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Research Article

Digital Revolution and Teaching in the 21st Century: Dimensions and Challenges with Special Reference to Teacher Education

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Abstract:

It is well known to us that this millennium is the digital millennium. From the very beginning of the 21st Century a rapid acceleration in digitalization of everything in every field is an utmost moto of the progress of human civilization. It is best observed in the education field, specifically teaching learning process at every level of curriculum from Kinder Garten (KG) to Post Graduate (PG) level for effective communication of message for better learning within a stipulated time.

Different dimensions in educational field viz. formal and non-formal education in school education, higher education, general education, technical education, medical education and other professional education are facing challenges due to a rapid change in transaction of knowledge from face to face mode to online mode via blending mode which is not accessible to all. Here, the speaker will try to give an overview on Digital Revolution and its impact on teaching- learning process in different dimension and challenges with a feasible process to overcome the challenges by different ways in the field of teacher education.

Key Words: *Digital Revolution, Teaching- learning, Dimensions, Challenges, Feasible Solutions.*

Introduction:

We all know that education is nothing but the acquisition of knowledge that have been developed by the vast experiences of the previous population which help everyone for future life of an individual or a number of social members within a stipulated time by formal and non-formal education and sometime by informal education. We also know that each education is comprises of some contents and concepts to be transacted and followed by different mode of transaction and finally an evaluation to assess the achievement level of the learners involved in the programme.

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The 21st-century digital revolution has shifted education from traditional face to face methods to dynamic blended methods, technology-driven, and personalized learning environments. Fundamental dimensions include blended learning, AI, and digital literacy, requiring teachers to move from knowledge transmitters to facilitators. Key challenges for teacher education involve overcoming the digital divide, updating pedagogy, and fostering adaptability among educators.

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Discussion:

Dimensions of the Digital Revolution in Education

1. Blended and Virtual Learning: The combination of in-person and digital platforms has become standard.
2. AI and Personalized Learning: Technology enables tailored education pathways, accelerating to individual student needs.
3. Digital Competencies & Literacy: A shift toward ensuring both teachers and students possess necessary IT skills and critically evaluate information.
4. Co-Creation of Content: Teachers are moving from mere users to creators of digital content in various languages and various dimensions.

Present Scenario of Teacher Education:

We all know that Teaching at every level of education is a Science and an Art also. According to the philosophical, psychological and sociological bases of education the framing of curriculum for each level is different. To make a child to a productive and responsible national & global citizenthese curriculum transactions mostly depends on framing of teacher education of a country so that a skillful, competent and dedicated teacher may able to fulfill the aim and objectives of whole course content in such a manner that children may learn it joyfully and motivate himself or herself to go ahead for further learning.

Therefore, the Teacher Education Programme are very much vital and crucial to make a nation as productive generous and motivated nation for the global fraternity peace and an era of humanity. Otherwise these children may be the liability to the country as a nonproductive consumer. So, we have to know the details of teacher education in India and other countries.

National Level and State Level in India:

Teacher Education comprises of different stages of children. These are as follows.

Integrated Child Development scheme (ICDS) for the children of the age of 0 years to 3 years and Ministry of Children, Women and Social Welfare Department.

Pre-Primary Teacher Education Programme (PPTEP) for the students of the age of 3years to 6 years and Primary Teacher Education programme namely (D. El. Ed.) for the learners of the age of 6 years to 14 years are going on under the supervision and guidance of School Education Department and NCTE.

Secondary Teacher Education (B. Ed.)and Teacher Education on Physical Culture or Physical Education at school Level (B. P. Ed.) for the students of the age of 14 years to 18 years are going on under the purview of School Education Department of India and states and NCTE.

Besides these, for the Teachers or Professors of General Degree Colleges, Engineering and Technological Colleges, Medical Colleges, Law Colleges, Other Professional Colleges and Universities Orientation Programme (OP) and Refresher Courses (RC) are one kind of Teacher Education Programme (TEP) for the UG

and PG students of the age of 18 years to 23 years are going on under the guidance Higher Education Department of India and States with UGC, AICTE, MCI, JCI and HRDC.

