

Innovating Education: The Journey Towards a Sustainable, Women-Led, and Digitally Transformed Education 5.0 via G20 Summit at India

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Abstract

Post Covid world has revolutionized the world in terms of Technology. Technology and tools that was chosen by choice in pre Covid has now emerged as most demanding. Few reasons for the same are digital revolution giving rise to boost in technology, sustainable development goal 2030- agenda put by United Nations to beat the problems like poverty, hunger, natural disasters, deletion of renewable/ non renewable resources and imparting quality education and boosting world economy by globally collaborated research, innovations, and industries in secured manner. Another reason for high demand of emerging technology is ease of use and anywhere, anytime, and everywhere demand from end users. This revolution has immensely impacted industry and society transforming them to framework of 5.0. Latest demands of Industry 5.0 and society 5.0 can only be fulfilled by upgrading education framework to Education 5.0 that is human centric, sustainable and women led especially. India after understanding the importance of education 5.0 has added Education feature in discussion group of G20 summit held on 09-10 September 2023. This summit discusses the features like how education can be boosted by global collaboration of institutions and universities and exchange programmes for students and teachers all over the world. Various existing policies success rates were analysed and gaps were taken care of and new policies to move towards Education 5.0 were formulated. This paper firstly mentions G20 education group problem formulation and objectives. Thereafter it presents the finalised design of education group policies and programmes and their implementation in INDIA specifically. In section 2, a detailed survey on Education 5.0 is presented and thereafter in section 3 impact of education 5.0 on India's economy is discussed.

Keyword(s)

G20 Education working group (EdWG), SDG 2030, Education 5.0, Digital transformation, collaborative and lifelong learning.

1. Background

Under the leadership of Prime minister Shri Narendra Modi Ji and rich cultural diversity, India is now fifth largest economy in world GDP ranking list. Dr. Jitender Singh, Union Minister of State Science and Technology, in recent interview highlighted the latest achievements of India **Aditya L1, Gaganyaan and Venus orbiter, Chandrayaan-3** contributed by ISRO, based on decisions like opening up of space sector to private industries with more than 150 startups working on space mission. Education sector is the foundation stone for development of any sector using current technologies and smart working. Major act passed in parliament for boosting education sector is **Anusandaan, National research foundation** aims at equitable funding in research and academics. This paper is discussing the Education 5.0 framework and its mapping with nation's sustainable development goals 2030 defined by United Nation. United Nations of academic impact proposed SDG2030 to provide quality education and side by side taking care of human beings (living/non-living) by maintaining climatic condition, flora and fauna, renewable/non-renewable resources Further, it will present the education policies and programmes finalized in G20 summit to support Education 5.0 and Industry 5.0.

2. G20 summit education policies and programmes – A revolution in Education framework of India

National Education policy 2020[1] has played significant role in boosting education from foundation learning to high learning education systems. Moreover, all these government policies are supported by more than 5000 edtech startups in education sector that made India to secure second world wide rank in online Education after US. Another step for boosting Education system in India is Hosting G20 summit[2], 09-10 September 2023. This summit consists of major 20 developed and developing countries that consists of 2/3 of world's population. Apart from this, some countries from ASEAN are also invited as guest wherein all policies for various sector will be devised and will be implemented and monitored globally. Three main accelerators of given in G20 report for education 5.0 are

1. Digital Transformation[3]: To provide digital infrastructure consisting of digital resources, courses and delivery mechanism. Resources like computer, laptop, mobile etc. is to be provided to each individual local or remote. Further the course and curricula were to be designed in such a manner to impart all level blended education or training (Full time/part time/ vocational). And finally, to increase the opportunities for every

