orientation, better career option, moral & ethical values etc.

Students of Government College Zirapur are facilitated with the highly qualified, energetic, active and dedicated faculties. There is a strong community environment irrespective of caste and religion in the institution.

The Zirapur College has a well-deserved reputation for delivering high quality programs at both UG and PG levels across the academic departments of Science, Arts, Commerce and Sports.

प्राचार्य संदेश

अत्यंत हर्ष का विषय है कि शासकीय महाविद्यालय जीरापुर में एक दिवसीय राष्ट्रीय वेबीनार का आयोजन दिनांक 24-08-2023 को आयोजित किया गया, जिसका विषय "अध्ययन/अध्यापन में आधुनिक तकनीक का प्रयोग एवं उपयोगिता" रहा। जिसमें कई राज्यों के शोधार्थियों] विद्यार्थियों एवं विद्वानों ने भाग लिया और अपना शोध पत्र प्रस्तुत किया। साथ ही विषय विशेषज्ञों द्वारा संबन्धित विषय पर व्याख्यान दिया गया। इस राष्ट्रीय वेबीनार के माध्यम से सभी प्रतिभागियों को अध्ययन/अध्यापन में आधुनिक तकनीकों के बारे में अधिक से अधिक महत्वपूर्ण जानकारी उपलब्ध करवाई जो निश्चित रूप से अध्ययन/अध्यापन की उच्च गुणवत्ता में सहायक होगी।

इस अवसर पर प्राप्त शोध पत्रों को ISBN नंबर वाली पुस्तक में प्रकाशित किया जा रहा है जो सभी के लिए अत्यंत महत्वपूर्ण और उपयोगी होगी।

मैं राष्ट्रीय वेबीनार के आयोजकों को बधाई एवं शुभकामनाएं देता हूँ।

(डॉ. वी.बी. खरे)

प्रभारी प्राचार्य

शासकीय महाविद्यालय जीरापुर

Editor's Message

In the present scenario, the use of modern techniques and resources in learning and teaching is extremely necessary for both the learners and facilitators as these techniques are designed for interactive, engaging, collaborative and self-paced learning. It is a great matter of concern that the Higher Education Department of Madhya Pradesh is initiated and sponsored One Day National Webinars to introduce these techniques and resources to learners and academicians to make learning and teaching more interesting.

In the same vein, Government College Zirapur organized a One Day National Webinar on 24 August 2023 and the topic was **Use and Utility of Modern Techniques in Teaching/Learning**. In that webinar, we invited Dr. Sunita Bisnoi Associate professor, Vivekanand Global University, Jaipur (Rajasthan) and Dr. Himanshu Gupta HOD Chemistry, School of Science, IFTM University, Moradabad, (U.P.) as resource persons and Mr. Sanjay Singh Pawar President, JBS, Government College Zirapur as Chief Guest.

Many learners and academicians were participated and benefited from this webinar. We invited research/review articles in the field of the topic of webinar to present and publish in webinar proceedings. We received various articles from different parts of country. In this presented book, some selected articles are being edited and published. The use of modern techniques for teaching/learning is important in global perspective and I hope this publication will beneficial for all the readers.

I cordially acknowledge honorable Commissioner Sir HED (MP), Respected Chief Guest, Respectable

Principal sir Government College Zirapur and my all dear colleagues for this well-turned completion of webinar and publication of webinar proceedings. A special thanks to Dr. Kalpana Maski RIE Bhopal, Dr. Pragyesh Kumar Agrawal IEHE Bhopal and Prof. Santosh Kumar Verma, Deputy director, Swaraj Sansthan Bhopal for their guidance, motivation and kind support.

Prof. Sakshi Kasanya
EDITOR

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Review Paper on Modern Techniques & Aids in Teaching / Learning

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Abstract - *The review discusses the classic and modern teaching methods used in our educational institutions. The article defines teaching aids before elaborating on a number of traditional teaching instruments that are still essential to modern classroom education techniques. The essay then discusses the various modern teaching tools that are currently available. The author gets to the conclusion that educational institutions should make the most of both traditional and modern teaching resources. Anything that makes learning easier for students to understand and retain is a teaching aid. This term covers instructors, tutors, and anybody else working in the teaching field, as*

well as laboratory assistants at educational institutions' science labs. utilizing teaching aids. The new teaching approach, which we named the modern teaching approach, centers the learner's thoughts and involves them fully in the learning process. The learner is the main focus of curriculum preparation and teaching in the modern teaching approach.

Key words: Traditional, Contemporary, Conventional, Teaching Aids, Educational Institute

Introduction

Over time, there has been a noticeable change in how education is delivered. The advantages of contemporary teaching techniques have led to the introduction of interactive teaching methods, and the results are clear. These techniques have taken the place of traditional recitation exercises and memory in the classroom. This educational reform presents a completely different viewpoint on teaching and learning because modern teaching methods, in contrast to the conventional style of teaching, do not treat all students at the same level of their understanding capacities. Less focus is placed on lecturing in contemporary classrooms and more is placed on debate, demonstration, real-world application, collaboration, and activity-based learning. Teaching aids assist students in learning in a variety of ways. Teachers use a number of instructional tools to encourage their pupils to listen carefully and with enthusiasm. A few examples of common teaching aids are textbooks, chalkboards, posters, globes, charts, and other visuals. But as technology developed, so did teaching aids, which may today be categorized into a wide range of subcategories, including mechanical teaching aids, audio-visual aids, visual aids, and more.

Elements of Modern Teaching Methods

Mutual in Nature- The current teaching approach is characterized by being extremely participatory. To complete the learning tasks and produce the appropriate outcomes, the teacher urges the pupils to work in pairs or small groups. It enables them to learn from one another. Students develop a sense of cooperation and teamwork. When they venture outside, it also works in their favor.

Assets Based - Teachers of BST should be creative. All of the study materials needed for the students to learn or comprehend the subject fully should be gathered and distributed by them. The school setting or any other place where they are available can be used to gather the resources. A learner may also provide resources or study material from their own end.

Mission Based - The BST teacher or guide plans the task or activity and motivates the students to learn in this manner. As a result, it is activity- or commission-based. Through these interactive exercises, students are encouraged or invited to participate in classroom engagement.

Student-Centered – Student-centeredness is one of the key features of contemporary teaching strategies for basic science and technology (BST). It concentrates on students using or applying during lectures in the classroom and in the lab. The learning process is entirely student-driven, with the teacher serving merely as a guide. Significantly, students seem to dominate interactions in the classroom.

Collective in Nature - The fact that modern teaching approaches are integrated is one of their key benefits. Teachers integrate topics from other subjects into one another, for example, social science topics like drug usage, domestic violence, safety, pollution, food

distribution, and crime. This allows a student to learn about numerous subjects while studying one.

Traditional/Conventional Teaching Tools

Traditional teaching tools have been around for a while, as their name suggests. These educational resources were essential in the days before technology. Typical examples of traditional teaching materials include blackboards, textbooks, charts, pictures, posters, maps, atlases, globes, flash cards, flip cards, worksheets, science lab equipment and supplies, models, crossword puzzles, quizzes, dramatizations, one-act plays, dictionaries, encyclopedias, reference books, learning toys, and abacuse. Let's look at each of these teaching resources separately.

Textbooks - Textbooks of studies for particular courses in an educational institution have been a teacher's other incredibly useful instrument from the dawn of time. To read and explain to the students everything covered in the text book classes, a teacher uses the text book.

Chalks and Blackboards - Blackboards are among the most traditional and popular teaching instruments in education, along with textbooks. Black boards have recently been replaced by green ones, but the fundamental function of the board is unchanged regardless of shade.

Globes, Atlases, and Maps - Geography classrooms become more realistic when teachers use wall maps, atlases, and globes to assist students comprehend and know various geographical notions and to know the positions of various areas in the world.

Models, Materials and Scientific Apparatus - No scientific training may be deemed complete without demonstrating to the students how real-world

applications can be used in the lab or during class activities, such as with zoological parks and locations, eaves, twigs, flowers, seeds, etc.

Charts, Photos, and Posters - Charts, photos, and posters are displayed on the walls of classrooms by teachers as teaching aids to help students comprehend the subjects they are teaching.

Modern/Contemporary Teaching Tools

Over the past few years, people's understanding in science and technology has expanded dramatically, as has their ability to take in new information in these domains. Because of this, there is a great need for imaginative and innovative minds to venture into unexplored waters in a range of businesses. The only way to prosper in the modern world and the knowledge-driven era of technology is to adopt modern methods. Online dictionaries, encyclopedias, image dictionaries, talking dictionaries, online tests, online e-books, and audio-video instruction are all examples of technology used in education. aids for learning a number of topics, such as languages, PowerPoint presentations and games, flash educational games, lessons relayed on radio by satellite, lessons relayed on TV by specific TV channels, and Educa contain contemporary teaching methods.

Power Point Presentations - Slideshow Power Point presentations and Power Point games are widely used in modern education. With only a basic understanding of PowerPoint, anyone may make slides and games on the important educational subjects. A teacher can do this work very quickly if they are sincerely interested in studying and using this medium to instruct their students.

Desktop, Computers and Laptops - Computers are one of the most important instructional instruments

available today. In the present era, education is considered inadequate without computers. Every other electronic learning tool is developed around this core component. These come in many different forms, including desktop PCs, laptops, notebooks, and straightforward e-readers.

Slide Projectors, Overhead Projectors and Projector Screens - Slide projectors are only used to play tiny slides on projector screens; the visuals, though, are still rather than moving images. Overhead projectors, Slide Projectors, and Projector Screens - Slide projectors only serve this one purpose. However, it is a useful and inexpensive teaching tool when compared to contemporary electronic projectors.

Interactive Electronic Whiteboards - Interactive electronic whiteboards, sometimes known as "smart boards," are the most contemporary teaching tools being used in classrooms today. These calls require a computer, an overhead projector, and already loaded educational software. Only educational institutions that charge their students astronomically high rates will be able to afford this pricey technology, which necessitates a large investment.

Online Encyclopedias or Dictionaries - Kids nowadays are consuming an unprecedented amount of online learning resources. Numerous youngsters are becoming more familiar with the internet. This is because the internet offers young students a variety of opportunities through tens of thousands of websites. There are numerous free online resources, including talking and visual dictionaries, encyclopedias, and dictionaries.

Conclusion

It became unthinkable to envision a classroom without a teacher drawing diagrams and pictures with chalk or writing the lesson notes on the board, which the students diligently copied into their notebooks, as the value of teaching grew. The majority of Indian educational institutions continue to employ the same teaching methods, however as was indicated above, several have changed to more modern ones. Combining traditional and innovative teaching methods is the best strategy. The most recent educational technology must be kept up to date, and teachers must take advantage of every chance to have it installed in their classrooms.

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Prospects of Online Learning and Virtual Classroom in the Traditional Educational Landscape

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Abstract- *There are two categories to describe the features seen in most online learning platforms. The first category consists of characteristics shared by programmes designed to mimic traditional schools. The group discusses the distinctions between a typical classroom and an online learning environment. Best practices are also offered that might help teachers make their classes feel more like a regular experience for their students. The second set consists of cutting-edge tools and methods that supplement conventional education. Successful practices that cannot be carried out in a traditional classroom are introduced in this group. This*

study provides a qualitative assessment to make full use of the cutting-edge tools available in today's virtual classrooms and compares them with offline teaching responses.

Keywords: Online learning, virtual classroom, traditional education, e-learning, smart classes

Introduction -

Teachers today use online forums to conduct classes much as they would in a traditional classroom, a tradition that dates back centuries. This is typically what students expect, which creates a self-perpetuating cycle of frustration whenever they log into a virtual classroom. Although the resources exist for virtual classrooms to go beyond conventional (in-person) educational and incorporate methods that are impossible to use in such platform, this is not the case and is unlikely to become universal practise for at least a few more years. This happens frequently when cutting-edge technology is introduced to an area that has relied on time-tested practises for decades. The film business, to give just one example, has adopted this strategy. While motion pictures didn't exist until 1890, their earliest iterations mirrored what audiences and performers alike were already familiar with from decades before. Thus, early films were shot using fixed cameras on a stage, with actors relying on their training from their previous medium (theatre) and the assumption that the action unfolded in a linear fashion.

The "Great Train Robbery" (1903) was the first picture to fully explore the possibilities that the new medium offered [1]. It featured location filming for the first time and presented audiences to events that occurred simultaneously in multiple locations. It took a long time for all films to start using these techniques, but they're

now standard. This study claims that while virtual classrooms have the potential to break free of the constraints of conventional classrooms, their application is nevertheless limited by 'tradition,' as in the paradigm of the film industry. In order to make this point, a brief literature study on online classrooms is presented in this work. We provide lessons learned and best practises from experimenting with virtual classrooms as a means of either mimicking conventional platform or breaking free of their confines.

Online E-Learning in Virtual Classrooms -

In 1980, Chambers [2] proposed implementing distance learning experiments in a method that may permit in-house learning for specific educational materials; this was the first-time computers connected via a network were used to improve the learning process. An early proponent of the concept of a "virtual classroom" was Hiltz[3], who coined the term in 1986 to describe the usage of a computerised conference system. First generation usage of virtual classrooms centred on technological concerns such sound and video and the use of a "pencil" for the whiteboard, with bandwidth constraints and a lack of "turn-taking" being the most frequently cited challenges [4, 5]. The proliferation of online synchronous tools for learning provides alternatives for virtual classrooms [6], following the development and maturation of video conferencing technology. Virtual classrooms often included a whiteboard, slide show, text-based interaction, and student feedback [7]. Virtual classrooms emerged out of a need to provide a realistic classroom environment for students participating in synchronous distance learning. The primary focus of these earliest implementations was providing students with a setting that mimicked a

traditional classroom. Network and equipment restrictions resulted in sound and video problems, and a lack of relevant tools (such as a discussion administration feature) meant that this was often unsuccessful. Focus shifted from sound and video problems to the environment's overall quality and ease of use [8–12] as newer environments began to incorporate additional features [6]. Distance learners weren't the only ones who may benefit from virtual classrooms; blended learning and supplementary on-campus courses were also viable uses [13]. In today's virtual classrooms, students can better form a learning community and avoid alienation, which is inversely related to classroom community, through the use of synchronous communication between distance learners [14]. In today's virtual classrooms, instructors and students can take advantage of a number of tools that allow them to both simulate and expand upon the limits of conventional classrooms.

Utilisation of Virtual Classrooms as a Noteworthy Experiences -

The components observed in typical virtual classroom settings are classified into two distinct groups to effectively convey the author's two decades of experience utilising virtual classrooms in higher education. Within the initial category, one will encounter distinctive attributes that are specific to simulations of traditional educational environments. The second category, referred to as "advanced features," encompasses a range of tools and procedures that are not commonly included in traditional classroom instruction[15]. The superior functions were differentiated based on the imposition of the following conditions. a) The feature of accessibility is prevalent in the majority of virtual classroom environments that have

been implemented thus far. b) Extensive documentation exists for educators to gain familiarity with these features. c) The accessibility of these features is limited to online platforms and not available in traditional classrooms, unless certain physical and practical limitations are overcome. The subsequent sections explore the practical distinctions between traditional and virtual classrooms, as well as present instances of optimal approaches pertaining to advanced functionalities that are unattainable in a conventional classroom setting[16].