Again, for the students of the age of above 23 years to 25 years or i.e. For Teacher Educators or Professors for Colleges of Teacher Education (M.Ed.)and for the Professors of Teacher Education on Physical Culture or Physical Education (M.P.Ed.)are going on under Higher Education Department and NCTE.

Finally, for the Research Students of above the age of 23 years M. Phil. and Ph. D. Courses a Six-Month Research Orientation Course (ROC) viz. Course Work (CW) is being organized by the University Departments of corresponding University following the guidelines of UGC and Higher Education Department of India.

All these courses are mostly pre-service training or orientation courses by nature but for the emergency and inevitable condition these courses sometimes run as in service programme with the demand of the states and country.

International Level:

Regarding Education of all Nationals viz. UK, German, France USA, Russia, Japan and China have given an importance on learning by doing, learning by hands on experiments and experiential learning.

Therefore, problem solving ability will be developed among the learners and creativity with innovation temperament will be developed from the very beginning of the basic education.

Regarding Teacher Education, framing of orientation in Teacher Education programme such type activity-based training, internships with schools have major part of the curriculum followed by all these nations.

Discovery, invention and creation are the moto of capturing market in different field is the vital force of education and consequently the teacher education also.

Glimpses of Digital Revolution:

A slow but steady progress was going on the subject of Computerization of Education since 1980 with the development of computer science. In 1990, after GAAT treaty among the nations, it was the opening of global market to all Nations and Multinational companies and consequently education and health become the commodity to them. Then and then Each and every one was ready to serve a quality education and health related issues for capturing the huge global market throughout the nations for benefit of populations.

Here, lies the vital force of competitive market and consequently quality education to transform unskilled common population to more and more skilled and competent labor in different field. Therefore, UNO, UNESCO, UNICEF, IMF, WHO and all other international organization became very active to make this vision as a mission to human being for underdeveloped countries or second and third world countries.

Research in the field of digitalization or computerization of education became accelerated and consequently the development of new generation of computer with internet facilities through satellite to reach to all with a least cost was the target of the scientists and industrialists or billionaire. And thereby a corporate culture was developed. And service to the nation or human being becoming the remunerated job to each and everyone in the new millennium of 2K. Therefore, digital revolution was inevitable in every field human life and livelihood.

There is a gulf of difference between the Situations of Pre-corona era and Post- corona era of 2020 which open the eyes of common people throughout the world how digital revolution was targeted by multimillionaire for last 30 years to reach a radical change in human society among the nations.

Now a days the term Artificial Intelligence (AI) and Robotics Engineering (RE) are the burning research area throughout the world to capture the market and to engulf all professions by digital revolution. Television,

Computer, Desktop, Laptop, cell phone becoming obsolete by discovering sixth or seventh generation and more in the development of Information and communication %Technology (ICT). So, what next to Human Civilization, Health, Education, Teacher Education Livelihoodis?

Global Perspective:

At present global population is about 800,00,000,00 or 800 crore or 80 million or 8 billion of which both Asian (59.4%) and African (17.6%) countries carry about seventy seven percent (77%) population which are still developing countries. Other developed countries including European (10%), Northern and Southern American (12%) and Oceania (1%)countries carry only rest of the population of 23%. Out of these total population of 800 crore, one third population i e. about 300 crore population are below the age of 30 years who are need to be rear up by quality education and transferred them to be a productive global citizen for better future.

Therefore, Demand of resources and exploiting of resources among the population of countries of Asian continental is too high which causes too high poverty and pollution in this continental which hamper education tremendously. No method of teaching learning is suitable for the population of this continental when they are hungry and thirsty.

The education for them should be skill based and competency based so that they can do something for their own and family's financial support for livelihood in future and simultaneously economic development of the country and the world as well with a quality life. Here, lies the role of effective teacher education not only to a particular country but throughout the world.

In the changing scenario of liberalization, privatization and globalization with scientific development in the field of information and communication technology (ICT) with the digital revolution, we all have to accept digital mode of teaching learning process. That would be able to develop and connect with the best possible of learning environment among the learners of every level all over the world. Mode of transaction of concepts and contents by the teacher should be changed accordingly for developing the reflecting thinking and problem-solving ability among the learners.

