The Vice President on Science Education and Innovation

- The Vice President of India called for inculcating scientific temper and nurturing the spirit of inquisitiveness among the children from a young age.
- He was addressing the **27th edition of the National Children's Science Congress** (30 December, 2019) in Thiruvananthapuram.

About National Children's Science Congress

- It is the **flagship programme** of *National Council for Science and Technology Communication (NCSTC)*, Department of Science.
- **Theme** for 2019 Congress – **"Science Technology and Innovation for a Clean, Green and Healthy Nation"**

Achievements of India

- Historically, India has been a lighthouse of knowledge. Our Ayurveda system of medicine can be traced back to 5000 BC.
- **Indus Valley Civilization** had irrigation and sewerage systems as far back as 2500 BC. By 200 BC, South India was making **high quality wrought iron** and, the **invention of zero** and **contribution to astronomy** was well known.
- Aryabhatta's '**Aryabhattiyam**' is considered a seminal work; equally pioneering work is **Panchasidhhantika** of Varahamihir. Charaka and Sushruta are known as **Fathers of Surgery**.
- Rishi Kanad first spoke of "**anu" (atom)** as an indestructible particle of matter in Kanada Sutra while Patanjali is considered as **Father of Yoga**.
- In early 20th century, Prof. Satyendranath Bose's '**Boson**', Prof. Subramanian Chandrasekhar's '**Chandrasekhar limit'**, Sir C. V. Raman's '**Raman Effect'**, and Prof. Jagadish Chandra Bose's '**wireless communication'** have earned global recognition.

Artificial Intelligence: Challenges and Opportunities for India

AI can be described as a system's ability to learn and interpret external data via software/algorithms or machines/devices for problem solving by performing specific roles and tasks currently executed by humans.

Opportunities and Applications:

- The AI has the ability to overcome some of the computationally intensive, intellectual and perhaps creative limitations of humans. Therefore, it opens up **new application domains** within manufacturing, law, medicine, healthcare, education, government, agriculture, marketing, sales, finance, operations and supply chain management, public service delivery and cyber security.
- **Within the education sector**, AI can be deployed to *improve teacher effectiveness and student engagement* by offering capabilities such as intelligent game-based learning environments, tutoring systems and intelligent narrative technologies.
- AI can **impact education in three ways**:
    - **AI enabled hyper-personalization** helps in developing student-specific learning profile and in developing customized learning environments based on ability, preferred mode of learning and experience.

- The use of **smart assistants** (Amazon Alexa, Google Home etc.) and associated technologies offer significant potential to help students.
- AI systems **can assist educators with secondary tasks** such as grading activities, providing personalized response to students etc.

- AI technology can be used within several other sectors for **enhancing both efficiency and effectiveness**.

AI and SDG:

- AI-based systems can help in achieving **UN Sustainable Development Goals**. It can be utilized for **conducting remote diagnosis supporting doctors** to help improve health service delivery.
- It can also help achieve the "**Zero Poverty and Zero Hunger**" (SDG 2) by assisting in resource allocation for predicting adverse environmental conditions, diagnose crop diseases and identify pests in timely manner to mitigate the risk of catastrophic agricultural events.
- Similarly, AI based systems can be used to **predict energy and utility demand** to help in achieving SDGs such as **"Clean water, sanitation" and "Affordable clean energy".**

Application of AI in India:

A. In Health

- India has **0.8 per thousand doctor-to-patient ratio** (UK – 2.8, Australia – 5, China – Approx. 4). **In India, doctors spend just 2 minutes per patient**, whereas in the US it is close to 20 minutes.
- AI could be a valuable assistive tool for doctors in helping reduce their workload and assisting in diagnosis.

B. In Agriculture

- The **per hectare cereal productivity in India** is almost half that of China and UK (3000 kg/ha vs. over 6000 kg/ha). There is significant loss of productivity due to pests and diseases.
- AI-based agricultural pest and disease identification system are helping farmers in identifying the disease and advising the remedial measures.

C. In Education

- India has about 50% less teachers per thousand students when compared with developed countries (**India 2.4/thousand** vs. UK 6.3/thousand). In this scenario, AI can help in providing education in remote areas.

Potential:

- India has **1.18 billion mobile phone users** with 600 million internet users and 374 million smartphone users.
- It has one of the **cheapest data rates in the world** ($0.24/GB) and an **average data speed of 6 MBPS**.
- These factors open up huge potential for adoption of AI technology in India.