Utilisation of Enhanced Functionalities -

In contemporary educational platforms, the classroom environment commonly incorporates multimedia elements such as video and audio, which are utilised by both educators and students. Contrary to this, early 21st century online classrooms did not exhibit such characteristics. One effective strategy for cultivating a sense of community is to provide video introductions among students, particularly in cases when they have not yet had the opportunity to meet face-to-face.[17,18] In situations where, physical interaction is unattainable for students engaged in remote learning, it is imperative to afford them the chance to present themselves via video and audio mediums. We introduced a dialogue option for historical and pragmatic reasons, even though it has little to do with classroom practise. Virtual classroom recordings from 2000-2003 show that roughly one-third of pupils had sound issues. This is rare today, but one-third of virtual classroom students did it then. As most modern chats allow direct student-to-professor messages, students can explain a topic or the professor can collect rapid remarks, which are beneficial beyond fixing the sound [19]. Chat activity can indicate student involvement, but one professor cannot teach oral and

written communication. One method is to have two teachers, with one collecting chat logs and reporting verbally. When more than 30 students are expected to use the chat system, multiple lecturers are recommended.

The lecturer can track student participation with their feedbacks. Having students answer questions like "is everything OK so far?" or "can everyone hear me?" individually might delay a lecture for minutes, but employing the feedback system makes it smooth. Experts recommend "yes" and "no" above nuanced replies like feelings in most cases. Students should affirm attendance every 10–15 minutes with an interesting activity. Because it requires a lot of turning away from the class, the whiteboard can distract teachers in traditional classrooms[20]. Having students write on the whiteboard or highlight issues they want to explore keeps them engaged in class.

Slide presentations are useful if you know how. Use only complex slides with photographs and diagrams. It turns out the online classroom with the slides is a webcast. Instead of slides, use a whiteboard to illustrate. If showing a slide is necessary, use the virtual laser pointer, comment, have students point, or underline significant parts to engage them in the debate. Last but not least, the virtual classroom's discussion administration tool reduces the hardest teaching tasks. Audience management skills like keeping order, counting hands, and letting everyone speak need practise. Some students 'raise hand' just to retract it, making it difficult for the instructor to maintain order and guarantee no one feels excluded. When there are less than 10 students in the audience, switch on all microphones and turn off 'hand raise', but in front of a larger crowd, use all features. An aide to track students' raised hands might be essential in

large audiences (particularly over 50 or 60). If no hands are raised after 10–15 minutes, pause and ask a question to start people thinking and discussing[21,22].

Conclusions -

In summary, this study presents recommendations for improving pedagogy in online learning environments, with a focus on replicating the dynamics of traditional face-to-face classes. Many contemporary educators continue to deliver instruction on online platforms as a means of emulating the pedagogical dynamics observed in conventional face-to-face classroom platforms. It is frequently observed that the utilisation of state-of-the-art tools is often employed while modernising a long-standing practise. The suggested methodologies, emphasized in this study are expected to assist teachers in removing barriers to virtual classroom limitations and effectively using the complete array of resources accessible in contemporary virtual learning environments, which will challenge traditional offline classroom learning systems in the near future.

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Conflict of Interest

The authors declare no conflict of interest.

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PROJECT-BASED LEARNING (PBL)

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Abstract - *Project-based learning (PBL) is a novel or imaginative educational strategy. The use of projects in the classroom allows students to investigate issues and difficulties from the outside world while also gaining valuable skills. A modern method of instruction known as project-based learning (PBL) has recently gained popularity across a variety of academic fields and across several national settings. We conclude by saying that the studies contrasting PBL's relative productivity are largely consistent in showing that it is more effective at retaining knowledge over the long term and applying it.*

In a problem-based learning (PBL) approach, students learn about a subject by collaborating in groups to find a solution to a problem. The motivation and learning of the students and teachers are driven by this issue.

Introduction -

PBL is a proactive method for increasing student engagement and inspiration in their educational endeavors. The primary goal of several learning techniques used in the teaching method is to empower students to actively address the challenges that are put before them (Martn and Rodrguez, 2015). The project-based learning approach is an alternative that involves interaction with the study objective and culminates in the completion of an assignment by the students that has been recommended by the teacher⁽¹⁾.

Briefly stated, project-based learning evolved from the concept of constructivism, which holds that learning is perceived as an intellectual construction. Accordingly, students learn through the development of novel ideas on their own initiative, show that they have understood them using various presentation forms, and gain expertise and knowledge that will serve as a solid foundation for their future in the global community.

Objectives of the Study -

The study attempts to accomplish the following goals through the use of cooperative learning, an active strategy that enables students to accomplish both social and academic goals, so fostering acknowledging for all learners without distinction. Having an understanding of how cooperative work functions is important for developing the operational structure of the newly launched PBL. More proof of PBL's effectiveness has just been provided through an empirical investigation. The research team randomized the groups of students to

participate in one of the three scenarios (lecture-based, or self-study groups, PBL), and they discovered that those who participated in the PBL group had an increased chance of changing their conceptualizations, compared to those provided to both of the remainder of the two scenarios in conceptual tests after the instructional session and in a post- test that was postponed one week later.

Teachers build up an well-organized system of correct collaboration in order to hinder the growth of the predetermined goals as well as other competing goals, such as communication, collaboration, and social awareness⁽²⁾.

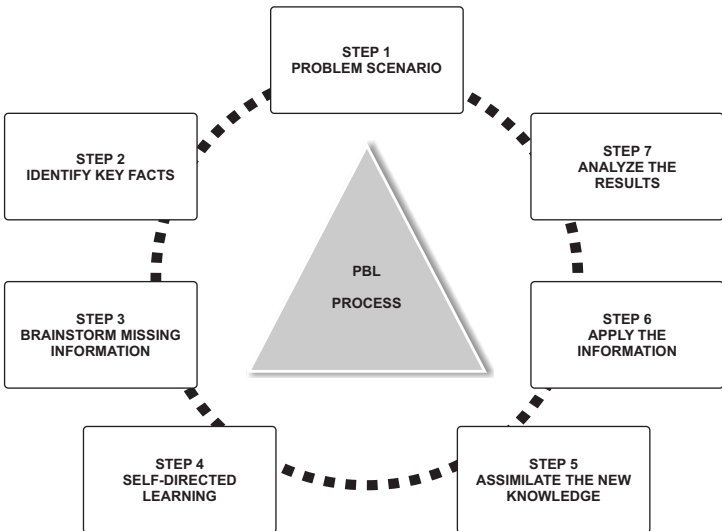


Figure 1: The process of PBL

PROJECT-BASED LEARNING IN LANGUAGE TEACHING AND LEARNING

In numerous ways, project-based learning (PBL) constitutes a productive and effective teaching strategy. Greater emphasis should be placed on how PBL might be modified to effectively teach language in secondary education. PBL learning has been extensively examined, and various publications have explored the fundamental benefits of using PBL in educational situations. Future generations of people will require skills to be able to overcome concerns and problems related to the global environment, so students should practice working on these issues in class. Students need to develop the ability or capacity for using their comprehension of science in circumstances that require decision-making and problem-solving expertise, rather than simply memorizing the material without comprehension of the facts and value associated with the knowledge⁽⁴⁾. The following four key concepts from the field of learning sciences are essential to project-based learning: To make it possible for students to learn effectively,

1. Work continuously to improve their comprehension,
2. Working collectively,
3. Authentic learning environments that are appropriately complemented by cognitive⁽⁵⁾.

The success of project-based learning should focus on teaching expertise that is student-centered and developing a close-knit community between students and teachers⁽⁶⁾. The teacher and student both grow to play different roles as a result. Students are expected to expect self-indulgent learners who can endure the ambiguity and unpredictability of project-based learning projects, and teachers frequently have to masquerade concurrently as developers, the promoters, facilitators, and leaders in

project-based learning⁽⁷⁾.

Through their active participation in the work that has been allocated to them and their use of that knowledge to improve the future of the international economy, students are taught a course of knowledge through project-based learning. The pupils have the opportunity to engage with the world physically, intellectually, and socially in an effort to discover the purpose or the body of knowledge required for the growth of this modern world. As a consequence, the learner gains a thorough understanding of the subject.

Preparation for the accomplishment of PBL:

In project-based learning, the instructor is expected to educate the group for the project. However, he will mostly delegate the position of leader to the students, who will oversee the entire process. PBL's primary goal is to connect pupils to the outside world so that both they and the global economy can grow mutually beneficially. Because of this, the achievement of PBL is entirely and substantially dependent upon the encouragement of students, and an effective educator will be able to not only awaken the desire to learn and think, but also to start and maintain a suitable degree of engagement until the process is complete. All of this requires a little bit of different preparation, and it doesn't just come down to submitting a simple paper to the school teacher as a record. It may be true that reflection is a necessary component of project-based learning, and that this task is not very challenging to complete. However, we must make sure that the results acquired are not ignored at any cost, and that students are driven to complete the task for the benefit of human welfare.

METHOD

STEP 1: Context and Selection of a project

The teacher should set up a scenario where the pupils begin planning their contributions to the assigned projects. These projects should be discussed separately by the teacher and the pupils. The teacher should provide any essential or significant direction so that the student has as much opportunity as possible to complete a project. First, it must be acknowledged that not all circumstances have been created for our educational system to facilitate the transition to a PBL paradigm. The reasons for this include the extensive course requirements for all courses, the level of responsibility placed on students while they are enrolled in school, the unreliable school infrastructure, teacher preparation programs, etc. PBL provides an opportunity for the entire class to engage with the outside world, accept their differences, and grow as a team through fostering team spirit. It is not just for the top student.

STEP 2: Make a plan for PBL and Make an outline

As it encourages teachers to be involved and creative, this is a significant, extremely engrossing, and restorative element of PBL. Due to the second step's ease of completion and its benefit of creating realistic employment chances. The concepts have now been placed in their proper perspective. Following the selection of the project program's content, the teacher and students should have complete flexibility to discuss it. The supplied foundation of PBL is completely clear if any of the offered topic content has been stratified or the student must deal with the context, but for the time being, the student and instructor can work together to make the content clear and sorted. For instance, if a student receives a topic on soil composition, the student will

gather a variety of soil samples for the purpose of the project and discuss all of the details alongside the teacher for improved guidance.

STEP 3: The rational structure of PBL and exhibition of the project

Project work should begin in accordance with the prepared or roughly formed project's structure or outline. As soon as the project-making process begins, the student's job must be completed responsibly. The teacher's duties include advising and motivating the students, supervising and reviewing their work, and making necessary revisions to the student project. Following that, the student completes the work provided with proper understanding, and the knowledge acquired is real and lasting. But you should also consider the following when planning a project:

- Why was this project assigned?
- What is the PBL's primary objective and end result?

PBL goals

Students that participate in project-based learning should learn the subject matter, develop project-specific skills, and comprehend the project's objectives.

It will assist students in acquiring talents that they can apply for the good of the world and the future.

STEP 4: Evaluation and Results

As soon as the project is finished properly, the professors and students review it and examine the outcomes, which will result in knowledge that will last a lifetime. It is based on the project's goals, and after the project is finished and carefully analyzed, its success or failure is discussed. In order to amend or remove errors from their work and recall all of their knowledge, the students debate and plan adjustments to their work.

The PBL is not a straightforward learning process; it demands greater focus and commitment to the project's subject, and the information gained from it is rigid and enduring. The right direction from the teacher to the learners is essential for precise and accurate information. Hence, the collaborative effort between students and their teacher produces the ideal assignment for better knowledge and informational pieces.

CONCLUSION

Empowering society think differently in order to produce autonomous thinkers and learners is one of the primary objectives of project-based learning. Not just students and teachers are affected by the practical application and diffusion of the knowledge learned through PBL, but also many other people. The pupils will eventually have to enter the workforce where their performance will be assessed together with future generations' well-being. The quality of their collaboration, planning, organization, critical thinking, knowledge, abilities, and other important factors that help the students must also be taken into consideration while evaluating their work in addition to its results. PBL is the most effective and most accurate way for teaching kids the correct and superior knowledge. Project-based learning is an approach of imparting knowledge to students by getting them interested in the work that is given to them and utilizing that knowledge to improve the development of the global economic system.

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A Study on the Application of Artificial Intelligence in Education

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Abstract- *The teaching and learning techniques are significantly affected by the growth of novel technologies. Recently, the technology of artificial intelligence has undergone rapid advancement, owing to its apparent usage in the education. The present study will address the role and applications of artificial intelligence during education. Thereafter, a discussion is made to analyze artificial intelligence impact on teaching as well as learning. The study will pose positive impacts in order to raise the quality of teaching by teachers as well as the learning experience of students. The scheme may assist students with both different backgrounds in executing artificial intelligence in education studies*

Introduction -

The rapid technological advancements that have occurred over time, particularly in the field of education, have been driven by different principles and methodologies¹. Artificial intelligence (AI) is constantly evolving and is widely applied technology in a variety of fields. AI is applied in various educational practices as AI in education (AIEd), which includes clever teaching robots and tutorial systems². In schools, AI has influenced the instructional methods and learning environment³. AI has demonstrated significant application benefits, having an enormous effect on the classroom management and teaching process⁴. AI may cause constant optimization and improvement in the learning environment, stimulating students' enthusiasm, creativity, and initiative. At the same time, it has the potential to significantly improve teachers' classroom management skills⁵. Research in related fields has made it possible to apply AI in education more broadly, and it have shown positive application effects to help in advancement of teaching reforms^{6, 7}. AI outperforms humans in computing and decision-making. AI research is now focusing on audio-visual literacy of human, including capability to write, hear, see or read. As a result, the focus is on developing computational and cognitive thinking of students. Google Maps is an example, from prior customization to real-time adaptation⁸. Google Maps may detect when traffic approaching towards the route of a driver and recommend an alternate route. Furthermore, AI can help in identifying numerous unknown values and hidden results⁹. Precision education is the application of

learning analytics of AI and machine learning for improvement in quality of teaching and effectiveness in learning ¹⁰. The students' learning outcomes can be improved by application of related technologies and AI for determination of learning conditions ¹¹. AI may improve human productivity through technology, in terms of technology-to-humanity transition¹². The attempts to merge machine learning with human intelligence, AI designs should take into account human circumstances and adopt a human-oriented approach. The development of Generative Pre-Training (GPT-2) and Bidirectional Encoder Representations from Transformers (BERT) has become more useful than traditional methods of deep learning ^{13,14}. These new algorithms have the potential to achieve human-like performance. Furthermore, the precision education can apply AI for prevention, treatment, prediction, diagnosis, profiling, evaluation and smart assessment ¹⁵. In order to make AI educationally and theoretically sound, it may require learner data in large quantities, which may give rise to ethical issues ¹⁶. In educational institutions, various departments or the education sector has been permeated by AI ¹⁷. Among other things, a significant impact of AI includes efficiency in education administration, smarter content, customized/ personalized learning and global learning. AI is still evolving, and new applications in education are emerging ¹⁸.

Purpose of Artificial Intelligence in Education (AIED)

Based on educational perspective, AI in education can prepare the more intelligent policy-making advisor, learning tool/partner, tutee and tutor as illustrated in Figure 1.