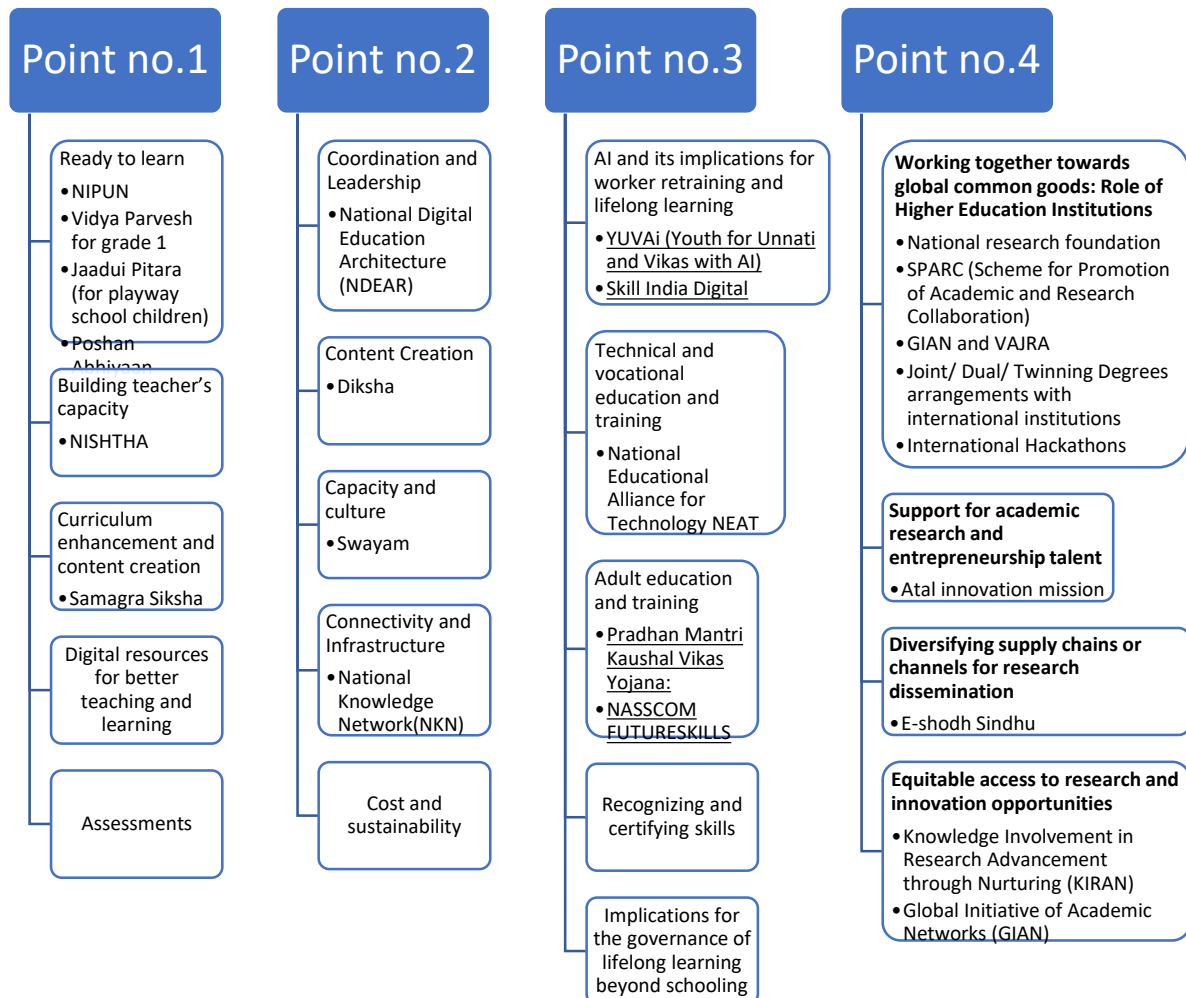
individual to acquire necessary digital skill by ensuring their protection, privacy and security.

2. Sustainable transition to green economy[3]: To address the issues like energy and resource limitations, analysing climate effecting impact for every project and approving even if it is with threshold, strengthening green environments etc.
3. Women led development[3]: India has significant participation of younger girls in school level, skill enhancement or upgrading opportunities. But ensuring their significant role in higher level leadership, governance and management positions can bring revolution in every sector of India.

Problem statement of G20 Education working group: EdWG aims at devising global education system that imparts universal quality and sustainable education to everyone irrespective of age, gender etc. with following objectives:

- a) To strengthen the learning outcome of every course/programme/degree.
- b) Equitable access of latest technological tools along with immense digital transformation
- c) Partnership for education at International level via exchange programmes, credit transfer schemes, funding to meritorious and passionate students etc.