Success Story:

- The Tamil Nadu e-Governance Agency has partnered with Anna University to launch a **Tamil smart assistant called "Anil".**
- The agency has recently launched an AI-based agricultural pest and disease identification system and made it available to over half a million farmer families through a mobile app.

- The Tamil Nadu Govt. is implementing an **innovative use of AI through face recognition for recording attendance**. The system is saving more than 45 minutes per day and is freeing up extra time for core educational activities in schools.

Challenges and Shortcomings:

- **Lack of explainability** – Generally AI operates effectively as a black-box-based system that does not transparently provide the reasoning behind a particular decision, classification or forecast made by the systems.
- **Lack of contextual awareness and inability to learn** – AI based systems have major limitations in terms of making decisions where context plays a critical role.
- **Lack of Standardisation** – AI based systems are increasingly being embedded in variety of products and services. This poses a critical question: how can the inferences delivered by different AI components be integrated coherently when they may be based on different data and subject to different ecosystem conventions?
- Organisations face challenges on **how to ensure AI and human work together successfully.**
- **Job Losses** – Increasing automation will lead to significant job losses particularly at operational and lower skill levels for repetitive tasks.
- This emphasizes the need for strategic management of AI transition requiring organisations to **carefully consider a number of challenges**: how to select tasks for automation; how to select the level of automation for each task; how to manage the impact of AI-enabled automation on human performance and how to manage AI-enabled automation errors.
- **Lack of competency and need for re-skilling and up-skilling workers**
- **Lack of trusts and resistance to change** – Due to above mentioned issues and negative media coverage on the consequences of AI, people are generally apprehensive about its implementation.

Key Public Policy Challenges of AI:

I. **Ethics** – There are two dimensions of ethics in AI:
   a. **Privacy and Data Protection**: It is the top most concern while using AI systems.
   b. **Human and Environmental Values** – Any AI system has to conform to human value system and the policymakers need to ask: Has the AI system been sensitized to human values such as kindness, equity, dignity etc.? An important aspect which needs to be built into AI systems is the overall cost of their decisions on the society.

II. **Transparency and Audit** – The technology providers must explain the decision-making process to the user so that the AI system doesn't remain a black box. These AI systems must provide an audit trail of decisions made not only to meet the legal needs but also for us to learn and make improvements over past decisions.

III. **Digital Divide and Data Deficit** – Since the entire AI revolution has data at its foundation, there is a **real danger of societies being left behind**. Countries and governments having good quality granular data are likely to derive maximum benefit.

IV. **Fairness and Equity** – AI can disrupt social order which could damage the social fabric exposing people lower in bargaining hierarchy with a real threat of exploitation and unfair treatment. An AI system designed with equity as a priority would ensure that no one gets left behind in this world. Also, the AI system must exhibit fairness. They must not exhibit any gender or racial bias and they must be designed to **stay away from 'social profiling' (especially in law enforcement, fraud detection and crime prevention areas).**

V. **Accountability and Legal Issues** – Once machines are equipped with AI and take autonomous decisions, the question of accountability becomes very hard to answer, more so when the algorithms are unknown to the designer.

VI. **Misuse Protection** – This possibly is the toughest of all. How do we insulate every new technology to prevent it from being twisted for achieving destructive goals?

Conclusion:

- States like Tamil Nadu have already started deploying AI systems at scale for addressing some of the key challenges in health, education and agriculture sectors.
- An effective public policy framework for AI along with a practical scorecard would be needed to make this AI revolution work towards an equitable prosperity.

Innovation in Higher Educational Institutions

- Premier higher educational institutes in India have always been a gateway to secure and prosperous life for many. However, over the last decade a cultural change has begun in these institutes.
- These institutes have been transforming themselves to **produce the next generation leaders** who are willing to take up entrepreneurship, foregoing assured income; thereby creating multiple jobs for the society.
- At the root of this transformation is the **culture of innovation**.

