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Importance of Sustainable Digital Pedagogy and ICT Resources during Post COVID Scenario

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Abstract:

In context to the recent global pandemic outbreak life has been threatened by ever-increasing cases of COVID patients worldwide, resulting in heavy casualties, economic slowdown, and significant disastrous effect on socio-economic livelihood. Among all its disastrous effect, most predominantly, it has negatively distorted students' psychological and emotional state of diverse kinds, resulting in distress as they cannot regularly continue their studies because of nationwide lockdown. Social distancing norms have been adopted to limit the spread of the deadly virus. Moreover, all government guidelines & standard code of conduct needs to be strictly followed as there is scientific evidence of its airborne nature and high probabilities of contamination, which considerably challenges traditional education. This thriving global crisis hour can be equally transformed into numerous opportunities that may involve the systematic development of digital pedagogy and remote learning infrastructure in a sustainable ecosystem. Modern cutting-edge technologies and ICT resources shall play a unique role in exploring and strengthening the present scenario. This sector eventually demands potential research activities to improve teaching-learning qualities to flourish as the best-suited alternative platform. Within a short time, framework popularity for digital remote learning has marked a record, although there is a significant fundamental problem that needs to be overwhelmed. In this paper, a novel initiative has been taken by authors to categorically identify specific scope, social limitation, technological challenges, performance expectancy, social influence, facilitating conditions, forthcoming opportunities, and finally, specific outcomes of digital pedagogy. Besides, novel characteristics have been assessed & scrutinised to highlight its growing importance in the post-COVID scenario and sustainable digital education role.

Keywords — **COVID19, Digital, Education, ICT, Pedagogy, Literacy, Sustainable-development.**

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I.   INTRODUCTION

With a sudden fundamental revolution in digital technology, modern life has entered a new era where education is not bound to face-to-face interactions irrespective of teaching and learning. Many studies have shown that effective e-learning could help increase student motivation, engagement, and attendance. Digital Learning helps build knowledge of digital technologies and blends both practical and pedagogical skill sets to empower the students in the coming era. It is expected that there will be a proportional disorder between the number of students and teachers that can be overcome by adopting an e-learning scheme. While most countries are at different points racing on their COVID-19 infection rates worldwide, billions of children and hundreds of institutions are affected due to this pandemic. Commencing from the outbreak of one of the deadliest viruses, the

traditional learning method has almost come to a halt. With this sudden shift away from the classroom learning programs in several parts of the globe, the adoption of online learning or e-Learning has accelerated the worldwide education market. Keeping in mind the current situation, face to face physical interaction between the student and the teacher needs a change. Most educational institutions maintaining the contactless teaching protocol have adopted the e-Learning process and began offering teacher-students interaction using online software, auto-evaluation process, coordinating project work, intelligent scheduling, and more other features. E-learning came as a light upon the flexible learning method for students in a much engaging and interactive method, giving access to world-class learning material despite any geographical restraints. Research shows the adequacy of digital pedagogy has expanded as of recent years, essentially due to the ample opportunities for ICT resources in the learning ecosystem and moreover because of the increasing organisational attention. The technology boost in the electronic gadget sectors and the sudden jump in internet usage, and several government plans have encouraged and enabled the growth of e-learning in South Asian Countries, promoting digital literacy. Instead of relying on traditional methods, students can enrich knowledge through e-Learning in a much-streamlined method, thus stepping for the next generation digitisation step.

II. LITERATURE SURVEY

Technology Drives the New Paradigm as of which a detailed literature survey has been executed to have a clear understanding of the present educational framework, the specific role of ICT tools, and Novel Corona's impact on educational infrastructure. A novel approach was instigated by M. F. Hmida et al. in 2018 about Pedagogy Enhancement with ICT Integration: Consolidation with E-Learning Platforms and Portals [1]. An all-new utility-based Programming Curriculum, Pedagogy in Digital World [2] has been formulated in 2016 by L. N. S. P. Goteti et al. [3] O. Shabalina;

et al. has presented Creativity in digital pedagogy using game-based learning techniques in 2015. G. Sandhu et al. [4] have investigated Academic Libraries' role in the Digital Transformation of Universities in 2018. In 2002 [5], M. Johnson et al. have premeditated computer systems pedagogy's importance using digital logic simulation. [6] G. Y. Grevtseva et al. has designed and developed a new cybernetic approach as future engineers' digital competence in 2019. [7]-[12] authors have worked on specialized ICON (innovation curriculum online network with Green Pedagogy and Digital Diversity for Multilingualism strategy. World Health Organization has launched online training programs like Infection Prevention and Control (IPC), e-Protect, and several initiatives to control Covid-19 growth. The innovative strategy needs to be adopted for creative Digital Pedagogies.