Design of Education policies and programmes by EdWG: The outcome of EdWG meeting was identification of four key points around which new methodologies for addressing the education problem can be handled globally with cooperation. These key points are[3]:



- a. Ensuring that all children are set up for life with foundational literacy and numeracy (FLN) and can enjoy opportunities for lifelong learning, by improving teaching and learning practices, including through blended learning.
- b. Leveraging digital resources and technologies to accelerate progress in education.
- c. Understanding how education systems will be impacted by the future of work, and strengthening their relevance and linkages.
- d. Promoting closer collaboration between higher education, the research and development sector and societies, both within and across national boundaries.

Methodologies and tools: This section discusses the various existing and newly proposed tools and policies in India under four main points as mentioned above.

Digital Transformation and Smart Infrastructure

Key Technologies:

- **Broadband Networks:** High-speed internet ensures uninterrupted access to online resources, e-learning platforms, and virtual classrooms. Efforts like India's **BharatNet project** aim to provide connectivity to rural areas.
- **Smart Classrooms:** Integration of IoT devices, interactive whiteboards, and cloud-based learning management systems (LMS) for real-time interaction and resource sharing.
- **Cloud Computing:** Facilitates centralized content repositories accessible anytime, anywhere, enabling scalability for mass adoption.
- **Edge Computing:** Supports latency-sensitive educational applications, like live classrooms and AR/VR experiences, even in regions with low connectivity.

2. Personalized and Adaptive Learning

Key Technologies:

- **Artificial Intelligence (AI):**
 - **Natural Language Processing (NLP):** Enables real-time translation, speech recognition, and chatbots for multilingual and personalized support.
 - **AI-Driven Recommendations:** Algorithms analyze learner behavior and suggest tailored resources or courses.
- **Machine Learning (ML):**
 - Models train on performance data to adjust the difficulty or content pacing to suit individual learning needs.
 - Identifies at-risk learners and provides early intervention.
- **Gamification and Behavioral Analytics:** Tools such as AI-driven gamified platforms motivate engagement while monitoring progress in real-time.

3. Inclusivity through EdTech

Key Technologies:

- **Assistive Technologies:** Voice recognition, text-to-speech tools, and tactile devices (like Braille displays) empower differently-abled learners.
- **Low-Cost Devices:** Affordable tablets or single-board computers like Raspberry Pi paired with open-source educational software reduce the barrier to entry for disadvantaged communities.
- **Language Translation Models:** AI tools like Indic NLP platforms provide localized and linguistically accessible resources for diverse learners.
- **Blockchain Technology:** Digital certifications provide secure, tamper-proof credentials for marginalized groups lacking traditional academic documentation.

4. Skills for the Future Workforce

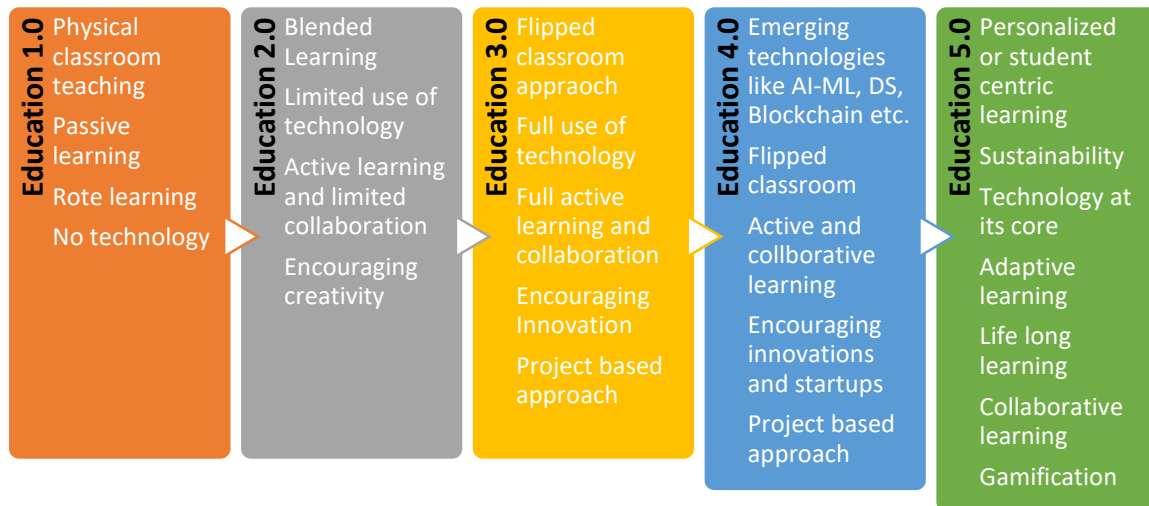
Key Technologies:

- **Immersive Learning Environments (AR/VR):**
 - **Virtual Reality (VR):** Simulates real-world scenarios for skills training (e.g., medical procedures or industrial tasks).
 - **Augmented Reality (AR):** Enhances interactive learning by overlaying educational content in real environments.
- **Coding and Robotics Platforms:** Early integration of robotics kits and coding platforms (like Arduino and Scratch) develops technical and problem-solving skills.
- **Big Data and Analytics:** Curriculum development informed by massive datasets predicts future skill demands and measures learning outcomes.
- **IoT-based Experiential Labs:** Hands-on experience with connected devices in smart lab settings nurtures practical learning for high-tech industries.

3. Education 5.0[4] Framework towards SDG 2030[5]

Early education system in India was delivered through GURUKULS and was commended under the supervision of Gurus. Takshashila and Nalanda were some examples of higher learning institutes in India where students from all over the world used to come. Education system in those days were centric on pupils to enhance their concentration, learning,

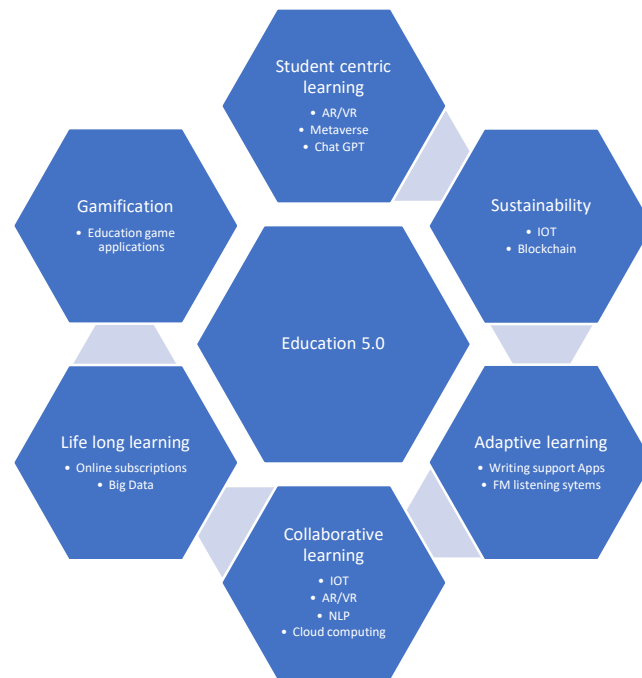
adaptiveness and collaboration. British Rule and subsequent establishment started the new education system Education 1.0 that subsequently has been upgraded to Education 5.0. Education 5.0 Framework is depicted in following diagram and received a lot of strength from EdWG.



Education 1.0 was basic education system supported by physical classroom teaching assisted with chalk duster or marker. However, with advent of internet, physical classroom teaching was blended with online teaching that gives flexibility to student to sit anywhere inside/outside the campus and attend the lecture that comes under Education 2.0. It also uses limited technological support like Emails, chat rooms, cloud software's like Gdrive, forms, spreadsheets etc. Education 3.0 adds creativity and innovations via project based learning supported by full use of latest technology. Here main focus was not classroom teaching rather students used to learn via projects and National/ International level competitions like Smart India Hackathons etc. Then comes the era of emerging technologies like artificial intelligence, machine learning, Big data, Cyber security, IOT, blockchain. The aim was to create convenient and latest working style by embedding these technologies in existing architectures. This usage of latest emerging courses in existing teaching learning methods gives rise to Education 4.0.