2.1. Intelligent tutor -

The majority of AIED applications may fall under this category. This group includes adaptive/personalized learning mechanisms, intelligent tutoring systems, and

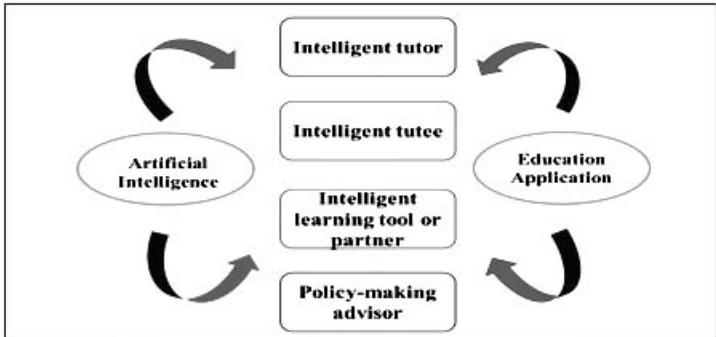


Fig. 1. Role and framework of AIED

recommendation strategies. Multiple meta-analytic research has shown how intelligent tutoring systems can effectively support learning outcomes¹⁹.

2.2. Intelligent tutee -

This type of research is uncommon because mostly educational systems based on AI prioritize helping students rather than giving them the chance to act as tutors or advisors²⁰.

2.3. Intelligent learning tool or partner -

Student-centered learning and constructivism both emphasize on importance of providing an intelligent learning partner or tool. The tool can help students gather and analyse data in more productive and efficient ways, allowing concentrating upon important details or higher-order thinking (such as prediction or inference) instead of simple tasks (such as calculation or editing). Some tools may even evaluate and support data in a "smart" way assisting learners to think deeply and discovering useful implications of data²¹.

2.4. Advisor for decision-making -

In recent years, AI methods have been used to help inform and direct the development of policies or laws²². As a result, creating a policy-making advisor for education policy-building is both possible and feasible. Policymakers can more effectively build and assess educational policies by using AI technologies to better understand trends and issues for education systems from micro as well as macro perspectives²³.

3. Application of AI in Education -

The major focus of additional studies on education and AI is using the technology to implement intelligent learning, create smart campuses, support instruction, management and teaching. Adaptive learning, face recognition, image recognition, and other artificial intelligence (AI) methods are being used in the field of education to enhance student learning and increase teachers' productivity²⁴. Additionally, big data and AI technology are combined thoroughly and evaluate teaching data, which can also support teaching reform and enhance the quality of instruction. Following that, we will conduct a literature review on the contribution of AI on smart campuses, teaching evaluation, intelligent tutoring robots, virtual classrooms, and adaptive learning²⁵.

3.1. Intelligent teaching system -

The system is comprehensive and adaptable, involving various scientific areas like behavioural science, psychology, pedagogy, cognitive science, computer science, and artificial intelligence²⁶. The main purpose of the system is to apply individual instruction, offer guidance and impart knowledge to learners using artificial intelligence. Intelligent teaching systems can be used to implement various teaching and learning

techniques, including collaborative learning, discovery learning and inquiry learning. This increases effectiveness of teachers' instruction while also assisting students in the development of personalized learning and innovation²⁷.

3.2. Teaching Evaluation -

The intelligent examination system, a significant example of computer-aided teaching, is a virtual intelligent examination program that makes use of AI methods to enhance the effectiveness and efficiency of automatic teaching evaluation²⁸. AI methods such as computer vision, prediction systems, and image recognition, make teaching assessment easier. Student evaluation is an important part of the teaching process. Teachers give much time on assessment tasks such as scoring, test paper analysis, performance evaluation, and question preparation, in conventional classrooms. The use of AI increases the variety of teaching evaluation techniques, the scientific accuracy of the evaluation process, and the reliability of the evaluation outcomes²⁹.

3.3. Intelligent agent technology -

It is, also known as agent technology, a entity of software that includes a database, agent communication explanatory reasoner, and knowledge domain base. The agent is extremely intelligent as well as self-teaching; it may mimic human behaviour by actions, learning, perception, and reasoning³⁰. Many subsystems of intelligent agent technology exist, including homework publishing, examination, interaction, and question answering. To store data, each of these subsystems has a separate database. The subsystem databases may be linked together using intelligent technology to allow for information sharing resources. Intelligent technology may create learning plans for students by analyzing this

data and finding personalized features like click knowledge point statistics, interaction logs, and learner interests and hobbies information. This allows teachers to quickly master the changing information of their students as they learn³¹.

3.4. Online Classroom -

The advancement of online reality (OR), sensing, and hearing techniques are facilitating educational reform. Utilise ubiquitous computing technology to create virtual laboratories and classrooms by integrating physical and virtual space³². In order to provide students with a contextual learning environment, smart classrooms can present changes which are difficult/impossible to experience in real life. Virtual technology is used in virtual classrooms to simulate challenging teaching scenarios³³. Students' hearing, vision, and other senses are stimulated when learning material is presented in multiple dimensions³⁴. In terms of flexibility in course attendance, the hybrid virtual classroom is very promising, as students can decide to participate in lecture on campus or at home. The term "virtual simulation laboratory" suggests the use of multimedia, 3D modelling, simulation, and virtual reality technologies to create computer operating environments for related software and hardware, and to replace all or some of the operating links in conventional experiments³⁵.

4. Conclusion -

The present study was aimed to demonstrate effect of artificial intelligence on education. The presence of the metaverse will provide a completely new perspective on educational technology. For learners, it will provide new learning opportunities and environments. Due to advancement in AI technology, it can be progressively

applied in areas of education in future. Considering applications of AIED and challenges that AIED faces can help in obtaining a general understanding of the state of AIED. Furthermore, it aids students and teachers in better embracing and utilizing AI in learning as well as teaching, improving the quality of teachers' instruction and learning strategies or styles of students.

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Benefits of Artificial Intelligence in the Field of Education

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Abstract - *The emergence of artificial intelligence (AI)-based education is leading to substantial upheaval in traditional teaching approaches and having a dramatic impact on the direction of technology within the field of education. AI solutions used in the realm of education leverage sophisticated algorithms to evaluate extensive datasets, facilitating the provision of tailored and adaptable learning experiences. Within the field of education, students are given the chance to partake in personalized learning experiences, get timely feedback, and use state-of-the-art immersive technologies, including augmented and virtual reality. The emergence of AI educational software has resulted in a notable shift*

in traditional learning methodologies, including many innovations such as mobile digital courses, online references, and virtual classrooms. The integration of artificial intelligence chatbots into the realm of education is having a profound impact on the pedagogical strategies used to facilitate student learning. The growing use of AI technology by educational technology (EdTech) companies prompts the need for a scholarly discourse on the many applications and benefits of AI application development in the field of education.

Keywords: Artificial Intelligence in Education, Digital empowerment, online learning, digital technology for education, e-learning, digital media.

Introduction -

Artificial intelligence (AI) has become an indispensable component of our everyday lives, exerting profound influence across several industries in manners that were previously inconceivable. AI is transforming several domains, including sports, construction, and education, by fundamentally altering the way humans engage in labour and acquire knowledge. The integration of AI in the field of education has presented novel opportunities for individuals across all age groups. Educational technology (EdTech) enterprises are now engaged in the customization of learning experiences, the identification of areas of deficient knowledge, and the provision of focused feedback through electronic learning (eLearning) platforms.

The integration of AI with education has introduced a new paradigm of learning within the industrial sector. The advent of AI education software has brought about a significant transformation in conventional learning approaches, including many advancements such as mobile digital courses, online references, and virtual

classrooms. The increasing use of AI technology by EdTech enterprises necessitates a discussion on the many applications and advantages of AI app development within the education sector.

AI in Education -

The use of artificial intelligence in education is causing significant changes to conventional teaching methods and exerting a profound influence on the future trajectory of technology within the business. AI solutions in the field of education use advanced algorithms to analyse vast amounts of data, enabling the delivery of personalized and customizable learning experiences. In the realm of education, students are given the opportunity to engage in personalized learning experiences, get prompt feedback, and use cutting-edge immersive technology such as augmented and virtual reality.

Conversational AI applications in the field of education, such as chatbots and virtual tutors, provide expeditious support, hence fostering self-directed learning. The integration of AI chatbots in the field of education is significantly transforming the pedagogical approach to student learning. The use of interactive and engaging learning experiences improves students' comprehension of topics and enhances their ability to remember knowledge.

The fast rise of EdTech is being driven by emerging AI trends that enhance student engagement via the implementation of customized courses, interactive lectures, and gamified classrooms aimed at skill acquisition. As a result, the AI education industry is projected to surpass \$20 billion by the year 2027. Furthermore, it is projected that the revenue of the worldwide e-learning industry would increase to \$166.60 billion by the year 2023. The provided graph illustrates

the substantial financial investments made by corporations in various AI applications.

Benefits of AI to Students -

By providing pupils with early exposure to technology, we are potentially equipping them with a competitive advantage in the future labour market, since the use of such technology is expected to become more prevalent. However, it is important to shift our focus towards examining the many ways in which AI is now providing substantial advantages to those engaged in the process of learning.

In this article, we shall undertake an analysis of the subject matter at hand. Learning gaps may be effectively identified with the use of specially developed AI platforms, which have the capability to examine prior performance. These platforms are able to uncover learning gaps that may otherwise remain unnoticed.

Personalization -

Artificial intelligence has the capability to tailor educational information to individual students, hence facilitating a personalized learning experience as opposed to a standardized approach.

Instantaneous Question Answering -

Through the use of artificial intelligence, students are able to get prompt responses to their inquiries, eliminating the need to wait for a human counterpart. This approach has the additional benefit of fostering an environment wherein reticent students feel more inclined to seek clarification without apprehension of potential scrutiny. The provision of timely feedback and just-in-time learning allows students to get feedback more often and promptly, precisely when they are engaged in the learning process and have a higher receptiveness to acquiring knowledge.

The use of artificial intelligence in the realm of education facilitates the incorporation of gamification and immersive learning environments, such as virtual reality (VR) and augmented reality (AR). These technological advancements have the potential to significantly enhance student motivation and engagement.

Efficiency Enhancement -

The use of AI for the purpose of idea generation or content structuring allows students to allocate their time more effectively, enabling them to concentrate on advanced cognitive abilities such as critical analysis and creative thinking. Enhanced accessibility may be achieved via the use of AI technologies, which provide intelligent data collection, customized job allocation, and customized scheduling. These advancements have the potential to bridge the gaps that exist between students, instructors, and educational administrators. As we progress towards achieving round-the-clock accessibility, barriers arising from physical location, language, and financial constraints may be effectively overcome.

The use of AI-powered environments has been shown to be beneficial for neurodiverse individuals who have difficulties in traditional educational settings or with conventional learning techniques, since it allows them to flourish.

Benefits to Educators -

Educators are now using various methods to harness the potential of AI, and these advantages are poised to expand more in the future.

Time efficiency -

Artificial intelligence has the potential to assume several labor-intensive tasks that instructors are now

obligated to do, such as record keeping and assessment. Additionally, it may facilitate the optimization of the planning process, enabling teachers to actively participate in the creative and inherently human acts necessary to enhance the learning experience.

The use of AI has the potential to significantly reduce the time instructors spend on generating ideas and material, including learning goals. AI may provide teachers with pre-generated information and ideas, allowing them to examine, modify, and employ these resources in a creative manner inside the classroom setting, as well as in project work and assignments.

Responding to inquiries from students -

The use of AI as a personal tutor yields advantages not just for students, but also for instructors. Additional inquiries may be addressed, educators can monitor the queries that have been posed while directing their attention towards formulating interventions to enhance student involvement and address any areas of educational deficiency.

Analyzing student performance -

Artificial intelligence has the capability to monitor class attendance, submission of assignments, and performance on particular activities in order to facilitate the identification of learning gaps or the detection of concerning behaviour. This facilitates the process for an educator to provide suitable interventions promptly.

Motivating and engaging students -

In the contemporary era characterized by rapid technological advancements, individuals exhibit a strong need for enjoyable and stimulating approaches to education in order to sustain their interest and involvement.

Conclusions -

AI is advancing rapidly. The school system has already experienced the effects of this phenomenon and will continue to be subject to its disruptive influence. Educators who persist in adhering solely to traditional methodologies will encounter a growing disadvantage, whereas those who embrace the capabilities of AI and incorporate tools and platforms to streamline time-consuming tasks will have the opportunity to allocate their efforts towards the more humanistic and innovative aspects of designing meaningful learning experiences. From the standpoint of students, there is a growing anticipation for immediate feedback, innovative and engaging learning experiences, and the incorporation of gamification as a norm. The ongoing advancement of AI is likely to bring about unavoidable changes not just in the methods of instruction, but also in the content of instruction. The forthcoming workforce will need a greater emphasis on advanced proficiencies such as critical thinking, creativity, and communication.

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Blended Learning : Unveiling its Importance, Benefits, and Strategies to Surmount Challenges

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Abstract: *Blended learning is an educational approach that combines online and face-to-face instruction in various ways. It aims to provide students with greater adaptability, personalization and engagement in their learning process. Blended learning can take different forms and models, depending upon the objectives, content, and context of the course. Blended learning is gaining popularity in higher education because it has demonstrated to be a fruitful technique for obliging an undeniably increasingly varied student body while upgrading the learning environment by consolidating web-based instructing materials. However, blended learning also poses some challenges that need to be*

addressed, such as the planning and design of the blended components, the responsibility and self-guideline of the students and teachers, the adaptation to new modes of instruction and interaction, the availability and quality of technology infrastructure and support, and the potential digital gap or disparity among students. The paper presents the theoretical foundation of blended learning adoption and implementation in terms of its origins and evolution. It also aims to highlight modes of blended learning, identify some of the advantages and capabilities of blended learning implementations and the various limitations related to it. The paper concludes with some recommendations for overcoming these limitations involved in blended learning.

Blended learning, the fusion of traditional classroom instruction and online learning, has gained substantial prominence in modern education. This research article explains the significance of blended learning, elucidates its multifaceted benefits, and provides practical suggestions to effectively tackle challenges associated with its implementation. Through a comprehensive analysis of existing literature, this article aims to contribute to a deeper understanding of how blended learning can revolutionize education.

Blended Learning : Origin and Evolution -

Blended learning is a term that describes a combination of online and offline learning methods. It involves using technology to deliver some educational content and activities, as well as having face-to-face interactions between teachers and students. Blended learning can offer many benefits, such as increasing flexibility, personalization, engagement, and scalability of education.

The origins of blended learning can be traced back

to the 19th century, when Sir Isaac Pitman launched the first distance education course in 1840. He taught shorthand by sending postcards to his students and asking them to return them with their answers. This was a form of blended learning because it used both mail and physical presence to facilitate learning¹.

The development of blended learning continued in the 20th century, with the emergence of computer-based training and video-based technology. Blended learning, a pedagogical approach integrating face-to-face instruction and digital technology, has emerged as a transformative force in education. This article explores the reasons behind the increasing popularity of blended learning, highlighting its potential to address diverse learning needs while optimizing the use of technology.

The term "blended learning" itself was not coined until the late 1990s, when it was used by various education businesses to describe their approach to combining online and offline learning methods. The term became more concrete in 2006, when Bonk and Graham published the first Handbook of Blended Learning, which defined blended learning as "a combination of physical f2f [face to face] modes of instruction with online modes of learning"².

Since then, blended learning has evolved into a diverse and dynamic field, with many variations and models depending on the context, goals, and needs of learners and educators. Blended learning can be applied to different levels of education, from K-12 to higher education to professional development. It can also use different types of technology, such as web-based platforms, mobile devices, social media, games, simulations, etc. Blended learning is constantly adapting to the changing demands and opportunities of the digital age.