Catalysing Student Innovation and Entrepreneurship

- The **Atal Innovation Mission** under the aegis of **NITI Aayog** is promoting the formation of Atal Tinkering Lab (ATL) in schools to promote innovation.
- At IIT Madras (IITM), an **after-class activity called the Centre for Innovation** (CFI) transformed the students from passive listeners to active learners. CFI was set up to provide an outlet for the students to try-out their passion without the burden of grades or exams.
- The centre was set up with the motto ***"walk in with an idea and walk out with a product"*.**

Few achievements:

- Recently, the CFI team "**Aavishkar**" became the only Asian team to qualify and was placed within the top 25 in the hyperloop competition held at SpaceX.
- Similarly, there are many student formula racing car teams in the country (such as the IITM Raftar) that routinely participate and win in competitions across the world.

Innovation as a Catalyst

- These innovation centres also fosters team spirit and the ability to work beyond classroom lectures.
- It prepares the students to take collective ownership of outcomes and work on multi-generational products.

Innovation Eco-system:

- The innovation ecosystem **can be divided in to four buckets**: 1. Ideate 2. Pre-incubate 3. Incubate 4. Support
- Among these, the incubation and support ecosystem are highly instrumental.

- **Society for Innovation and Entrepreneurship (SINE)** in IIT Bombay is one of the earliest incubator in an academic setting in India supporting tech start ups and socially relevant projects.
- IIT Madras established India's first university based research park, collocating established companies with start-ups.

Where are the Problems?

- The challenge for our higher educational institutions is to **enable routine transformation of these intellectually stimulated individuals** to deep tech entrepreneurs and innovators solving societal problems of today and tomorrow.
- It is often very hard to take a step back from a narrowly defined academic problem definition to identify broad opportunities where the research or technology developed might meet a market need.

Role of Incubation:

- Incubators offer mentoring, networking, and funding support for early stage start-ups along with business acceleration support.
- Ideation and technology development is taken care of by the research and tinkering lab.

US' Success Story

- In the United States, the **National Science Foundation** (NSF) had pioneered the concept of **lab to market through the Innovation Corps (I-Corps) program**.
- I-Corps accelerates the economics and societal benefits of NSF funded basic research programs by training scientists and engineers to extend their focus beyond the university laboratory and look at commercialization.

Way Forward:

- Our institutions will have to imbibe the spirit of entrepreneurial thinking, which includes rapid adaptation to the societal needs, developing and scaling in resource constrained environments and serving as focal points or nodes of innovation and entrepreneurship, to reach our national goal of a $5 trillion economy.

Education and Technology for the Blind

- Towards the fag end of the 19th century, many efforts were taken for educating common blind.
- Miss Annie Sharp, an Anglican was instrumental in launching a facility in Amritsar for the blind in the year 1887.

A Chronology of Educational Services for Blind:

- 1887 – A facility for the blind was launched in Amritsar
- 1944 – Lt. Col. Sir Clutha Mackenzie played a major role in writing the GoI report on blindness.
- 1947 – A unit for visually impaired was established in the Ministry of Education
- 1951 – India adopted the uniform Braille codes for various Indian languages
- 1952 – First ever Braille printing plant of India was established in Dehradun
- 1954 – Braille appliances manufacturing unit was set up
- 1959 – Govt. set up its first school for blind children in Dehradun

- 1960 – Four regional centers for teachers of blind were set up
- 1974 – India launched the Integrated Education for Disabled Children (IEDC)
- 1981 – Observance of International Year Od Disabled Person
- 1983-92 – The UN Decade for the Disabled
- 2016 – Rights of Persons with Disabilities Act enacted

Note

- India enacted the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995 to give effect to the decisions taken in the Beijing meeting in 1992.
- The act provided for education in special as well as normal school and informal settings, research and resources required for the disabled among other facilities.
- Recognising the prevailing environment, this law allowed free and universal education for the disabled up to the age of 18 years.

Quality Education for Weaker Section and Disadvantaged Groups

- The **Right of Children to Free and Compulsory Education (RTE) Act, 2009**, entitles every child of age 6 to 14 years to a right to free and compulsory education in a neighbourhood school till completion of elementary education.
- **Section 12(1)(c) of RTE Act** provides that all specified category schools and unaided schools shall admit at least 25% children belonging to weaker section.