Impact of Digital Revolution: Dimensions and Challenges:

Digital revolution has both positive and negative impact on different field. These are discussed below one by one in brief.

On Environment:

Challenges related to environment are Protection of environment, decrease down the environmental pollution and health hazards, development of total environmental awareness for a sustainable human civilization through education.

On line mode of education will be accelerated due to digital revolution thorough internet. Therefore, Hard copy printing in paper will be minimized in drastic level for production books and copy books. So, deforestation will be decreased in drastic level as because use of paper will be minimized. And thereby production of different kind of papers by using green wood and leaves will be decreased down Therefore, physical environment will be protected much by avoiding pollution due to paper industry, Both Abiotic (Water, air, soil) and Biotic (Plants, animals, microorganism) environment will be protected more. Secondly by developing awareness through education with proper guidance of teacher education through digital mode may be feasible by involving maximum population in educational field.

But human labor related to these field of paper industry, printing technology will be automatically denied. Health hazards may grow in the society due to cut down of manual labor and excessive use of gadgets related to ICT accessories.

On Education:

Challenges in Education are of different types. These are as follows: Target of 100% literacy in vernacular, target of 100% numerical literacy, target of 100% literacy in National Language, in India it is Hindi, Target of 100%literacy in English as digital language, Target of Universalization of secondary Education for converting common mass to a productive skillful people and Target of 100% literacy in scientific temperament for enjoying quality life standard in the society and ultimately socialize the children for a sincere world citizen.

These are of Herculean task for each and every country. But these may be solved with the help of Digital revolutionary development by minimizing the cost of the project with increasing online platform. Online mode of teaching-learning process would be practiced more. Face to face interaction between teacher and students would automatically be abolished and simultaneously the expenditure.

Thereby isolation among human being will be dominated rather than the role of schools for socialization of learners will be totally go beyond the wall. Therefore, infrastructural expenditure related to promote building and other related matters will be minimized. Physical concepts may be transacted by audio or video or by audio-visual mode at every level. Learning by doing may be transferred to virtual mode livelier with number of repetitions without much expenditure.

On School Education:

Challenges in school education is 100% enrollment of the children of the state and minimization of dropout up to the age 18 years. So, retention and continuation of the children is the great challenges in school education

Curriculum of school education is mostly depending on macro concepts and is framed in such a manner taking something of everything with a wide range of all subjects. Accumulation of simple ideas with formation of concepts, contents and processes are the primary frame of school education which are generally transacted by lecture method in theoretical mode

No such laboratory activities are incorporated upto secondary level of school education. Now, with digital revolution all the concepts may be transferred digitally with digital projector through power point software again and again and by problem solving activities. Learners may feel very cordial to get an experiential learning process.

On Higher Education:

Increase of Enrollment ratio in higher education and development of skilled personalities in different field is very urgent and emergent issue.

Generally, background of Higher Education may be started from senior secondary schools or higher secondary schools or pre-university course or intermediate course at either school Board or council or from intermediate college. Learning of critical thinking or thought-provoking model is started at this stage with problem solving abilities through laboratory practicum or field study or project presentation.

In higher education at Colleges and Universities education is imparted mostly by face to face mode with physical presence of teacher and students. But after 2020, i.e. After pandemic calamity due to corona virus made everyone as a self-sufficient pupil by using a smart phone. Learning by doing in Higher Education is the first and foremost method to transact more complex or micro contents concepts to the learners.

Therefore, to make it a convenient process presently higher education students (viz. UG and PG) favor or choice learning by online mode to avoid unnecessary movement in transport and related expenditure. They feel

free to use online platform as their approach of learning without any hazards in rushing to colleges or university. Here, also the digital revolution radically changed the teaching learning process in higher education. The updated software help much to be more interactive to learn and evaluation is also be feasible very objectively. Thus, the digital revolution plays the vital role in future higher education.

On Health and Mind (Psycho) Education:

Challenges in health and psycho related problem are very much prominent in the present modern world. To face Different kind of deceases from the very beginning of the life of a child both physical and psychological hindered the smooth progress of education.