Blended Learning Models -

Blended learning is an educational approach that combines online and face-to-face learning experiences. Blended learning can take various forms, depending on the needs and preferences of the learners and instructors. Some common blended learning models are:

1. **Online:** Learners complete most of the course content online, with occasional face-to-face meetings for orientation, assessment, or feedback³.
2. **Rotation:** Learners alternate between online and face-to-face sessions, following a fixed or flexible schedule³.
3. **Flex:** Learners have more control over their online learning path and pace, while instructors provide guidance and support as needed in small groups or individually³.
4. **Personalized blend:** Instructors design a mix of online and face-to-face activities that suit the learners' goals, interests, and abilities³.
5. **Online lab:** Learners access online course content in a physical lab setting, supervised by para professionals or peers, while instructors deliver instruction remotely³.
6. **Self-blend:** Learners choose to enroll in online courses to supplement their face-to-face courses, based on their personal or academic needs³.
7. **Face-to-face:** Instructors use technology to enhance their face-to-face instruction, such as by using multimedia, interactive tools, or online assessments³.

Benefits of Blended Learning -

Blended learning has many benefits for both learners and instructors. Blended learning caters to the

varied learning styles and preferences of students, offering flexibility and personalized instruction. It bridges the gap between traditional and digital learning environments, enhancing engagement and promoting active learning. The incorporation of technology cultivates digital literacy skills, vital for success in the digital age.

Some of these benefits are -

1. **Increased engagement:** Blended learning can make learning more engaging and motivating for learners, by offering them a variety of formats, media, and activities. Blended learning can also foster a sense of community and collaboration among learners, by enabling them to interact with each other online or in person.⁴
2. **More student-centric:** Blended learning can cater to the diverse needs and preferences of learners, by allowing them to choose when, where, how, and what they learn. Blended learning can also empower learners to take more responsibility for their own learning, by giving them more autonomy and feedback.⁴
3. **Promotes autonomy:** Blended learning can help learners develop skills and habits that are essential for lifelong learning, such as self-regulation, time management, problem-solving, and critical thinking. Blended learning can also prepare learners for the challenges and opportunities of the digital age, by exposing them to various technologies and resources.⁴
4. **Improved outcomes:** Blended learning can improve the quality and effectiveness of learning outcomes, by providing learners with more opportunities to practice, review, apply, and assess

their learning. Blended learning can also enhance the retention and transfer of knowledge and skills, by reinforcing them through multiple modes and contexts.

Limitations of Blended Learning -

However, blended learning also poses some limitations that need to be addressed carefully. Some of these limitations are:

- 1. Imposes new burdens on instructors:** Blended learning can require more time and effort from instructors than traditional teaching methods, as they need to design, deliver, monitor, and evaluate both online and face-to-face components. Blended learning can also demand more skills and competencies from instructors, such as technological literacy, instructional design, communication and facilitation.⁵
- 2. Requires greater comfort with technology:** Blended learning can rely heavily on the availability and functionality of technology, such as devices, software, platforms, and networks. Blended learning can also expose learners and instructors to various technical issues or glitches that can disrupt or hinder their learning process.⁵
- 3. Remains difficult without proper technology solutions:** Blended learning can be challenging to implement without adequate technology solutions that support its goals and principles. For example, some technology solutions may not be compatible with different devices or browsers; some may not allow for synchronous or asynchronous communication or collaboration; some may not provide sufficient data or analytics to track and measure learner progress or performance.⁵

4. **Decreased motivation:** Blended learning can affect the motivation and engagement of learners negatively if they feel isolated or overwhelmed by the online component. Blended learning can also reduce the social presence and rapport between learners and instructors if they do not interact frequently or effectively online or in person.
5. **Weakened relationships:** Blended learning can weaken the relationships between learners and instructors if they do not establish clear expectations, roles, responsibilities, and feedback mechanisms. Blended learning can also create a sense of disconnect or imbalance between the online and face-to-face components if they are not aligned or integrated well.

Strategies to Overcome Limitations of Blended Learning -

To overcome these limitations, blended learning requires careful planning, preparation, implementation, and evaluation. Some strategies that can help achieve successful blended learning are:

1. **Conducting a needs analysis:** Before designing a blended learning course or program, it is important to conduct a needs analysis to identify the goals, objectives, outcomes, content, audience, context, resources, and constraints of the blended learning initiative. This can help determine the most suitable blended learning model and technology solutions for the specific situation.
2. **Choosing appropriate technology solutions:** When choosing technology solutions for blended learning, it is important to consider their accessibility, afford ability, reliability, usability, interoperability, security, and scalability. It is also

important to select technology solutions that support the pedagogical and instructional design principles of blended learning, such as learner-centeredness, interactivity, collaboration, personalization, and assessment.

3. **Providing adequate training and support:** To ensure the smooth and effective implementation of blended learning, it is essential to provide adequate training and support for both learners and instructors. This can include orientation sessions, tutorials, guides, manuals, FAQs, help desks, forums, feedback channels, and peer mentoring. Training and support should cover both the technical and pedagogical aspects of blended learning, such as how to use the technology tools, how to access the online content, how to communicate and collaborate online, how to manage time and workload, how to monitor and evaluate learning progress and performance, etc.
4. **Building a learning community:** To foster a sense of community and engagement among learners and instructors in blended learning, it is important to build a learning community that is based on trust, respect, and mutual support. This can be done by creating opportunities for social interaction and collaboration online and in person, such as icebreakers, introductions, discussions, group projects, peer reviews, etc. It is also important to establish a positive and supportive learning climate that encourages participation, feedback, reflection, and recognition.
5. **Aligning and integrating online and face-to-face components:** To ensure the coherence and consistency of blended learning, it is important to

align and integrate the online and face-to-face components of the course or program. This can be done by defining clear learning outcomes, objectives, and expectations for both components; by designing complementary and reinforcing activities for both components; by providing seamless transitions and connections between both components; by using consistent formats, styles, and standards for both components; by assessing and evaluating learning outcomes across both components.

Conclusion -

In conclusion, blended learning is an innovative and promising educational approach that can offer many benefits for learners and instructors. However, blended learning also entails some limitations that need to be addressed carefully. By following some strategies that can help achieve successful blended learning, such as conducting a needs analysis, choosing appropriate technology solutions, providing adequate training and support, building a learning community, and aligning and integrating online and face-to-face components, blended learning can become a rewarding and effective learning experience for all. Also, Blended learning offers a dynamic and flexible educational paradigm that leverages technology to enhance learning outcomes. By recognizing its importance, understanding its benefits, and addressing challenges probatively, educators and institutions can create enriched learning experiences that cater to the needs of a diverse student body. As education continues to evolve, the thoughtful integration of blended learning stands as a promising avenue for holistic and effective learning.

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A study on Professional Learning through Digital Technologies

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***Abstract** - Digital technologies have the ability to significantly alter how professional development activities are delivered to teachers at all stages of their careers. As a result, online professional development opportunities for teachers have recently attracted new attention. Quality of teaching and, consequently, outcomes of student learning can be improved by pre-service education and in-service teacher professional development, which are referred to jointly as TPD below. Technology in education has the ability to improve both formally offered programs and unofficial peer-learning TPD models. The importance of facilitators or expert*

peers is crucial for technology-enhanced TPD to be as effective as possible, but their function is sometimes overlooked. In order to characterize suitable and efficient uses of technology as well as unique restrictions functioning in those contexts, this chapter presents a thorough overview of the literature on technology-mediated TPD for educators of school-aged learners.

Keywords: Teacher professional development, e-learning, MOOC, ICT

Introduction -

Online professional learning solutions for teaching have recently received fresh interest because face-to-face professional learning is highly difficult in several countries.¹ To assist teachers in adjusting to remote teaching, private sector, higher education institutions, as well as many governments, are providing resources of learning or offer online professional development solutions. New opportunities to create online professional learning communities are being investigated.² More than 380 million children will graduate from primary school without knowing how to read or perform simple math, according to projections from the UNESCO Institute for Statistics (UIS) (85% in sub-Saharan Africa and 56% on average).³ Low educational attainment is caused by several factors, including poor instruction, but the deficit model, which is all too common, is incorrect. The assistance of teachers in becoming effective educators can be greatly aided by pre-service training as well as ongoing teacher professional development (TPD).⁴ However, just like in high-income countries (HICs), teachers in low and middle income countries (LMICs) frequently do not have access to TPD opportunities. Growing the use of technology in educational systems could be advantageous for reducing

TPD.⁵ Utilizing affordances like ease of mobile devices access, audiovisual media capability, and two-way communication, educational technology (EdTech) can facilitate the effective delivery of TPD.⁶ Integration of technology increases the requirement for teacher professional development. For instance, when an experienced teacher is available to provide contextualized input and feedback, learning gains through the usage of customized, adaptive technology are larger. The urgent need for TPD is further emphasized by a thorough evaluation of studies on EdTech to serve learners with impairments in LMICs. However, compared to those that also include other measures to support pedagogical change or teacher development, hardware- and software-only EdTech interventions are ineffective.⁷ The necessity to provide instructors with a range of support choices for leveraging technology for remote teaching and learning, has become urgently necessary in light of the Covid-19 outbreak and extensive school closings.⁸ Yet throughout the ongoing pandemic, teachers in LMICs have frequently been asked to interact with students and provide education to them without the necessary training.⁹ Technology-mediated professional learning may help to enhance the effectiveness of instruction and student learning outcomes. A thorough evaluation of the literature was carried out on the use of EdTech for professional development in LMICs that was written between 2008 and 2020.¹⁰ This includes enhancing pedagogy in the classroom and/or subject understanding.¹¹ The demographic traits and study designs in the papers are used to elaborate on the review's approach. The research presents the evolution and usefulness of technology for TPD models in various contexts and cultures.

Adult Learning Research and Evidence in General : MOOCS and Online Courses -

Insights from general research on effective online adult learning may also be particularly helpful for teachers' professional development. Numerous experimental research have looked at the effectiveness of both more established online learning options, such as MOOCs, as well as more recent options.¹² Online courses offer the potential to lower the costs of implementing face-to-face education while also giving learners flexibility who might not otherwise participate owing to time or location restrictions. The majority of experimental research conducted at the post-secondary level for online courses have found that, in terms of participants' accomplishment and future growth, completely online learning environment were less advantageous compared to in-person learning environments.¹³ Evidence suggests that online course learning outcomes are poorer, particularly for students with lower academic achievement. In the United States, students from community and technical colleges are the subject to Xu and Jaggars' study, which demonstrates that performance gaps related to enrollment in online courses are greater in students having low GPAs as well as students of particular subject areas (such as social sciences and applied professions).^{14,15} When compared to in-person courses, participation in online courses was associated with lower academic achievement and advancement (grades in subsequent courses and chance of continuing enrollment a year later). For pupils with lower past GPAs, its detrimental effects are even more pronounced.¹⁶ Students who took course online did worse than those who took it in person, whereas those who used the blended format were on level with those who took the

course in person.¹⁷ However, little is known about how well online courses work in attracting students who normally wouldn't participate in these kinds of educational activities.¹⁸ The first piece of supporting evidence in this regard comes from Goodman, Melkers, and Pallais, demonstrating how online education delivery promotes educational pursuits.¹⁹ The in-person degree attracted younger candidates, but the online degree attracted mid-career adults who would not have enrolled otherwise. The online degree offered excellent training and had lower costs than its in-person equivalent. Surveys revealed that online degree didn't replace non-degree options but rather increased overall training participation.²⁰

In 2019, there were more than 110 million MOOC students worldwide, excluding China. MOOCs have consistently demonstrated low completion and retention rates since their introduction and, have a tendency to recruit highly educated students from richer neighborhoods and nations.²¹ Teachers-focused MOOCs have experienced similar problems with low retention. On the other hand, people may participate in MOOCs and non-completion can also signify that someone took course for the information they required without finishing it.²² Early dropout can also be a sign of a course's poor quality or a mismatch between its content and the demands of its students. In fact, there is a dearth of evidence on the caliber of MOOCs and how well they work to improve student results.²³ While completion rates rose, those with advanced degrees benefited more from feedback. Another study found that planning prompts students receive at the start of the course and that encourage them to plan their course participation from the beginning were effective at increasing completion rates.²⁴

Ensuring Instructors have Access to High-Quality ICT -

The first requirement for teachers, like other individuals, to benefit from digitalization for skill development is access to new technologies.²⁵ The requisite digital devices, the knowledge to use these tools and high-quality Internet connection to carry out more complicated activities are important for instructors to participate in online learning activities.²⁶ However, little is known about how instructors use digital resources and connect to the Internet outside the school. The OECD countries' digital access gaps have gradually closed, although there are still disparities in access, particularly between rural and metropolitan areas.²⁷ Similar to other people, teachers in remote locations are likely to face problems using online learning tools to their full potential due to the worse quality of Internet connections.²⁸

The pandemic COVID-19 highlighted how crucial it is to have computer access or other devices to continue learning/teaching from home.²⁹ Thus, one out of every two upper-middle-income and high-income nations aided teachers during COVID-19 pandemic by giving free Internet access and ICT tools to help them with their job during the school closures.³⁰ The data for teachers' access from home are frequently insufficient, the wages of teachers vary widely within and within OECD countries.³¹

Improving the Digital Proficiency of Teachers -

To ensure that they can take advantage of new digital learning tool potential, teachers' abilities are also essential. The digital divide, which at first concentrated at disparities of access to Internet, is now more frequently associated with disparities in how people apply digital device and Internet. Such inequalities have key drivers, including skills.³² Higher cognitive abilities, such as

reading, or problem-solving abilities, numeracy, or a combination of them, allow online users to advance from basic uses of the Internet to more complicated and varied usage. There are also notable variations in teachers' literacy and numeracy levels between nations.³³ Even though low-skilled teachers tend to participate in open or remote learning at comparable rates to high-skilled ones, simple participation cannot guarantee that teacher will be successful to the online learning endeavours. Teachers who are more proficient with technology or have the ability to use online resources effectively are likely to learn more effectively, make more progress, and complete their objectives faster. Once teachers start using online learning resources, how they use them and what kind of benefits they get from them will probably rely on their skill level.³⁴

Participation of Teachers in Webinars and Online Courses for Professional Development -

Thus, participating in online professional development for teachers may increase their motivation, learning preparedness, or curiosity in how learning activities are carried out while using digital technology.³⁵ Teachers in Spain typically discovered information on MOOCs while searching the web for personal reasons or based on their particular settings. In a professional setting, few people reported getting knowledge about MOOCs from their coworkers.³⁶ Differences of participation rates most likely reflect how well-supported and encouraged teachers are to participate in professional development utilizing new technologies.³⁷

Teachers' potential engagement in these types of learning is significantly influenced by the availability of ICT-based professional learning activities that are part of the formal teacher-training system, as well as by their

formats, frequency, and design.³⁸ In addition, as many teachers engage in these learning activities outside of class time, it is crucial to increase teachers' intrinsic motivation.³⁹

This online community was started by teachers and operated through non-profit on volunteer basis for more than ten years. It still depends on a support group made up of educators that serves as a community run by and for educators. However, when they come from the "bottom" as opposed to through "top-down" tactics, more initiatives of a similar nature can easily go unreported.⁴⁰

Engagement in Online Courses for Involvement in Other Professional Development Activities -

Research on (not necessarily online) teacher communities for professional development demonstrates the potential value of top-down involvement e.g., to assist the community's formation, give financing, or offer professional support.⁴¹ While certain entirely top-down strategies have been linked to successful outcomes, according to teachers, they haven't always produced communities that last.⁴² Similar difficulties can affect online groups. The teacher involvement in the community significantly decreased as the issues caused by the COVID-19 disruption were gradually resolved, highlighting the need to possibly rethink the community's role.⁴³ Teachers are likely to face greater challenges than other professionals in increasingly digital work and educational environments, which has led to an increase in online or hybrid instruction.⁴⁴ This is because they may not be as required to keep up with new tools and products or may not be accustomed to doing so. Evidences from literature on adult learning demonstrates that high performance work-organization techniques that combine worker autonomy, teamwork, and frequent peer

interactions can boost informal learning and increase its benefits.⁴⁵ Further research is required to determine the kinds of programs or projects that can encourage professional cultures of collaboration both inside and outside of schools and aid in making teachers active learners.⁴⁶

Conclusion -

In addition to various chances for teacher professional development, new technologies have also presented numerous difficulties. Both general MOOCs and ones geared for teachers have experienced low retention and completion rates. Online teacher professional learning can be influenced by the same guiding concepts that make traditional teacher development more effective. The use of behavioral and motivational interventions has been helpful in boosting engagement and completion rates when it comes to aspects unique to digital learning. Additionally, teacher learners seem to benefit better from but also like blended (learning) environments over exclusively virtual ones. These hybrid formats encourage greater levels of trust, which increases involvement and sociability among users of online communities. The latter's effectiveness, however, also depends on the community moderators whose abilities, knowledge, and time are crucial.