Steps Taken to ensure Education of Children With Disability:

- **Samagra Siksha**, an overarching programme for school education sector extending from **preschool to class XII**, aims to ensure inclusive and equitable quality education at all levels.
- It envisages the '**school' as a continuum** from pre-school, primary, upper primary, secondary to senior secondary levels.
- The '**Padhe Bharat Badhe Bharat'** is a sub-programme of erstwhile Sarva Siksha Abhiyan (SSA) which is continued under the new integrated scheme Samagra Siksha to ensure quality at the foundational years of schooling.
- The objectives of the programme are to **promote early reading and writing** with comprehension skills in children, and also basic numeracy skills.
- The **Navodaya Vidyalaya Scheme** provides for opening of one JNV in each district of the country to bring out the best rural talent.
- The **Draft National Education Policy 2019** is presently under consideration. The revision of curriculum, syllabi and textbooks for school education would depend on the finalization and approval of the New Education Policy.

Key Initiatives in Education

- In pursuance of the Government's vision for 'Transforming India', MHRD took a leap forward in transforming the education sector.
- Department of Higher Education of the Ministry has released a five-year vision plan named **Education Quality Upgradation and Inclusive Programme (EQUIP).**
- SWAYAM 2.0, Deeksharambh and PARAMARSH are some of the major schemes of this department.

Key Reforms in School Education:

A. NISHTHA

- A National Mission to improve learning outcomes at the elementary level through an Integrated **Teacher Training Programme** called NISHTHA – National Initiative for School Heads' and Teachers' Holistic Advancement was launched.

B. DHRUV

- The Pradhan Mantri Innovative Learning Program (DHRUV) was launched to identify and encourage talented children to enrich their skills and knowledge.
- It will act as a platform to explore the talent of outshining and meritorious students, and help them achieve excellence in their specific area of interest.

C. Shagun

- One of World's **largest Integrated Online Junction** for – School Education 'Shagun' is an over-arching initiative to improve school education system by creating a junction for all online portals and websites relating to various activities of the Department of School Education and Literacy.
- Report cards of 15 lakh schools all over the country will be available on the newly created junction. Common people **can directly give their feedback** about schools which will further increase the public participation and will ensure accountability and transparency.

D. Unified District Information System for Education Plus (UDISE+)

- To ensure quality, credibility and timely availability of information from all the schools in the country, the revamped UDISE+ has been launched.
- The Data Analytics portal gives information about the aggregated position of the school.

E. Digital Infrastructure for Knowledge Sharing (DIKSHA) 2.0

- It was launched in 2017 for providing digital platform to teachers giving them an opportunity to learn and train themselves and connect with teacher community.

F. Operation Digital Board (ODB)

- The aim is to provide by March 2023, two smart classrooms for every Secondary/Senior Secondary schools.

Key Reforms in Higher Education

A. Five-year vision plan 'Education Quality Upgradation and Inclusion Programme' (EQUIP)

- EQUIP is a vision plan aiming at ushering transformation in India's higher education system by implementing strategic interventions in the sector over five years (2019-24).

B. Institution of Eminence (IoE)

- Ten institutions in public sector and 10 institutions in private sector have to be declared as IoE.
- Each IoE will be eligible to receive Rs. 1000 crore during next 5 years.

C. SWAYAM 2.0

- It is initiated with enhanced features and facilities to offer online degree programmes through SWAYAM by top ranking universities.

D. SWAYAM PRABHA – DTH Educational Channels

- It is a project to telecast high-quality educational programs through 32 DTH channels on 24/7 basis to reach out to students/learners of India with wide reach and minimal cost.
- It also aims to provide dedicated channels 'IITPAL' to assist the students of XI and XII standards aspiring to join premier educational institutions in the country.

Implementation of Quality Improvement Programme

- **Deeksharambh** – A guide to Student Induction Programme has been launched.
- **Learning outcomes based curriculum framework (LOCF) revision** – New Curriculum in 16 subjects which is based on LOCF has been uploaded on UGC website to facilitate universities to revise the curriculum.
- **Scheme for Trans-disciplinary Research for India's Developing Economy (STRIDE)** – Launched for promoting quality research by faculty and creation of new knowledge.
- **PARAMARSH** – A scheme to mentor institutions seeking National Assessment and Accreditation Council accreditation.

Open & Distance Learning: A Futuristic Approach

How ODL is distinct?

- Open & Distance Learning (ODL) is distinct because of **its teaching methodology**. In ODL, the **presence of learners is not mandatory** except in practical-based programmes and ultimately communication takes place in one way leading to dropouts in number of cases.
- In Distance Education teaching is done with a variety of "mediating process" used to transmit content, to provide tuition and to conduct assessment or measure outcomes.

How ICT Can be More Useful in ODL?