However, all these education models were courses and technology centric thereby limiting the importance and outcome of education. But by understanding the need to develop human centric education system as per alignment with early education system in India, the whole education system was revolutionized and converted into education 5.0. The major goal of education 5.0

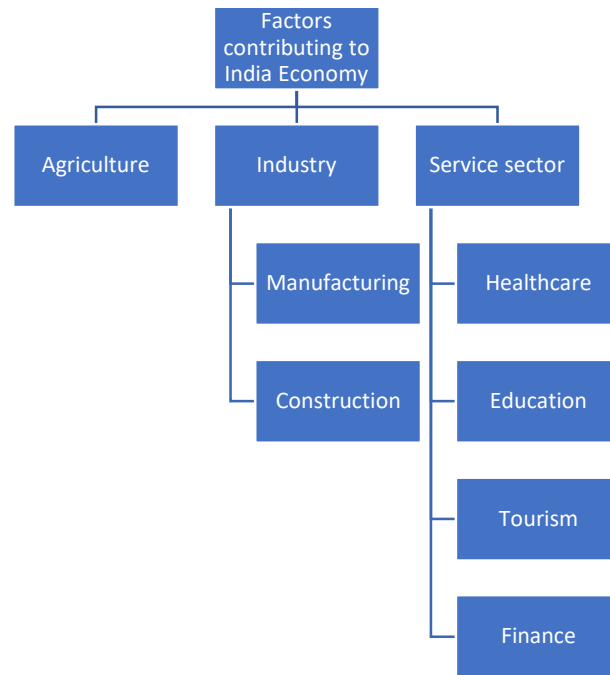
is lifelong adaptive and collaborative learning irrespective of age, gender, socio economic culture or students who are facing mental or physical disability. All the characteristics of Education 5.0 are immensely supported by latest technologies as depicted in following diagram



4. Education 5.0 role in Bharat economy

As India has already secured the fifth position in world economy by overcoming the position of UK also and is expected to enter three largest world most powerful economy country in next 10-15 years. India is achieving its goal by standing over the pillars of SDG 2030, human centric especially women empowerment and privacy and security of population and services that has given rise to new concept of Industry 5.0. The reason for sudden rise in India GDP is digital revolution in India and upliftment of startup culture. Major contributing factors of India economy are as shown in following diagram. Profit making can be by increased in any of below described three sectors by following measures.

- a. Use of technology
- b. Upskilling of human resource
- c. Upgradation of tools
- d. Partnership of public private entities
- e. Development and boost of small scale, medium scale and large scale entrepreneur programmes or MSMEs or startups.



India leaders have successfully identified all contributing factors and has very aggressively participated in meetings of respective working groups of these factors. Suitable policies have been formulated at global level for their further upliftment. One of the major outcomes of G20 2023 summit is the creation of startup 20 engagement group that will connect the startup ecosystem of India globally, funding them collaboratively, mentoring them through global network institutions. Main highlighting point addressed in this summit are to raise the joint annual investment of G20 nations in global startup ecosystem to US \$1 trillion by 2030[6].

Demands of Industry 5.0 can only be fulfilled by support of Education 5.0 as discussed above. This also highlights the current topmost need of understanding Education 5.0. India government is moving very fastly towards Education 5.0 with formation of NEP2020. G20 summit education group has also opened several opportunities for all level schools, high levels institutions and universities. Now next pressure is on schools, institutions, and universities to understand Education 5.0 in their best interest and implement it within available resources.

5. Conclusion and Future work

This paper presents the importance of Education 5.0 in development of any country. India successfully raised the issue in G20 summit and presented existing policies and programmes and formulated new one for rapid conversion of education framework to 5.0. Various India policies and programmes have been mentioned in section 2. In future, data analysis on success

rates of these programmes can be done to successfully implement these policies with in time bound and to evaluate the reasons for delayed implementations.

Sustainability being one of the current goals for any organization so implementation of these policies in a sustainable way that not only addresses poverty, hunger but also robust under natural disasters and did not increase global warming. Technology choice and enablement should be done in such a way that that leads to more global collaborations and lifelong learning.

Two main pillars of Education 5.0 are personalized learning (1:1 teacher students' ratio) and Gamification. Suitable apps should be innovated to promote these two characteristics.

Apart from softwares, hardware resources (computing or communication device) should also be upgraded that can cope up with the speed of 5G technology.

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