To support teachers in utilizing the potential of digital technologies for learning, a number of prerequisites must be satisfied. It is crucial to figure out how to recognize and validate teacher abilities and information gained through online learning. The importance of evaluations and data collection may be explored, especially in light of the increased opportunities that cutting-edge technologies and tools offer to improve analyses of the efficacy of teachers' online learning strategies.

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USE OF BLENDED LEARNING AS MODERN TECHNIQUE IN TEACHING LEARNING PROCESS

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***Abstract-** Teaching is one of the core components of educational planning, which is crucial for implementing educational programs. Despite the importance of providing good training, the outcomes are far from perfect. Knowledge-seeking challenges preconceived notions of reality. To be able to accomplish all of this, getting help from seasoned academics can be very successful and valuable. The purpose of the current qualitative study was to investigate how new educational policies are supported by effective teaching in the current setting.*

Introduction -

Due to the quick changes in the modern world, the Higher Education System is currently dealing with a wide range of problems. As a result, there is a requirement for more enthusiastic, intellectual individuals to pursue multidisciplinary fields of study.^{1,2} Professors play a significant role in educating such people in the aforementioned field, which is why research and exploration into effective and efficient teaching and learning methods is one of the most fundamental necessities of educational systems.^{3,4} In a university, novel ideas germinate, flourish, and grow tall and strong. It is a unique location that contains all of the available knowledge. It is a place where imaginative minds gather, interact, and develop new realities.

The pursuit for knowledge challenges preconceived beliefs of reality. Getting assistance from seasoned professors can be quite beneficial and successful for being able to accomplish all of this.⁵

Considering the high quality of education, focussing on students' education as the primary result of an education quality system is now much more important than it was in the past. Giving great education and research the same level of consideration has always been a priority before making any decisions. Studies, however, indicate that the current focus on research in universities falls short of the requirements for high-quality education.^{6,7}

Teachers must focus on students and learning strategies in their instruction because it is thought that this role in higher education is a big task. In addition to these two factors, teachers should advance to learn new teaching techniques. The wants and interests of the students weren't considered during instruction under the

previous system because it was teacher-centered. This is the time when the way that kids are taught must change to one that takes into account their needs and leads to active behaviour change in them.⁴ In addition, a significant portion of recently graduated students, particularly bachelor's degree holders, do not feel prepared to work in their relevant fields.^{8,9}

Education plays a important role to the pace of economic growth of the nation. Effective teaching is also very necessary to convey the message of teacher to students. The present study throw a light on the blended learning methods among students in present time.

Advantages of Blended Learning -

A. Subjects are learned in different manner by different people

The fact that different people learn in different ways is fairly well known. Online self-paced video delivery would be the appropriate medium for lone learners who prefer visual or written learning. Live instructor-led classes would be most beneficial for social and auditory learners. In the meanwhile, kinesthetic and logical learners would benefit from practical experience gained by participating in applied learning initiatives.

B. Applying many modalities reinforces engagement, learning, and retention drastically

Numerous studies demonstrate that combining diverse activities with more passive study improves learning for the majority of people. For example, threaded discussions, video conferencing, and internal social media platforms could all be used to exchange knowledge, encourage application, and otherwise connect in a "human" way.

C. Learners can control the pace of their learning

People learn best when they have some control over their learning. Choice reduces learner apathy, relieves some of the stress of the learning process and motivates people to engage with the material.

D. Blended Learning are Economically Sound

Through incorporating e-Learning into instructor-led programs, businesses of all sizes may increase engagement and retention while maximizing return on investment.

Conclusion -

You don't need to come up with anything new or rely on band-aid solutions to make your staff training program more effective when you use a blended learning method. This method combines instructor-led in-person instruction with online material, typically in the form of on-demand videos that students can view outside of class. There may be no live lectures at all, or the live instruction may take place in person or online (through a live virtual classroom or even two-way video).

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Inclusive Education through Technology

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***Abstract:** Technology assists students with disabilities to be included in education by permitting them to get beyond some of the challenges that keep them out. Technology supports other in-person approaches and resources, such as inclusive teaching and preparation for teachers. In this article, we will examine several software solutions that can help people with disabilities learn more easily and discuss how technology can make the educational process easier for such individuals.*

Introduction -

We are currently seeing borders slowly disappear in the modern world. Politics and business are not the only aspects of this process. Today, practically everyone can access medical or academic resources anywhere in the world, regardless of their citizenship or physical condition. Numerous specialized commissions work to create laws and norms to control these interactions between individuals and global organizations. In accordance with educational standards, chances for disabled pupils to reach their full potential should be made available. They must be treated equally with pupils who do not have disabilities and must be allowed to participate in training and education without facing any barriers. Digital technologies are now widely available and offer students new prospects as a result of the IT industry's development and widespread use, enabling the use of them to offer new options to students.

Here are some ways that technology can make the educational process easier for those with impairments.¹

Students with Special Requirements Advantages of Recent Technology -

The Individuals with Disabilities Education Act (IDEA), which was passed in 2001, provided educational services to 6.7 million children in the United States in 2015–2016, according to the National Center for Education Statistics. 13% of all kids in public schools fall under this category. The overall number of these students has increased by 0.3 million during 2011–2012, despite the fact that the percentage has stayed relatively constant over the past few years. The website of the National Center for Educational Statistics displays the percentage distribution of the various categories of disability.

According to these figures, there isn't a single

technological solution that could meet the needs of all pupils with special needs. The adoption of specialized solutions created in accordance with the needs of a particular group of students can ensure the best results possible due to the wide variety of disabilities.

A specific student can become more independent thanks to special technology, which relieves him of the need for ongoing teacher participation. As a consequence of this, a student can select the learning pace that works best for him, resulting in more individualized instruction. When a student doesn't impede the learning of the entire class, it allows for a decrease in anxiety, which is important for education as well. Technology integration in special education programs enables communication simplification and academic skill improvement among learners with disabilities.²

The following benefits of technology use in special education are listed by Edmentum, a business with extensive experience in the development of eLearning solutions:

"Technology supports the addition of individual learning experiences to a classroom, allowing teachers to be more flexible and differentiate their education. Teachers can utilize technology to provide a range of educational possibilities and techniques that engage, educate, and support children in special education using a number of strategies made to appeal to different types of learners. Students are no longer confined to an unfamiliar classroom while attempting to study at a rate they are unable to maintain up with or participate in."

A key viewpoint is shared by Power School, another leader in the creation of e-learning solutions:

"Technology can assist school employees in achieving the IEP compliance required by state and

federal regulations, as well as ensure that sufficient and timely financing is obtained. In order to maximize compensation, special management of education solutions may ensure that the right support is not only provided to all eligible instances, but also monitored as well as reported on.

With suitable technology, educators are able to produce and maintain complying, high-quality special education papers utilizing logically guiding actions and business rules that are in line with the IDEA as well as additional state and federal requirements. Reporting capabilities can be used to manage compliance by identifying timetables, which instructors are on schedule, and which teachers have gotten ahead. Additionally, technology can assist instructors in generating mandatory statewide and district reports and, if permitted, sending data directly to the appropriate governmental entities.”

Let's move on from generic terms to something more precise.

Breaking Barriers Through the Application of Technology in Special Education -

Technology can benefit special needs students in a variety of ways. For instance, some infirmities prevent pupils from using handwritten text, which is essential to "traditional" teaching. You can skip using paper and a pen during the instruction by using technological tools designed to facilitate human speech identification and synthesizing. Students with diseases that make it difficult for them to properly interpret visual information might also benefit from this technology.

Adaptive computing technology enables the avoidance of difficult tasks when utilizing digital equipment. Students who are blind or visually impaired

can use computers thanks to Braille keyboards that have been specially built and screen reader programs like JAWS.³

Students with speech impairments can overcome the ability to communicate barrier with the aid of augmentative communication technology. For more effective communication, these systems utilize visual graphs, textbooks, and specialized computers with word-prediction features. Consider noting the following suggestions before requesting a company's services for developing technology for special education:

1. Consider the price of a particular solution and how it can impact the learning process.
2. Check to see that the program you intend to use is reputable and will seamlessly fit into the process of education.
3. Choose a technology that is simple to learn.
4. Pay special attention to simple and logical answers.
5. The options to add new functionality that satisfies your needs or modify the current solution.

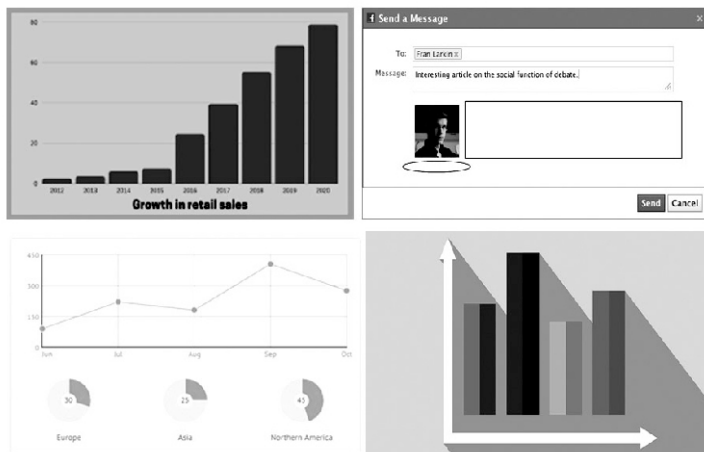
Issue to Resolution: Several Web-Based Special Education Programs

Modern software facilitates reducing the amount of work needed to approach the learner with a disability. Internet-based resources make it possible to take part in the classroom environment to the same extent as other students.

Distance Education by Web-based service -

Students with particular requirements may experience difficulties moving over extended distances as a result of some limitations. The objectives of learners and educational institutions can be taken into consideration when offering educational services thanks

to web-based learning solutions. The objective is to provide students with simple, user-friendly tools for scheduling, paying for, and monitoring their academic progress.⁴



Students can order some of the offered educational courses online using this program without leaving their homes. Additionally, it's possible to engage a professional who is qualified to instruct kids who have a specific kind of limitation.

Affordable and Efficient Video Conversation for Online Learning -

Web-based talking tools that are neat and simple to use enable the creation of online classes to assist students with impairments in communicating with one another and the instructor. These online classrooms make it possible for instructors and students from around the globe to interact in real time. One of the key benefits of this method of instruction is that it is inexpensive. The cost of travel is not a concern for students. All that is

needed is a tablet or laptop with a connection to the internet.⁵

The web-based chatting tool XB Chat, which is user-friendly and allows both text and audio/video interactions, is a perfect instance of a solution to all these problems. Lessons can be read aloud in chat rooms with a maximum of five people. Both the teacher and the student can start a fresh person-to-person conversation if individual sessions are required. The instructor can show presentations to the complete class with the help of the screen sharing tool. Lesson recordings are another feature of the software. In other words, even after being sent, the content can still be accessed.

A web-based application for assessing academic performance -

Students with impairments can achieve their potential with the aid of special education software. Working with youth who may have learning difficulties brought on by brain traumas, developmental delays, or intellectual impairments is made easier with the use of individualized education program (IEP) software. Software for response to intervention (RTI) provides the instruments needed for knowledge assessment of pupils. Such a system makes it easier to track learning progress and display it as a series of charts. Additionally, it makes reporting simpler.⁶

The Online Staff Performance Management System (PMS) is a user-friendly performance management tool for educators that give teachers a better understanding of student progress. It permits monitoring a student's educational program and making adjustments as necessary. In order to help students achieve better achievements, educators can better manage personalized education plans.

Workflow Automation and Standards Compliance Web-Based Solution

A reduction in paperwork and increased organizational efficiency can be achieved by automating processes and building just one database of all students. Web-based educational software makes it easy for teachers to adhere to legal and regulatory requirements:⁷

Additionally, the ability to import as well as export data was put into practice. You can print or save every document you make with this module as a PDF file.

Conclusion -

Technology is used in special education to lower barriers to disabilities with learners and give them access to the most current curricula. Students with special needs can receive a modern education and access any needed information online thanks to well-designed software and hardware.

Technology makes it possible to differentiate teaching techniques and provide students with more individualized learning experiences. With the help of modern technology, teachers may quickly adjust to the potential of a certain student and select from among the many learning strategies that are available and cater to the needs of different learners.

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Modern Teaching and Learning Methods for analytical Chemistry Education

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Abstract : *Chemical science education is a collaborative effort that constantly develops new methods and improves existing ones. Teachers must define what learners should gain before beginning a course, evaluating techniques and methods to cover in-depth. However, focusing too much on covering the subject can lose sight of the course's main objectives, student learning. It is crucial to develop an educational setting that facilitates students comprehension and understanding of the subject matter. Chemical science*

teachers should have an understanding of current concepts of education and instruction, and provide sufficient instruction to prepare them for their future roles. The review moves on to give an overview of each of the 10 areas where we believe creativity has prospects for improving learning for students in advanced chemistry teaching. It is also emphasized how crucial it is for fresh lecturers to have better pedagogical education and educational topic understanding.

Keywords: *Chemistry Education, Learning and Teaching, Modern Techniques.*

Introduction -

In the field of chemical evaluations, advanced chemistry involves a collaborative endeavour that is constantly developing new methods, improving existing ones and looking for novel teaching applications. As an outcome, it is difficult to teach every subject that can be thought to be pertinent in the usual amount of course work needed for a bachelor's or even a master's degree. The educator has to define what they want the learners to gain before beginning a course. This often entails an evaluation of what techniques and methods should be covered and how in-depth to go into them, according to the majority of chemistry professors. But there's a lot of other abilities that learners will need to succeed in later life.¹

However, if you concentrate excessively on the necessity of covering the subject, you have risk to losing sight of the course's main objectives, which is student learning. While students aren't learning, what use is it to educating? Thus, it is important to bear in mind how important it is of developing an educational setting when instructing a course. It oughts to consider if the techniques we employ most frequently in delivering

chemistry courses best facilitate student comprehension and understanding of the subject matter.²

1. Different Learning Techniques in Analytical Chemistry Teaching and Learning - The 10 parts for creative thinking that have discovered are summarised in the portion of the paper that follows. For each one of these parts, analysing issues regarding the application of the latest theories of learning has led in the identification of universal patterns regarding a more modern technique of learning and teaching analytical chemistry in colleges and universities.