- ODL can be made **more interactive** through the use of technology like managing the virtual classroom with the use of internet, development of web-based hypermedia, use of interactive teleconferencing and radio counselling etc.
- In the virtual classroom the learners and the teachers meet in the cyberspace, a question and answer session follows.
- The web-based study helps the learners and teachers to access the information at their own choice of time and convenience.
- In addition, regular interactive teleconferencing, which is one-way video and two-way audio satellite-based learning facility and radio counselling sessions may be used for the learners.

Importance of IT:

- IT can promote the opportunities of **restructuring the teaching-learning process** and transform it by offering alternatives to the teacher in providing information, access to virtually unlimited resources, and opportunities for real world communication, collaboration and competition.
- Web can enrich the learning resources and help institutions **refocus from teaching to learning, from teacher to learner**. It can create learning environment throughout the world by networked learning communities.
- Networks may create educative environments embedded in democratic philosophy of instruction and helping learners learn.
- ICT is a potentially powerful tool for extending educational opportunities, both formal and non-formal. For developing countries ICT has the potential for increasing access to and improving the relevance and quality of education.
- The use of computers in ODL has provided new pedagogical strategies in distance learning as well as giving more autonomy to the distance leaners.

- The **main advantages of using technologies** in distance education are *cost effectiveness, independence of time and place, quality of education access resulting from the mass production of course materials, teaching a lot of students simultaneously, and finding a lot of educational resources*.

Way Forward:

- In using technology which can be integrated into the distance education system, the **following factors should be considered**: accessibility, cost effectiveness, human acceptance, and pedagogical suitability.
- In the era of information technology teachers will be spending more time in facilitating students rather than delivering lectures in the classrooms.
- They would be working in groups: preparing and evaluating instructional materials and organizing data into meaningful information and accessible forms.
- They will also be demonstrating the potential of skill development in students by using information in problematic situations.
- **Certain skills capabilities** of using different information technologies are necessary for of the students and teachers.
- We have to think about the uses of media and technology in regard to appropriateness and acceptability in the society as well as on the ability of the institution offering the programme.
- The socio-economic and cultural background of a person influences their ability to learn from different media technology.

Cybersecurity: Issues and Challenges

- The world we live in is highly connected and digitally exhaustive. Today, social networks have become one of the main communication channels.
- But, at the same time, they have also provided platforms for some decidedly unhealthy and destructive behavior. There are many problems like bullying, cybercrime, copyright issues, security threats and social unawareness among others.

Seriousness of Threat: Statistics

- In the year 2016, there were a total of 758 million online attacks worldwide, which amounts to around 2 million in a single day.
- Every organization, be it big or small, has been the victim of cyber-attacks.

Different Forms of Cyber Threats:

A. Bots

- Bots and fake followers are a big concern in the social media environment. Bot programs target specific hashtags and work by auto-commenting and auto-liking in order to attract followers who are mostly fake bot accounts.
- Bots were developed primarily for companies to engage with their users automatically for increasing customer engagement.
- However, bots are now being used much beyond their harmless cause and are misused for manipulating a conversation to creating a mirage of someone's personality and much more.
- In this age of misinformation, bots possess the power to hijack a conversation, troll someone, promote propaganda and even cause security issues.

B. Terrorist Attacks

- Terrorists have always sought attention and this is what they receive from the social media.
- Social media spread the horror far and wide and unknowingly amplify the chaos that the terrorists intend to spread. Extremists use the social media to make an impact.
- They even use it to recruit, propagate and to connect.
- The rapid spread of false information through social media is among the emerging risks identified in Global Risks Report.
- Social media sites have now initiated reporting procedures that allow users to flag any kind of content that supports terrorism which can be then removed.
- Also, the social networking sites today are playing an important role in counter-terrorism operations. For example, Assam State Police opened a cell to monitor social media and keep track of the spread of rumors.

C. Cyber Security Challenges

- Some new threats have also come up like organized cybercrime, cybercrime trading, smishing (phishing with SMS), hacktivism (hacker with activism) etc.
- Another type of attack that is rising recently is distributed denial of service (DDoS) attacks. Here the intruder is not interested in actually stealing one's information but in bombarding his/her server with unnecessary traffic thereby crashing it.