III. SCOPE OF WORK

An effort has been made to efficiently carry out this work by analyzing various published reports, journal papers, and information available at verified platforms. This work mainly focuses on presenting the Importance of Sustainable Digital Pedagogy and ICT Resources during Post COVID Scenario. A systematic approach has been carried out to represent the whole work in a simplified and effective manner. The current digital pedagogy scenario in South West Asian Countries and its future possibilities has been summarized. Contemporary challenges and the corresponding probable solution have been listed with justification. The time when the learner gets access to audio-visual study materials, learning becomes more exciting and compelling. Researches have already emphasized the effectiveness of audio along with catchy videos on making someone concentrate more and thus resulting in a depth and efficient learning process. Moreover, with day-to-day evaluation and analysis, faculties can chalk the student's progress and thus provide a path for the betterment of student-teacher relation. [12] The present education system's sustainable goals trigger new opportunities in qualitative learning and

strengthen a career identified and discussed elaborately. Besides, the outreach plan has been smartly investigated and validated. The digital platform will open a vast area of learning for all students. People residing in rural areas will access various technology, education, and culture of various parts of the world via this digital platform. People in rural areas with not much education can also enrich their lives with knowledge in their own free time with the help of e-Learning. Moreover, for remote places in emergency times, digital access will ease in finding probable solutions and connections. All these, along with government plans to digitalize, will help to progress in various fields, resulting in a prosperous outcome.

online learning market is the second biggest after the United States of America (USA). Besides, a low data tariff has triggered the sustainable growth of smartphone penetration with internet availability and usage. The internet offers a user-friendly ecosystem for learners to enroll in numerous self-placed distance courses from the reputed distant institution and turn to reinforce their professional skills. India is one of the momentous global players in the online service sector or Business process outsourcing (BPO) and extends beneficiaries extend to a wide range of nationalities. Empowering young minds with ICT-based innovative digital pedagogy approaches could transform India into a skilled capital with higher future possibilities.
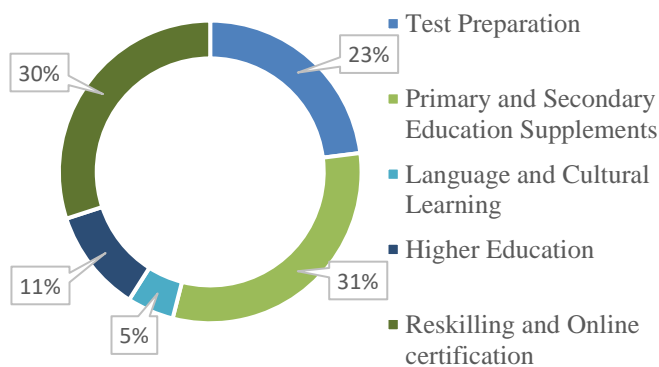

Fig. 1 Online Education Market in Indian Sub-Continent 2020 [5]