1.1 Considering Chemistry's Distinctiveness Discovering the principles of knowledge is one of the main objectives of chemistry education. The Next Generation chemists have to understand the specifics of the chemistry study as well as the broad fundamentals of science in overall. For this reason, it is crucial to consider chemistry's special characteristics when planning how to teach analytical chemistry in universities and colleges. The study of chemistry instructions ought to place an emphasis on methods that can assist students feel comfortable with all these types of portrayal and recognise how they are interconnected in light of constantly having to switch among the symbolic, macro and sub micro various levels of depiction.³ It is obvious that education must make use of the accessible tactics and resources to increase student's understanding of such techniques. Such techniques are expected to be cultivated by the deployment of suitable visualisation methods. A properly targeted educational strategy is going to be required for advancement to be made, it is

possible that an appropriate grasp of the two properties of science and models in overall will be required.⁴

1.2 Problem and Context based Teaching and Learning - According to the notion of contextual cognition, the education that uses engaging and recognisable circumstances to inspire students is more probable to result in sustained learning. According to contextual mental processes, teaching is more likely to be successful and long-lasting if the student can understand the importance of the necessary learning relative to the environment being employed. The various kinds of contextualised instruction that push students to create their individual expertise in a realistic and uniform way include focused on issues and inquiry oriented approaches. Through this model, it may be deduced why it is probably better for learners to start understanding chemical science in college or university from real-world circumstances rather than approaching it as an academic issue that seems to have little practical application. In order to encourage valuable understanding of science, it seems highly appealing to integrate its relevance to daily activities, current studies, humanity, or chemistry into the way we learn by adopting problem or issue and context problem-oriented techniques.⁵

1.3 Learning and Teaching based on Research - To build the abilities necessary for an eventual job in chemical studies, more teaching based on research is encouraged in advanced courses in chemical science. This is supported by a cognitive-apprenticeship technique. Through participation in

real studies, learners is motivated to develop their skills as scientists inside the context of an educational method based on research. As a result, problem & context-centered instructions re-considered as a specialized type of learning based on research.⁶ There are three essential skills for conducting study are able to envisioned at the foundation of learning and teaching based on research: analysing, synthesizing & theories building.⁷

1.4 Co-operative or Collaborative Learning - Co-operative or Collaborative learning entails setting up settings wherein learners begin acquiring knowledge processes side by side, aiding and assisting one another, while collaborating after a shared objective. Tragically, a shortage of discipline inside the team and different hobbies between the people in it frequently prevent groups from functioning well. Individual's unpredictable conduct is frequently another factor in the downfall of collective projects. As a result, it is crucial essential each team possess a distinct framework, and in certain scenarios, it can be best for them to let learners decide on the framework that is going to be used.⁸

The five parameters given below, which provide a helpful and well-respected framework for evaluating the achievement of a collaborative or cooperative educational expertise:

- Healthy interrelationships,
- Constructive interactions with others,
- Accountability for oneself,
- Relational & small-group abilities,

- Processing in groups.⁹

2.5 Innovating Experimental Work - The enthusiasm of learners for successful chemistry education has significantly increased thanks to experiential activity, which also helps to foster good attitudes in them. As a result, success of student in chemistry is significantly influenced by their beliefs about the value of experimental labor. In certain investigations, it was additionally discovered that experimental work can assist learners acquire more inspired to study chemistry by enhancing their skills in interacting with others. Additionally, experimental activity portrays chemistry as an interesting topic & stimulates and grows the curiosity of learners in subject. Learners observe how chemistry is a scientific discipline instead of limited to concepts and regulations as they perform reactions involving chemicals, for instance.¹⁰

The use of laboratories is crucial in the teaching of chemistry. Laboratories are frequently utilized throughout the context of learning to establish scientific terms and make models for evaluating theories. Learning the distinction among observations as well as data reporting is also aided by doing experiments. According to research, experimentation "making an appeal because an approach to permit learners to gain experience effectively and, in addition, get involved in the activity of generating information through practical science," which supports this statement. Chemistry laboratory tests are crucial for a field's research.¹¹

2.6 Online Support and E-Learning - Young students have grown use to utilizing the web too quickly and

anytime of the moment retrieve whatever knowledge they need, as well as to creating, watching, and passing on clips of video at a variety of subjects via platforms like Wikipedia. Additionally, they frequently write for websites or participate in forums or conversations that fascinate them. Thus, using comparable instructional technologies like online chat rooms, boards for discussion and e-learning environments ought to come effortless for them. Interaction may be improved and the process of learning supported by making use of information and communication technologies. It helps students move about a rigid focussed on teachers process of learning where they create their understanding from different places to an adaptable student-focused educational procedure where they build their understanding from a variety of sources of information. The traditional focussed on teacher's procedure, which is defined by teacher-to-student interaction circulation, divided employed types, directed lessons and closed trials. Online interaction can be asynchronously (discussion board) or synchronized (chat session). These alternates can be used in circumstances wherein both educators and pupils cannot be located close together all at once and are either not or are available. Additionally, other people may participate in the learning cycle such as educators from different courses, learners from various organizations, academics from distinct universities and subject-matter experts. By accessing web pages and chat rooms while collaborating in teams, pupils may easily cooperate digitally. It is crucial to

understand that interaction in person varies greatly from internet communication.¹²

2.7 Learning and Teaching Activities Range from Automated to Grid-Powered -

Researchers have suggested that how chemistry is taught and learned in colleges and universities is going to drastically shift as a result from the fast expanding function which technologies play in supporting education. Grid infrastructure technology advancements on a technical level may end up in major modifications. A entirely new era of technologically supported systems, simulated classrooms, and online labs could be developed thanks to this emerging technology. During several studies of recent ECTN experiments, the strategy has demonstrated strong promise for improving both motivation as well as education. It is stated because there is a requirement for instructors to organize oneself into an organized online organizational in addition to program planners in educational institutions to thoughtfully assess the best way to use these tools to facilitate effective learning.¹³

2.8 Industrial and Employment Learning -

Education in chemical science played an essential part in preparing the coming generations of people to deal logically both ethical and societal problems as a whole and the detrimental impacts brought on and resolved through chemical companies in specifically. Hence, the focal point of the course of study in chemical science must be shifted from a one-dimensional strategy that only focuses on concepts, fundamental ideas and procedures to a multifaceted strategy where learners are given the

necessary resources for establishing an equitable viewpoint on industrial problems and learn how to appraise these issues objectively. Future improvements in education of chemistry (including the creation of instructional resources) should incorporate a well-balanced combination of the interconnected six dimensions listed below:

The theoretical framework of chemical science;

1. The chemistry process;
2. Chemistry's technological expressions;
3. Chemical science as something that is "personally relevant" discipline;
4. Chemistry's cultural features; and
5. Chemistry's effects on society .¹⁴

2.9 Applying Modern Analysis to Encourage Meaningful Education - Novel methods of evaluation have to be used to complement novel teaching and learning strategies. Learning entails much more than simply memorizing informations, it also requires the creation of practical knowledge and the growth of transferrable abilities for both the individual and one's job. This calls for the development of evaluation instruments that can evaluate a wide range of abilities in addition to knowledge of the truth. Hence, relying just on classic, unseen test scores will seldom be sufficient, but it is important to consider how evaluation practices may affect the way we learn and teach. In research, it has been noted that switching beyond closed-book, limited in time official tests to a constant, open to everyone evaluation method has a variety of advantages. The argument is put forward for the use of a larger range of methods for

evaluation that are designed to support certain targeted goals for education, like as the growth of more complex mental abilities. A variety of alternative evaluation techniques currently in use and appear to be awaiting the opportunity to be implemented in more complex chemistry teaching.¹⁵

2.10 Programs to Train New Institution Chemistry Faculty - Although there is a compelling argument for modifying the way chemical science is traditionally taught in colleges and universities, if reform is ultimately adopted, instructors will undoubtedly require assistance and instruction. In order to create a cutting-edge, research-based strategy for chemical science instruction in educational institutions, we additionally glanced at all of the possibilities that are now accessible and compiled examples of exemplary behaviour. Whereas there exist numerous instances of best practice, it has been discovered that their are significant regional variances within the India as official instruction is still inadequate or absent in a lot.¹⁶

3.8 Conclusion - Prior to getting hired, chemical science teachers ought to during minimum have an understanding of current concepts of education and instruction as they apply to chemical science. It is also important that the coming chemical science educators have the necessary specific expertise in order to ease and secure within their respective fields of education. In our view, giving instructors of chemistry sufficient instruction ought to be the primary concern. It seems sense that prospective chemistry professors must complete coursework in

order to be ready for what has to come as educators. Even while broad instruction may be helpful, we believe that at some point in the years to come, PCK (Pedagogical Content Knowledge) will definitely have a bigger role in chemistry classroom teacher's preparation. Similarly, to how they currently see honing their research abilities, chemistry instructors should begin to conceive of expanding their understanding of and proficiency with educating as an integral component of their ongoing professional growth.

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Modern Advancements and Techniques for Physics Teaching/Learning

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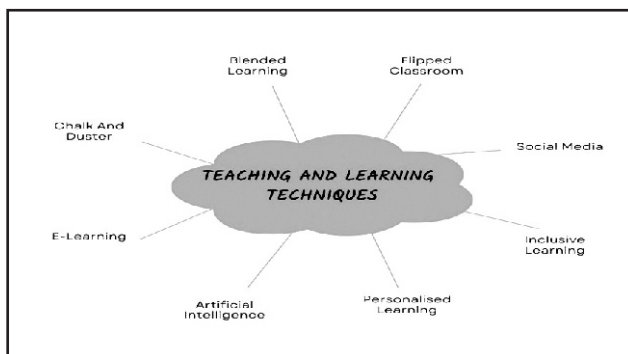
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Abstract : *Emerging technologies influences distinct sectors in day today life. In the educational field, modern techniques of teaching/learning are growing too quickly and effects positively. Learning/Teaching in physics is now more interesting and easy with these new advancements like Flipped Classrooms, Blended Learning approach, Social Media, Artificial Intelligence, Robotics, Gamification and so on. In this article, we discussed about some teaching/learning techniques, which are strongly used worldwide nowadays. The article further discussed about some experimental studies with various methods and approaches, which identifies how*

these teaching/learning aids effects learners' and facilitators' learning and teaching. In the present article, the pros and cons of these emerging tools and techniques are discussed too.

Introduction -

Teaching/Learning aims have shifted to focus on students' learning of the skills and qualities essential to successfully participate in employment and the economic climate of this century. Higher-order cognitive abilities like logical thinking, creativity and open-ended problem solving are prioritised by the latest educational requirements. Learner-centered and hands-on learning are notions that encourage emerging trends like online teaching/learning, flipped classrooms, blended learning, virtual classes, mobile learning, personalized learning, robotics, inclusive learning, learning communities/social mediagamification, multimedia instructions, e-portfolio and artificial intelligence in Education.¹ Creating and working with content allows teachers and learners have fun and engaging in learning new things. The implementation of these tools has offered educators with an opportunity to be innovative in order to boost high-order pupils' competencies or Higher Order Cognitive Skills. Physics study in specific that deals with plenty of



abstract concepts and challenging computations in mathematics, entail the integration of STEM (Sciences, Technology, Engineering and Math) into the curriculum.²

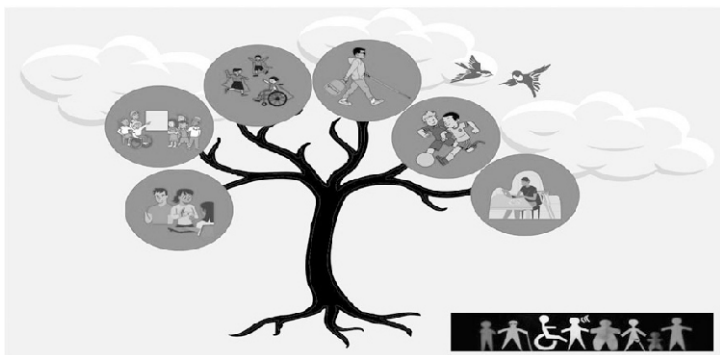
Numerous parties need to devote close attention to the development of technological advances among all disciplines. Technology proficiency amid youngsters is essential. This study examines the outcomes of creating an integrated learning/teaching resource for physics education.³

Flipped Class Room -

A flipped classroom is an instructional approach that splits instruction among personalized computer-based lessons outside the classroom and group collaborative learning inside the classroom. Students must prepare to learn outside of the classroom by watching online videos created by educators as a part of the flipped classroom model, which places an emphasis on integrating technology. The flipped classroom can boost students' writing abilities as well as their interpersonal and communication skills.⁶ The flipped classroom paradigm has been found to enhance students' attitudes, performance, and enthusiasm in educational contexts.⁷ The flipped classroom paradigm blends active learning beyond the classroom with technology for learning. The idea urges educators to create an engaging and collaborative learning environment while allowing students to discuss in classroom learning contents, which are not understood. By conducting a quasi-experimental study in the PGRI at Universities Indraprastha, it was determined that the flipped classroom style had effectively aided learners in their physics practical and strengthened their practical expertise⁵.