With the help of scientific development health related problems and psychological related problem may be solved by taking the help digital platform e-medication e -education with awareness. Here lies the role education both in school and higher education. Life is very precious and we have to keep vibrant with the help of scientific education using internet and digital platform.

On Social Education:

Challenges in social education are socialization of a child and developing a confidence to follow the four pillars of education i. e. learning to know, learning to be and learning to do and learning to live together.

This challenge could be combated with the help of digital education and with the help of teacher who can develop values of individual and social life.

On Economic and Business:

Challenges related to finance is a big question in propagating education through offline mode and digital mode as well.

Therefore, Government and corporate bodies should come forward to take an initiative to finance education so that they could get an educated knowledgeable society in future.

On Teacher Education:

Challenges in teacher education is that to get a quality and effective teacher from teacher education colleges mode orientation should changes which demand a revision of mode teacher education all around from curriculum to evaluation.

Generally, teacher education comprises of philosophy, psychology, administration, Management, teaching skill development and many more. Determination of learning objectives with teaching and training mode to get quality teacher training institute should be well decorated with digital platform.

Teacher education mostly give an internship program which is very difficult in online mode. Yet it needs a collaborative activities with trainee and internship schools. Here, a demand of computer laboratories with digital facilities is an urgent requirement.

Conclusion:

There are different kind of Teacher education program in India and abroad also. Now the era is the era of online digital era. We all have to think accordingly to change teacher education with digital mode using artificial intelligence and robotics education. Therefore, we all have to think about the upcoming challenges in different field of education specially in teacher education. those are as follows:

Challenges and Impacts on Teacher Education

1. Pedagogical Shift: Teachers have to struggle to move beyond traditional methods, requiring intense training in "e-pedagogy" to effectively integrate technology in their teaching learning practices.
2. The Digital Divide & Infrastructure: Unequal access to high-speed internet and devices, specially in rural areas, limits effective implementation of digital methods.
3. Continuous Professional Development: Teachers and teachers' Educators must have to engage in constant "unlearning and relearning" to keep pace with emerging, changing technologies.
4. Teacher Preparedness & Mentality: There is an emergent need to cultivate adaptability, resilience, and a global-mindset among teachers' educators to manage technological, social, and emotional aspects of at present century classrooms.
5. Ethical Concerns & Distraction: Managing student attention amidst online distractions and navigating the ethical use of technology are significant challenges considering the demand of the learners.

Teacher education must evolve from providing technical knowledge to fostering digital adaptability, ensuring teachers are equipped to create content, manage virtual classrooms, and foster critical thinking, rather than just delivering information to the learners in the face to face classroom or blended classroom.

References:

- Almazroa, H., & Alotaibi, W. (2023). Teaching 21st century skills: Understanding the depth and width of the challenges to shape proactive teacher education programmes. Sustainability, 15(9), 7365.
- Benade, L. (2017). Being a teacher in the 21st century. A Critical New Zealand Research.
- Caena, F., &Redecker, C. (2019). Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework for Educators (Digcompedu). European journal of education, 54(3), 356-369.
- Jan, H. (2017). Teacher of 21st century: Characteristics and development. Research on Humanities and Social sciences, 7(9), 50-54.
- Light, D., Manso, M., &Noguera, T. (2009). An Educational Revolution to Support Change in the Classroom: Colombia and the educational challenges of the twenty-first century. Policy Futures in Education, 7(1), 88-101.
- Milner-Bolotin, M. (2015). Technology-enhanced teacher education for 21st century: Challenges and possibilities. Emerging technologies for STEAM education: Full STEAM ahead, 137-156.
- Ong, Q. K. L., & Annamalai, N. (2024). Technological pedagogical content knowledge for twenty-first century learning skills: The game changer for teachers of industrial revolution 5.0. Education and information technologies, 29(2), 1939-1980.
- Seeletso, M. K. (2022). Teacher education in the digital age: Opportunities and challenges. Perspectives on teacher education in the digital age, 11-23.
- Siregar, L. A., &Siregar, S. (2024). Assessing teacher competency and preparedness for integrating digital media in 21st-century education: An exploratory review. AL-ISHLAH: Jurnal Pendidikan, 16(4), 5794-5804.
- Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. Cambridge Journal of Education, 50(1), 37-56.