Fig. 2 Digitization Scenario in Education Sector in context to India

IV.   RECENT SCENARIO

The Indian education system is often the subject of debate because of its outdated methodology, extrusive curriculum, poor infrastructure, intensive cost of education, and lack of opportunity. The formal education framework in the Indian subcontinent follows the traditional model with conventional classroom teaching, which has subsequently failed to enlighten or explore students' real merit. As indicated by a most recent report, the Indian e-learning market size is estimated to be USD287 million, involving 1.9 million active students in 2019. Several agencies worldwide have projected an approximate growth of 10x to reach USD 2.0 billion benchmarks, and along with this, the user base to be developed at 50 per cent CAGR to 9.6 million users by 2021. Moreover, India's
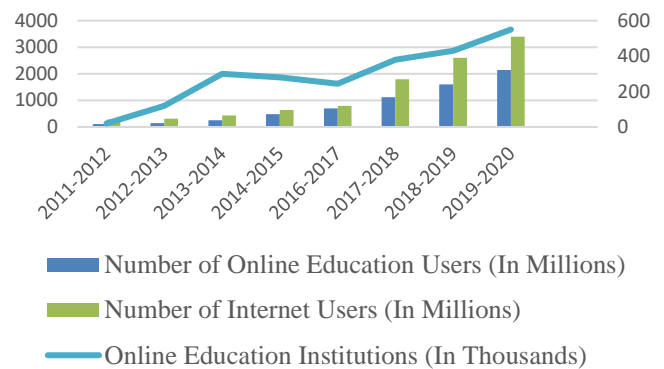
V. CONTEMPORARY CHALLENGES

In recent years, the world of online learning and computer-aided instruction have converged to some extent, morphing into what is often referred to as a blended- or personalized-learning scheme. The new era is all about digitalization; information technologies can prove beneficial for sustainable learning. The remote Learning Management Scheme has been characterized by the enormous potential to enlighten the whole world by educating students of various kinds. A competent investigation [11] has been done to examine a various significant critical problem which may severely affect the Online Learning Ecosystem, are assembled as follows:

• Social narrative, mindset and Stereotype.

- The lockdown in several places has halted digital goods production and thus increased the price of the goods, which further affected the countries' economy.
- High traffic in the network leads to low data transfer speed, which the intern fails to maintain connectivity.
- Lack of communication facilities in remote areas and poor connectivity problems & digitalization has not been well advertised and marketed to reach the end nodes.
- The majority of new generation students lack imagination as our education system does not encourage the thought process and only focus on materialistic education.
- Thus, using more impoverished and old communication systems is not cost-effective and lagging behind the much technologically advanced competitors.
- Lack of intensive supervision and monitoring leads to inefficient operation or system.
- The pandemic has heavily affected the maintenance of telecom connections, affecting the bandwidth and the users connected to the system.
- Faculties or Trainers are not well fortified or trained to execute digital classes effectively, and besides, many individuals do not have access to intelligent gadgets.
- The Covid-19 social distancing needs to be maintained for mass learning in remote areas, but this process lacks strict regulation.
- Higher Education Department lack effective policies for empowering and implementing Remote Learning.
- Data pack perform a critical role to connect individual digitally in learning platforms. In the Indian Sub-Continent, most students come from a poor financial background which discourages them from using expensive data packs.
- Lack of easy access to resources in remote areas and no appropriate infrastructure or framework to harness them in novel cause

VI. PROBABLE SOLUTIONS

The above-discussed challenges can be resolved quickly by adopting suitable digital tools with a distinct vision; some suggested proposals are listed below. The author has attempted to effectively address the unique set of specific challenges with the most suitable alternative:

- The government must ensure subsidized or free data pack to active learners for a specific time frame, encouraging the student community for their dynamic participation.
- Network infrastructure needs to be improved to overcome traffic congestion and confirm durable connectivity, besides there must be stringent policies over telecom operators to provide dedicated bandwidth for respective customers.
- Frequent maintenance in the overall system is required with efficient workers, and government must take precautionary and severe actions to connect the remote areas through digitization.
- To make the teaching-learning process more interactive, engaging, and meaningful, the sessions may be divided methodically, and in between Quiz, Reasoning, Psychology game could be introduced in the form of assessment to confirm full attention. Good performance of any individual may lead to help in achieving substantial credit points.
- Affiliating authorities such as Universities and Council need to come forward with AICTE, UGC, MHRD, etc. (Education Governing Bodies) to work synchronously, for developing new strategies and courses of action. Moreover, a Mentor institute or officer needs to be appointed for better supervision, monitoring, and management.
- To expertise Trainer or Faculties in Remote Learning Management System (RLMS), frequent webinars must be organized, and all forms of support need to be arranged. Feedback provides a notable contribution in designing,

developing existing Infrastructure due to which it must be incorporated into the learning process.