Inclusive Teaching/Learning -

Humans are who make science wonderful, and if they treated properly, they perform at their finest. The simplest way to assure that our field of science lives up to its greatest potential is through ensuring that each one of its contributors gets similar opportunity for resources, education and employment prospects. It is the responsibility of institutions, groups, and funding bodies to ensure that these assets and prospects are accessible as well as to promote an inclusive atmosphere in which individuals may flourish.⁷ For students, who have special requirements to get an excellent educational experience



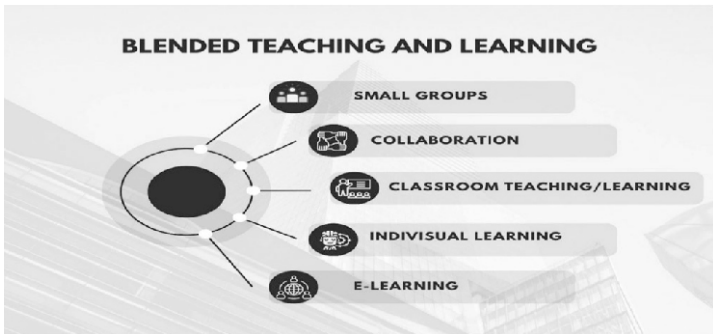
that enhances their possibilities for overall development, inclusive education attempts to integrate them through an environment that is adaptable. This objective relies on educators, who can foster equality in the system of education by imparting information, forming positive attitudes, and strengthening the abilities of gifted children to meet obstacles in life.⁸ Dilfuza Melievna Makhmudova et al. have studied more than 500 students for 7 years regarding the open mathematics and physics teaching method's adoption of ICTs. In their preliminary, theoretical and experimental study, they revealed that a

nonlinear open learning process that enables individual-creative, subject-activity and distinct methods which might be created owing to a modification of the instructional endeavor beneath consideration.⁹

In a study Z. Yasemin Kalender et al. they used a questionnaire to investigate the inspirational structures of both female and male students enrolled in beginning calculus-based physics courses alongwith their physics personalities at a prominent research institution. The manner in which learners perceive being recognized by others such as their family members, peers or educators and how this acceptance impacts their own identities showed gender variations. They put to trial various gender-specific designs, which looked at the connections between various factors that inspire and students' physics credentials. They also discovered that the notion of being seen by prominent individuals such as the course instructor or instructional aids, correlated significantly with female and male students' perceptions of belonging in the physics classroom and their level of self-efficacy in the subject. The findings indicate that these issues need to be improved.¹⁰

Blended Learning -

The blended learning paradigm offers the transmission of instructional content to learners via online networks in conjunction with in-person interactions. The integration of conventional and e-learning is known as blended learning. Owing to innovations in ICT, the blended learning model's output is supposed to enhance the ability of learners for problem-solving abilities. K. Suma et al. were studied on 14 students and divided them into two parts, a part of 70% students for in-person learning and other have 30% students for e-learning. They recorded motivational data



by multiple choice questionnaire and test were conducted to record the data of problem solving skills for both groups. Test result scores was recorded of pre test-67.21 (SD=5.45), post test-74.98 (SD=5.93) for G1 and pre test-33.43 (SD=4.90), post test-63.54 (SD=2.35) for G20.¹¹ W Suana et al. conducted a research on impact of blended learning and critical thinking, how learning physics in a blended learning strategy has enhanced learners' critical thinking abilities. By the multiple choice questionnaire and n-gain method for analyzing, they found learners are strongly interested in simply adaptable and advantaged by recognizing further. It implies that a blended learning approach based on the Schoology platform is successful in enhancing the capacity of learners to use critical thinking while learning physics.¹²

Social Media and E-Learning Tools -

A major component of the method of instruction and learning in pandemic is facilitated by social media and e-learning platforms. The adoption of social media networks in schools and colleges enable students to communicate with peers as well as instructors, retrieve educational resources, personalised their learning and form communities of learners. 90% of enrolled students in schools access the internet frequently, with over 75%

of adolescents preferring social networking sites for learning online.¹³ In addition, e-learning tools like NPTEL, Google Classroom, Piazza, Zoom, Easy Class, Microsoft Teams, etc., social networking apps such as Facebook, Instagram, Telegram, YouTube and many more have an impact on both the process of learning and instruction directly as well as indirectly.



It can provide fun and enjoyment by offering captivating postings on social media sites. People who love using a web system examine their interactions with it favourably, and as a result, they have a burning desire of utilising it to enhance their learning experiences together.¹⁴

Artificial Intelligence -

For the purposes of facilitating new paradigms in instructional design, technological advancement, and education, AI (Artificial Intelligence) has been viewed as a potent instrument. AI has witnessed significant paradigmatic changes in its brief lifespan, which are described into 3 paradigms: learner-as-leader (AI-empowered), learner-as-collaborator (AI-supported) and learner-as-recipient (AI-



directed).¹⁵ Intelligent collaborators or tools for learning, Intelligent tutees, consultant for formulating policy and many more facilities are provided by AI tools and platforms.

Advantages and Disadvantages -

Modern teaching/learning techniques have proved to be beneficial for teachers and students because through the medium of these techniques, Endless steps have been taken for discovering hidden physics and the overall development of the students. In the same vein, their is various disadvantages of these techniques like practical physics education should have hand on experiences. Additionally, online learning/teaching effected the physical activities of learners and teachers. It also create the problem of Eyesight, Eye irritation, Watering eyes, Headaches, Amblyopia, Blurred vision, Double vision, Dry-Red eyes, Neck or back pain and many more. These techniques have been proved themselves as a boon in educational fields but their should be more updated learning/teaching tools with effectiveness and taking care of the health of learner and teachers. It should be the first priority so that learners can also learn how learning and good health both are essential for a happy life.

Conclusion -

In modern technological world, rapidly growing resources for humankind have leave a mark in physics teaching/learning. These various resources named differently in educational world by the Learners, Researchers and Academicians. Some of these techniques and tools for effective teaching/learning are discussed in the present article. These techniques and tools have a great impact on different areas of various subjects. Science and Physics learning/teaching have a noble effect of these techniques which allow learners to

learn physics and sciences with a great Interest, Understanding and Joy. Learning physics is not tough nowadays by modern techniques of learning/teaching but there is some disadvantages of these techniques, they are also discussed in the article. With understanding, modern techniques of learning/teaching one should also understand good habits and health nourishing techniques for a healthy body and mind.

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Teacher Professional Development in Technology

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Introduction

Millions of people have been managing with the evolving nature of teaching and learning without effective teacher professional development, teachers—the single most significant school-based determinant of student learning—are at the center of the response to recover learning losses from the COVID-19 pandemic-induced education crisis. The shifting expectations placed on teachers must be carefully considered as education systems shift towards remote solutions or decide it is safe for schools to reopen,

ensuring they are equipped and supported through efficient teacher professional development procedures. Technology can be utilized effectively to improve access, participation, engagement, and ongoing application of new skills in the classroom. Education systems must make investments in workable strategies to support and continuously improve teacher professional development as they work to recover from the current crisis. Policymakers are becoming more interested in offering teachers remote and alternate assistance options.¹

In low-income nations, there is a strong argument for improved in-service technology-assisted teacher professional development. The lack of qualified instructors needed to expand universal access to high-quality education is a significant driving force. To achieve high-quality universal education, it is crucial to both recruit new instructors and eliminate those who are already working there. Technology can improve access, participation, engagement, and ongoing application of new skills in the classroom when used properly.^{2,3}

In response to these challenges, technology-assisted professional development (TAPD) is a way to enhance the abilities of both experienced and recently qualified teachers in settings where there are not enough teachers of sufficient quality and quantity. Another driving force is the requirement for novel approaches to enhancing education in times of war and catastrophe. Eight promising technologies that can assist effective professional learning for teachers in low-income and unstable states were examined by the authors of *Technology-supported Professional Development for Teachers: Lessons from Developing Countries*. These technologies include:

1. Audio learning

The process of learning and remembering information by listening is known as auditory learning. It describes the capacity to pick up knowledge by carefully listening, comprehending, retaining, and recalling spoken information. To better understand and retain new knowledge, auditory learners may find that listening to lectures, discussions, podcasts, or audio recordings is preferable to reading or writing.⁴

Students learn in different ways, and recognizing how one learns can help teachers tailor their lessons to the various learning preferences of their students. A potent strategy for improving student learning and retention is to recognize their preferred learning styles and offer learning material accordingly. For instance, a learner who processes information primarily through hearing may retain every word spoken during a lecture yet struggle to recollect material read aloud from a book or the board. There are a few of the following traits that auditory learners frequently exhibit:

- Superior recall of information that has been spoken
- Improved verbal communication abilities, including listening and speaking Good oration/storytelling/public speaking skills
- The ability to communicate thoughts clearly
- Recognizing these traits can assist teachers in identifying auditory learners in the classroom. Auditory learners are more likely to participate in class discussions, have good public speaking skills, enjoy having conversations, and be good at explaining and communicating verbally.
- These students frequently struggle with silence or ambient noise

Readers are urged to remember that some outdated technologies have a significant influence, as stated in the advice. It emphasizes the effectiveness of interactive radio and audio content that has already been recorded. It is evident that there is a risk that the importance of other more traditional technologies, like radio, will be overshadowed by the current concentration on mobile phones.



Figure 1: Teaching to the students by audio learning

2. Video learning

Video-based learning is a crucial component of any effective employee upskilling or onboarding process, say L&D specialists, now more than ever given the rise of remote and hybrid workplaces. This manual is for you if you want to start using video-based training in your business or if you want to improve your training approach.

A remote training method known as "video-based learning" uses live or previously recorded video to impart new knowledge and skills. Video-based learning creates a multi-sensory learning environment that encourages engagement and knowledge retention by utilizing visuals, graphics, on-screen text, and audio.



Figure 2: Teaching to the students by video learning

Motives for using video-based learning

There are a number of reasons why video-based learning is especially well-suited for corporate training programs:

- (i) Both instructor-led teaching and independent learning scenarios can benefit from video learning.
- (ii) Since video-based learning is self-paced, learners can better plan their training around their busy schedules and learn at a time and speed that works for them.
- (iii) Video also supports micro learning and just-in-time learning, which have both been successful in corporate training.
- (iv) It is simpler to evaluate the effectiveness of your video-based learning, particularly when using a platform of the highest caliber, such as Kaltura Virtual Classroom, which includes in-depth analytics dashboards.
- (v) Scaling video learning is simple since it can be accessed by an endless number of students at any time and from any location.

Technology advancements have made it much simpler to film classroom activities with a camcorder, camera, or smart phone. This kind of content presents intriguing chances for individual and intergroup reflection on instructional effectiveness. Video has the ability to give educators real-world examples of effective pedagogy.

3. Open Educational Resources

Learning, teaching, and research materials in any format or medium that are in the public domain or are protected by copyright and published under an open license, allowing free access, re-use, re-purpose, adaption, and redistribution by others, are known as open educational resources (OER). An open license is one that allows the public to access, use, repurpose, adapt, and redistribute educational resources while also respecting the copyright owner's intellectual property rights.



Figure 3: Students can be studied by Open Educational Resources

The OER Dynamic Coalition wants to encourage networking and information exchange to forge connections among the following recommended areas of focus:

- (i) Increasing the ability of stakeholders to produce, get, utilize, adapt, and redistribute OER.
- (ii) Making supporting policies is item.
- (iii) Supporting equitable and inclusive OER.
- (iv) Promoting the development of OER sustainability models.
- (v) Encouraging global co-operation.

Teachers can access a multitude of resources for self-study and collaborative peer reflection through OER and other digital materials through tablet, smartphone, and laptop. It can be utilized offline as well as online.

4. Computerized student testing

We enjoy many aspects of online learning in many educational programs, but assessment is not always one of them. Online assessment quality, validity, security, integrity, and accuracy are frequently questioned. However, computer-based testing has so many advantages for online students, teachers, and programs, particularly in terms of administration, grading, and scale, that it merits a much closer examination. This article, which is one in a series on assessment, argues in favor of using computer-based/online testing more frequently.

Additionally, delivering consistent 'real-time' data regarding students' academic achievement via online assessments has the potential to be an effective technique to show teachers the effects of different pedagogical approaches: "Teachers in fragile settings could further be enabled to take control of their own learning and increase their own likelihood of achieving quality standards if they could receive objective information/data on their own teaching performance over a period of time."



Figure 4: Computerized student testing

5. Computers in schools

There is virtually little proof that IT rooms in schools, which house a large number of school computers, improve student performance. However, these IT spaces provide a neglected asset for teacher professional development through the use of social media, online forums, online social networking, downloading of resources, and enrollment in online courses.

Computers serve a purpose in education to deliver audio-visual instruction, do research, facilitate online learning, keep records, create papers, and learn about new, developing technology.



Figure 5: Students learning/teaching by computers in schools

Important Uses of Computer in Education

- (i) New Era of Classroom Teaching
- (ii) Student Research
- (iii) Simplify Record Keeping
- (iv) Online Library
- (v) Easy to access information
- (vi) Online Learning
- (vii) Easy to Create Any Documents
- (viii) Track the performance of students
- (ix) Learn New Technologies
- (x) Computer-Based Training (CBT)

6. Mobile phones

Students can use their phones as a class calendar to note significant dates, and teachers can send out group SMS to the entire class to keep everyone informed about tasks. Cell phones can be useful for projects in terms of gathering media. Using a cell phone, you can capture pictures, record videos, and keep audio diaries.

Mobile phones shouldn't be used in areas with kids present, like a playground or a school. Utilization of phones, including sending and receiving messages and emails, should be restricted to times when there are no children present, such as in staff rooms, office spaces, and unoccupied classrooms.

Although there is not much concrete evidence of an impact yet, mobile phones show great promise. They are "economical, transportable, simple to use, and many offer web browsing." The importance of mobile phones for professional education is projected to rise as advancements in technology occur.⁵



Figure 6: Students learning by Mobile Phones

7. Online communication

Technology has transformed education in that it has made it more accessible. E-books, audiobooks, movies, podcasts, and other forms of information are now accessible to everyone with a reliable internet connection. The improvement of communication and collaboration in our classrooms is also a result of technology. Since we are no longer confined to the four walls of the classroom, we are no longer constrained by physical space for learning. Teachers today have a wide variety of communication tools to select from as a result of the changes in communication methods brought about by technological improvements.⁶

Detlef R. Prozesky emphasizes the link between teaching and communication in his article, "Communication and effective teaching." Teaching and communication go hand in hand since teachers are continually imparting new knowledge, or transferring information, to students. In light of this, we'll examine some of the top teaching-related communication tools in this blog post. We'll group them into three categories for your convenience:

- Communication tools for teachers working together
- Communication tools for teachers and students
- Communication tools for teachers and parents

Although platforms like Skype/Zoom/Google Meet allow for low-cost virtual coaching, this presently requires a stable internet connection, which eliminates many teachers in rural and underprivileged areas.



Figure 7: Online Communication

8. Serious gaming -

To impart particular skills, knowledge, and attitudes, serious games blend learning techniques, game mechanics, and knowledge and structures. They leverage the challenges and rewards offered by games to solve problems in a variety of contexts while also providing fun and engagement for the user. The idea of the serious computer game is one intervention that has potential but has been almost utterly disregarded. Such games could be a particularly entertaining method to examine professional issues.

Since they may be used to address a wide range of issues and concerns, serious games are utilized in many different contexts.⁷ There are a few localities where

serious games are more prevalent than in other places:

- **Education:** By incorporating games into exercises and simulations, certain subjects are taught. In this approach, pupils might, for instance, learn algebra or a foreign language. This is one of the most popular uses for serious games, commonly referred to as instructional games.
- **Healthcare:** By converting workouts into game actions, games are also employed in rehabilitation. The practice of medical procedures in a controlled setting is another application in healthcare.
- **Sustainability projects:** encourage participation in sustainability initiatives or behaviour changes.
- **Training and consulting:** A growing number of consulting firms employ serious games to teach and demonstrate teamwork as well as social and logistical aspects in the workplace.

What are the advantages of serious games?

So why are businesses using games to achieve more and more important objectives? What could be wrong with a simple book or online course? The traditional approaches are still effective, but games give us a fresh means of imparting information. And it works well as a tool for the reasons listed below:

1. **Higher immersion and engagement:** Due to the way games are made, players are constantly encouraged to keep playing through the use of rewards, plot advancement, and other feedback mechanisms. To fully immerse yourself in the subject, combine this with a stunning setting.
2. **A secure environment for experimentation:** In the actual world, your choices have repercussions, which occasionally result in material damage or

harmed sentiments. Games establish a secure, virtual world where players can explore wildly without worrying about negative consequences.

3. Positive emotions improve learning: According to studies, students who play educational games feel happier overall. Compared to traditional and video learning approaches, this results in a better learning experience.

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The Prospects and Challenges in the Practice of Technology through National Education Policy

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Education is the backbone of the society and India has been an important place of learning since time immemorial with institutes like Nalanda and Takshila. The purpose of education is always transforming and innovative, and to make an individual a better citizen. It brings better employability and prospects in the society that's why Nelson Mandela states "Education is the most powerful weapon which you can use to change the world." The implementation of National Education Policy has brought a paradigm shift in the existing education system to address the challenges of access,

equity, quality, affordability and accountability encountered by the education system. This research paper explores the prospects and challenges in the practice of technology through National Education Policy.