D. Mobile Technologies

- There are different types of personal information on one's mobile. This raises an important question – what if a hacker is able to build one's digital profile by collecting all these censored information and the data from the third-party apps and use it against that person?
- **Internet of Things (IoT)** is another such challenge posed by the new technology whereby every object we use is equipped with the capabilities to identify, locate, sense its surrounding, compute and communicate.

E. Ransomware

- This ransom demanding malware is a virus which gets into your computer, either when you download an attachment containing the virus or when you visit any such website and click on a link.
- Once it gets into your computer, it starts to encrypt all your files thereby rendering them useless. The only way to unlock your files is to get a secret key from the hacker by paying a ransom.

F. Big Data

- We are actually living in exponential data times. In Just 60 seconds 149,513 emails can be sent, 3.3 million FB posts can be made, 3.8 million Google searches can be performed.
- As a result, it has become lot easier to hack people using social engineering techniques and make them reveal information rather than using tools and technology.

Conclusion:

- Digital literacy is a broader concept that consists of developing new skills and knowledge which provides awareness and advanced level thinking skills. It is extremely essential to be digitally literate for appropriate utilization of digital information resources.
- It is the responsibility of each one of us to understand and use the cyberspace sensibly and responsibly. This will definitely ensure that the netizens are not only techno-savvy and socially existent but also digitally safe.

Global Synergy in Higher Education

- India aims to become a five trillion dollar economy by 2024-25; the realisation of this goal is incumbent upon the capability of its education and training institutions to equip young Indians with knowledge and skills relevant to an evolving job markets.
- It needs quality, excellence, innovation and constant upgradation.

Aspiration in Higher Education:

- India's draft **National Education Policy** aims at **increasing the gross enrolment ratio** (GER) in higher **education to at least 50% by 2035**, which would mean that one in four graduates in the world would be a product of the Indian higher education system.
- The **current GER stands at just 26.3%**, and doubling it in the next 15 years will require significant reforms both at planning and execution level. **India's GER is lower than the global average of 36.7%**.

Opportunities:

- India enjoys a demographic dividend. It is world's youngest country with an **average age of 29**. This comes at a time, when rest of the world is ageing. Average working age in US is 40, Western Europe is 46 and Japan is 47 years.
- Thus, India will not only have a young workforce to fulfil its domestic needs, it also has the opportunity to be the global hub for skilled workforce.

Higher Education – Critical Challenges for India

- The above-mentioned opportunity also presents a challenge. If we fail to create a suitable environment, this dividend will be converted into demographic burden.
- **Market forces have played a major role** in the higher education landscape. Of the 993 universities in India, **nearly 39% are privately managed**. Of the 39,931 colleges, 78% are from private sector.
- **Private colleges cater to 66.4% of the total enrolment in higher education**, which means that a mere 22% of govt. colleges are catering to a disproportionately large number of students who could not afford to seek higher education in private Higher Education Institutions (HEIs).
- Increasing social aspirations have made the **education divide between urban and rural centres more obvious**.
- The **college density** (per one hundred thousand eligible population) is 28 nationally, it varies from 7 in Bihar to 53 in Karnataka.
- The **opportunity cost of higher education** (commute, hostel fees etc.) for disadvantaged section is often too high and hinders the education process.
- Low employability of graduates, poor quality of teaching, weak governance, insufficient funding, and complex regulatory norms continue to affect the Indian higher education sector.
- The **number of international students** is generally a reliable indicator of the quality and robustness of a higher education system. As of 2018-19, only 47,427 foreign students were enrolled in the Indian higher education system (China – more than 400000, Germany – More than 3,00,000)
- **Globally India caters to less than one per cent of all International students**.
- Indian institutes have **failed to feature in the top 100 of world university rankings** published by reputed ranking frameworks. The outflow of Indian students for education abroad is itself more than 15 times the inflow of international students to India.

Why We Need Global Cooperation?

- Getting the right education is critical for India to maximise the potential of its demographic dividend. India will **not have the capacity** to meet this demand on its own.
- NITI Aayog and several other organizations have developed policy documents on higher education that have **stressed on the need of international assistance in higher education**.
- India's recently released draft National Education Policy 2019 **proposes inviting the top 200 global universities to establish foreign branch campus in India**.
- MHRD developed a **five-year action plan** named **EQUIP (Education Quality Upgradation and Inclusion Programme**). The initiative is made to bring transformation in the higher education system in the upcoming 5 years.
- NITI Aayog has more recently favoured the development of **Exclusive Education Zones (EEZs)** akin to SEZs in a few select cities in Bengaluru, Hyderabad, Ahmedabad, Pune, Chandigarh and parts of Sikkim, to boost growth in the flow of foreign students.