• In the era of Information technology data rule the world, safeguarding confidentiality and privacy becomes essential to focus on evolving dedicated Application software. This software may characterize by easy navigation, flexibility, reliability, swift operation, and most importantly adopting a high grade of data encryption.

VII. OPPORTUNITIES & POSSIBILITIES

The whole world is standing on the verge of developing the vaccine for Covid-19, and most industries are almost ready to buckle up and start their production post-pandemic period. Keeping in mind the present pandemic protocols, every sector has moved towards sustainable development by adopting digital tools. Several segments, such as banking, transport services, advertisement, shopping, etc., have deeply recognized the Digital era's significance and have already adopted it. Education seems to be on the back foot in this race as there is very little up-gradation for the last 2-3 decades. Researchers and Academician must come together to radicalize the present situation during this global crisis hour. Recent development has symbolized creative thoughts, and diligent efforts may prove beneficial for recolonization. The government, Universities, and Educational institutions of a different nation have pledged to bring Massive Online Open Course (MOOCs) to benefit students, research scholars, and fellows. MOOCs are a more straightforward and flexible way of learning, enabling remote access to all the electronic content and empowering our society. Moreover, the study materials and lectures can be availed from any device and any place at much ease, thus imparting the best knowledge to every node worldwide. The specially designed faculty development program has also been introduced using MOOCs to promote and encourage an innovative learning method. In simple words, future possibilities and growth opportunities of digital learning or pedagogy are endless with numerous co-benefits and may revolutionize the whole education sector. Most importantly, it enhances the probability of student enrollment and dropout back to the education system, which helps develop human resources' sustainable development; furthermore, it provides a flexible ecosystem to learners. Even after the pandemic is over, the digital world shall serve in accelerated transformation & remarkable life enrichment extended to almost every sector. The overall process is much more economical than the preexisting modes in all respect, and knowledge can be imparted to everyone and in all antagonistic conditions.

VIII. OUTREACH PLAN & SPECIFIC OUTCOME

Despite endless future possibilities and remarkable contribution, digital pedagogy suffers from numerous social and technological challenges that drastically affect its growth in Southeast Asian countries' education sector. The government should encourage research and development and promote remote online learning to attract most students to switch to digitalization. With low-cost data availability, technological innovation, and cutting-edge engineering, digital pedagogy can replace the entire conventional teaching-learning process. In this section, possible technology application has been discussed which can revolutionize the way of learning, in turn, emphasize Open Curriculum. Influential, innovative tools that are needed to be incorporated for new generation digital pedagogy are Virtual/Augmented Reality, Cloud Computing, Biometrics, 3D technology, Blockchain, Gamification, Mobile Application, Cryptography, Artificial Intelligence and Machine Learning.

Digital pedagogy is an almost new concept and continuously gaining popularity among the student community. The need of the hour is to immediately adopt digitalization in the education sector for a novel cause. It is also very challenging to compare its potential with the conventional education system. The specific outcome has been drawn to summarise the impact and modes of e-learning available.

- Promotes outcome-based Digital Learning & flexibility in the learning schedule
- Helps to get connected even with the remotest learner & support uninterrupted knowledge gain with STEAM approach
- An affordable, transparent learning ecosystem & Involve considerably less venture in infrastructure
- Enable students to grow practical self-directed learning skill with Customize learning environment
- Digital literacy education seeks to equip learners with the multidimensional competencies
- Endorses creative teaching and real-world learning with a broader scope for better career opportunities
- Ease of sharing abundance resources information, engaging, develop accountability among students.

IX.   DISCUSSION

This article examines the integration of digital resources in teaching with the pace of technology innovation and new skills growth. Critical thinking meets creative thinking to produce authentic, smart innovation for learners in the new digital circular economy. The future of online degree education looks promising and opens up education to a more extensive section of the population than ever before. This paper may prove suitable in framing the roadmap towards new education policies for a better efficient learning process. Specific outcomes and outreach plans have been discussed in consideration with social implications. This investigation has reported some significant discoveries about online instruction, refuted others, and introduced a scope of expectations about online innovation's fate for informational purposes.

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CONFLICT OF INTEREST

Ayan Banik et al. agree & abide by the manuscript's contents and further declare that they have no conflict of interest.

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