The aim of National Education Policy is to avail education for all. As the former president of India Dr. A.P.J Abdul Kalam opines “the purpose of education is to make good human beings with skill and expertise. Enlightened human beings can be created by teachers. Change in the education policy is a major way to provide the nation better students, professions and better human beings.” Understanding the need of change in education system, the Prime Minister Mr. Narendra Modi states while making announcement regarding National Education Policy 2020:

National Education Policy will set the foundation for 21st century India. We've given extra impetus to this national policy for ensuring that it makes Indians more empowered and easily attractive to opportunities. We're moving to an era where an individual will not be stuck to a single profession all his life. Thus, he will continuously need to re-skill and up-skill himself. We have kept this in contention while formulating the National Education Policy.

He further remarks:

The future is going to be quite different from our present-day world today. We can see and feel its requirements right now. In such a scenario, we have to equip our students with the skills of the 21st century. What will these 21st Century Skills be? These will be - Critical Thinking -Creativity - Collaboration -Curiosity and Communication. Our students must understand the sustainable future,

sustainable science and think in that direction. This is the need of the hour! It is very important. Therefore, students should learn coding early in life; understand Artificial Intelligence, Internet of Things, Cloud Computing, Data Science and Robotics. We have to ensure all of this.

The practice of technology has brought a sea change in the education system. Earlier, in the traditional or conventional education system, educators used to exercise the 'chalk and talk' model of learning but now time has tremendously changed due to the advancement of technology. Modern technology has been an integral part of all of us and without it imparting and providing knowledge is hard to imagine now. As David Warlick states “We need technology in every classroom and every student and teacher's hand because it is the pen and paper of our time and it is the lens through which we experience much of our world.” Educators and students need to be well-equipped and technology-friendly. The exercise of modern technology has transformed higher education in several ways from enhancing knowledge to gaining experiences and more importantly how to apply it. The online education system has revolutionized the education system through the implementation of the National Education Policy 2020.

The online education means the process of acquiring knowledge and skills through the use of digital platforms rather than attending physical classroom education. The mode of online learning has become rapidly popular among learners because of its flexibility of time, accessibility of several courses and transparency in accountability. The Higher Education of India has launched diverse online platforms for students and learners and its purpose is to make education door to door

available.

SWAYAM portal has been initiated with enhanced features and facilities to provide online degree programs through SWAYAM with the help of top-ranking Indian institutes or universities. The Higher Education of Madhya Pradesh has launched and made availability of SWAYAM-based degree programs in its all institutes, colleges and universities. Therefore, learners or students can access following on the SWAYAM portal.

- Video lectures by distinguished subject experts
- Reading/ study materials designed and prepared by experts and scholars that can be read, downloaded and printed.
- Learners' Self-assessments in the form of tests and quizzes.
- Detailed discussions for any doubts or confusions regarding study materials or lectures.

SWAYAM PRABHA-DTH Educational Channels -

The aim of this project is to telecast quality based educational programs through 32 DTH Channels to educate and spread knowledge among students and learners at minimal cost. Every day, new contents are being telecasted at least four hours for higher education and two hours for school education. The telecasted contents are being repeated during the day so that students can easily revise and memorize. The contents are being offered by several departments/ agencies such as NPTEL, IITs, UGC, CEC, IGNOU and NCERT. For higher education, contents of curriculum-based courses like under- graduate and post graduate level with diverse disciplines as science, commerce, arts, performing arts, humanities, social sciences, technology, law, medicine, agriculture engineering etcetera. All these certificate courses are offered through SWAYAM but contents are

being telecasted on the SWAYAM PRABHA. 12 TV Educational channels are dedicated for the school education of PM-eVidya and these channels provide contents for class first to twelfth which proves to be a milestone step for all students and especially remote students' educational learning.

Online Learning Platforms -

Universities, Institutes and colleges have embraced Learning Management Systems (LMS) for smooth conduction of online learning. Learning Management Systems (LMS) permits educators and instructors create an account and upload course materials and lectures on it. Students can access and download lectures and assignments from anywhere at their convenient time and respond and upload prepared assignments. Online Learning platforms provide flexibility in time and choice of learning.

Massive Open Online Courses (MOOCs) -

MOOCs have popularized and spread education to all over the world. Learners from every corner of the world can access high-quality content on diverse subjects. These online platforms provide free or low-cost courses. Learners have identified multiple advantages of the MOOC. Learners have flexibility in choice of courses and time to access the various courses. Learners can frame and design personalized and customizable learning directions or paths based on their educational experiences. MOOCs democratize education by removing the barriers of geographical boundaries, rigid time schedule and high costs. It provides golden opportunities to up-skills and re-skills not only learners but also workers at large scale. Therefore, it re-energizes the learners and workers by sharpening the dormant abilities and transforming them into superior employees.

Social Media Learning -

Now, social media and technology are indispensable parts of modern lifestyles. Everyone above 13 years will have account on social media such as Facebook, Youtube, Twitter, Instagram, SnapChat, WhatsApp, LinkedIn etcetera. Teaching and Learning can be a fun through these social media platforms by communication and collaboration. Learners share or receive ideas, views and opinions on these social media and react accordingly. Consequently, learning will not be a burden but a stress free learning with entertainment.

Multimedia Learning -

Today, it has been essential for all of us to know how multimedia is being handle, make and edit short videos, formulate power point presentation, and upload on the social media for all. Anything and everything can be learned through interactive platforms.

Flexibility in Choice of Learning -

Learners can access what they desire to learn while it is hard in physical classroom of teaching and learning because flexibility of learning has not been governed in the classroom learning. Educators have to be responsible while posting or uploading contents on the social platforms because whatever they post that is directly benefitted by students.

National Digital Library of India -

Students, teachers and learners can access all books online through National Digital Library of India portal. This library is a virtual repository of learning resources which provides service for reading and downloading softcopies of books. It offers convenient access resource materials from anywhere and is available for use 24/7.

The Digital India

Now a day, one requires digital literacy for many purposes. That's why, feeling the urgent of requirement of digital literacy respected PM Shri Narendra Modi launched the campaign 'The Digital India' on 01 July 2015 for transforming the systems of transitions, tickets booking and spread knowledge etcetera. 'The Digital India' promotes Digital education that offers education that is free or at the minimal cost. Many learners who are involved in their works or jobs can enhance and enrich their knowledge and complete various courses through digital platforms. As time flies so changes in everything is inevitable, obviously in education and ways of learning. There are some challenges of the practice of technology-based learning for remote or rural students who do not have access to internet and without accessibility of internet one cannot reach to and read learning recourses. Can we be able to foster or nurture critical thinking of children with the assistance of technology? It is very challenging how to enhance the critical minds of students. Students develop lack of moral behavior due technology as one can witness in the family as children are engrossed in their smartphones but not responding properly to their family members. Educators or guardians must teach students or children how to use technological tools and how much. Otherwise, students' lives will be lopsided and unbalanced. Therefore, the practice of advanced technology plays vital role for dissemination of knowledge and living balanced life.

The Ministry of Higher Education, India has implemented National Education Policy after 34 years which is a historical move in the history of Indian Education System. The National Education Policy 2020 stressed on the practice of technology in education.

Educators use technology to frame interesting and fascinating videos and lectures for learners. They develop contents in many regional languages so that learners from different regional languages background can access the study material efficiently. With the help of Smart classes, Virtual Classes and languages labs, learners can obtain greater heights in acquiring knowledge. Education plays a pivotal role in the shaping and transforming the whole nation into digitally enabled and empowered society. In the world of globalization, every nation is connected with another through digital equipments to sustain their economic status, weapon power, knowledge and process of communication. Technology is the need of hour to improve teaching, learning and evaluation process. It stimulates and strengthens professional and vocational training through educational planning management. Therefore, the exercise of technology in teaching and learning is necessary in the present scenario. The future of technology seems fairly exotic and adventurous and one would pursue in it to accomplish opportunities of employment and that's one of the purposes of teaching and learning. Hence, the practice of advanced technology revamps education sectors and aims to create opportunities of employment.

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Methods and Applications of Inclusive Education through Technology in Classroom

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Abstract: Inclusive Education (IE) is an approach of educating children with special needs in normal classroom unlike their strengths and weakness. IE helps to make more equitable society. Teaching and learning have always been long sustained activities. In order to maximize the potential of all the students the use of technology has contributed a lot. It is consequential element of learning. An innovative use of Information and Communication Technology (ICT) into teaching has brought positive changes in the teaching learning

environment. The use of ICT tools adds distinctive value to the training process by generating new environments, methods and resources that helps the students to understand in more appropriate way. In this paper we will explore the advantages of the use of technology also taking into consideration accessibility of educational tools and digital competence required by the teachers for implementing educational tools to make it fully accessible to all students. On the other hand teachers should have the digital competence and inclusion as an educational principle.

Keywords: Inclusive education, ICT, teaching learning, technology

Introduction

Traditionally food, shelter and clothing were considered as the basic needs for human beings. But today education is considered as one of the basic needs of human beings. It is the fundamental right of every child to get education regardless of strength and weakness in any area. In past children with special needs are deprived of mainstream education. They have to find special school for their education. But now organizations like UNICEF, CRIN, Plan International, Save the Children, IBCR, and researchers have laid stress on inclusive education (Laden, 1997). Integration or inclusion is very significant for the availability of educational opportunities equally equal (STARCIC, 2010) and for the development of equitable society (Pilco et al. 2022). Students with disabilities should be educated with their peers within the local community therefore schools are required to redesign themselves to accommodate a diverse group of students with a multiple of needs (Yuen, 2010). It helps to reach out to all learners and to improve the quality of students (Singh, 2014).

The word technology is derived from two Greek words “tekhne” meaning art or craft and “logia” meaning systematic handling which means systematic handling of art and craft. Today in this modern world technology has become the integral part of our lives. It has made our lives easier and faster and enhanced the productivity of work. Educational technology and ICT tools impart a significant role in generating effective and proficient learning environment for students with special needs and in inclusive classroom (Das et al. 2013). Traditional education focuses on only cognitive domain i.e. only emphasizing on knowledge, comprehension, analysis, synthesis, evaluation and application and has minimum focus on other two domains of learning i.e. affective and psychomotor domains. The use of technology focuses on affective domain (attitudes, judgements and responses) and psychomotor domain (skills, abilities and competencies) (Singal, 2006). ICT tools also help to overcome the hurdles of learning by increasing both self-achievement and self-esteem (Ross, 2009). It is a powerful medium in support of inclusive education. All students have the right to get benefitted from ICT tools irrespective of their disabilities and should be the integral part of learning process through any of the best ways to foster educational inclusive practices (Emmanuel et al., 2008).

E-tools for inclusive classroom

In this world of digitalization technology is everywhere. So the use of tools is becoming very crucial and is quite challenging. The transformation to adapt from the traditional methods to e-tools is not easy. It not only boosts the engagement of students but also provokes curiosity among students and leads to more effective learning (Xu et al., 2023). Three key points should be

given afore thought while using e-tools to support inclusive education: e-accessibility, e-usability and e-availability. The availability of ICT tools could be the significant problem for economically disadvantaged people or for those who have no fixed abode and most importantly for students having physical, sensorial and cognitive disabilities. E-usability is the major goal which is to be attained. It involves all the e-tool users and has an undeniable impact on immigrant student with communication disorders. If the problem of availability of ICT tools is solved by sufficient investments and awareness programmes than the other two issues requires a lot of struggle to fill the gaps between students.

Educational Methods for inclusive classroom

The use of digital technology ensures the inclusion of learners of every background without any discrimination. Despite of emphasis on e-inclusion there is lack of attention on applications of ICT for students (Williams et al., 2006). ICT assists the different types of disabilities with assistive technology (Zboon, 2019). The teachers also need some new competencies within them for the new roles and tasks in society. It mainly includes technical as well as methodological knowledge of use of ICT by students. From technical point of view it is capacity to evaluate and select the tools to create a powerful learning environment and from methodological point of view is the awareness of the use of ICT tools which helps them to become a active constructor of their learning process (Turgut et al., 2021).

Digital technology in education

Globalization of education is main need for application of digital technology. The pandemic Covid-19 forced the academic institutions to use online teaching mode in order to continue education during this period.

Digital technology served as education saviour during that critical period (Ahmad et al., 2022). Digital technologies not only make teaching –learning process more compelling but also help children in acquiring abilities that will improve professional performance (Seale et al., 2021). Integrating technology into education makes students more interested in subject with least distraction. The use of projectors, computers and other equipments in classroom make studying more entertaining and interesting than before. Technology creates more meaningful and inspiring instructions (Tokareva et al., 2019)

Structure of e-inclusive classroom

E-inclusive classroom are defined as classrooms use digital technology and ensure the inclusion of learners of every background without any discrimination. The classrooms are well equipped with platforms or devices like mobile and multimedia gadgets to teach students. Digital learning is the strategy that employs technology to achieve the entire curriculum with great ease (Oliver, 2005 & Pacheco et al., 2018). There are some key features of e-inclusive classroom i.e. they are flexible, upgrade learning pattern, interactive, innovative, collaborative, making teaching process easy (Fig. 1).



Fig.1. Features of E-Inclusive Classroom

Applications of E-inclusion

Technology is the strong instrument which may improve the quality of education in numerous ways. It makes teaching and learning process easy, flexible, dynamic, innovative and more productive. It helps to identify the learning gaps and personalise learning sequence to make education successful. E-inclusions help to improve the teaching productivity and helps in practical learning and easy understanding (Kudratilloev et al., 2021; Skiba et al., 2008). The assistive technology helps students with physical or learning disabilities. Speech recognition, screen reading tools and text to speech solutions proved to be a great help for visually impaired. Sign-language, lip-reading, video conferencing and sound amplifiers helped students with hearing disabilities (Collis et al., 2004; Hew et al., 2013; Barakina et al., 2021).

An e-inclusive classroom provides equal opportunities for each and every student with disabilities. ICT tools make class exciting and interesting and encourage students to become active learners. It also helps teachers to keep us inquire on student performance (Lacka et al., 2021; Schelly et al., 2015). The teaching environment becomes flexible and dynamic (Wang, 2009). Students analyze problem and try to find solutions in advanced and interesting ways. (Zawachi-Richter, 2021). There are no physical boundaries and technologies help students to pursue their education (Zabiyeva et al., 2021). Teachers use innovative methods of teaching to introduce new topic to students which have more practical approach than theoretical (Korostelev et al., 2019). Hybrid teaching and learning involves the use of both online and offline methods which is the future outcome of education 4.0 (Kesim et al., 2012).

Conclusion

Inclusive education is an on-going, long-lasting process that needs to be pursued with determination. Everyone is benefitted when inclusive education is supported by technology. The use of technology has always been a guide to teaching –learning activities by easing teachers’ and learners’ efforts in bringing progressive education. It saves lot of time by automating or partially automating day to day operations like attendance tracking and performance monitoring. Schools, teachers, parents and students all have access to digital tools can breakdown educational barriers. Children with disability with the help of assistive technology come to main stream of education to cater their needs accordingly. ICT and assistive technology helps learners to get positive learning environment. Students are taught how to use technology responsibly and help students to become independent and self-disciplined. Now, we have reached the era of hybrid teaching and learning process which is both online and offline systems to enhance the outcomes. In near future, these technologies will be implemented in education to enhance digital learning environment and performance

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