Opportunity for Deeper Engagement

- International education is **Australia's third largest export industry**. As a world class provider of education and training, Australia is well positioned to partner with India in the higher education sector.
- **Linkages between HEIs and industries** with diversified course offerings can prepare students for the job market.
- Global education institutes may also consider looking at building partnerships, beyond HEIs in metro cities of tier 2 and tier 3 cities and regional/state institutions, which offered tremendous possibilities because of large number of students with untapped potential and lack foreign collaborations currently.
- The joint student-academic mobility programmes, joint research, international **collaborations boost rankings**.
- India is also **seeking to attract international faculty** into the country for short-term research and teaching visits. Indian government initiatives like the **Global Initiative of Academic Networks (GIAN),** which provides funding for teaching at selected Indian higher education institutions and **Scheme for Promotion of Academic and Research Collaboration (SPARC)** are opportunities to be explored.
- However, **lack of knowledge** of India's higher education sector, including how to address **regulatory issues**, contributes to low faculty participation in mobility schemes.

Way Forward:

- **Partnership may look beyond silos** and into areas where Australia has an advantage and India has a need, for instance, in mining safety, bio engineering, signal processing, AI, cyber security, climate change etc.
- Increasing the **level of mutual cultural understanding** and **developing a strong knowledge base** for India and Australia can further bolster these relations.
- Increased focus on vocational and professional led education can help India find ways to up-skill 400 million workers by 2022.
- However, what is needed is targeted and granular advice from governments to assist providers to identify, from the mass of possibilities, viable opportunities that match Australian strengths with Indian needs.
- Also, Indian students' expectations around cost and employment outcomes need to be understood carefully.

In Conversation with Dr K Sivan

A. Satellite Instructional Television Experiment (SITE)

- SITE was the largest sociological experiment in the world. This satellite communications experiment was performed for one year during 1975-76 by ISRO.
- During SITE, TV programmes on subjects such as health, hygiene, family planning and agriculture were beamed through satellite (stationed in 36,000 km high geostationary orbit).
- SITE experience enabled ISRO to evolve INSAT system for rapid expansion of country's telecommunication, TV broadcasting and weather monitoring infrastructure.

B. EDUSAT Programme

- During this programme, GSAT-3 or EDUSAT, a dedicated satellite for the educational field, was launched by GSLV and utilized for enhancing the outreach as well as the quality of the formal as well as informal education sectors.

C. DHRUV

- DHRUV, the **Pradhan Mantri Innovative Learning Programme**, was started to identify and encourage talented children to enrich their skills and knowledge.
- Gifted children will be mentored and nurtured by renowned experts in different areas in centres of excellence across the country, so that they can reach their full potential.
- With children drawn from all over the country, the DHRUV programme reflects the true spirit of **Ek Bharat Shrestha Bharat**.

D. Role of Space Technology in Imparting Informal Education to Farmers

- During SITE programme, TV documentaries on **agriculture made in vernacular languages** were beamed to farmers on improving agricultural practices.
- Later during **APPLE and INSAT utilization programmes**, TV documentaries specific to various subjects on agriculture were made and telecast through satellites and they have been continuing.
- Weather monitoring satellites like **Kalpana and INSAT – 3D** have become instrumental in the accurate weather prediction. Remote sensing satellites have enabled our agricultural scientists to detect crop diseases, accurately estimate crop acreage, crop yield, soil quality, which ultimately will bring benefits to the farmers.

E. Young Scientist Programme (Yuvika)

- Yuvika is primarily aimed at **imparting basic knowledge on space technology** and its applications as well as space science to the younger ones with the intent of arousing their interest in the emerging areas of space activities.
- The **two week long residential training programme** involves invited talks and experience sharing by the eminent scientists, facility and lab visits, hands on training, exclusive sessions for discussions with experts and more importantly, a feedback session.

F. Samwad with Students

- It was launched by ISRO as part of its **enhanced outreach programme**. The interaction of scientists with students goes a long way in awakening the curiosity and creativity lying inside the student community.
- With this in mind, as well as with the intention of making our young students proud of their country's achievements in space through the narrative of ISRO scientists themselves, 'Samwad with Students' programme was launched.