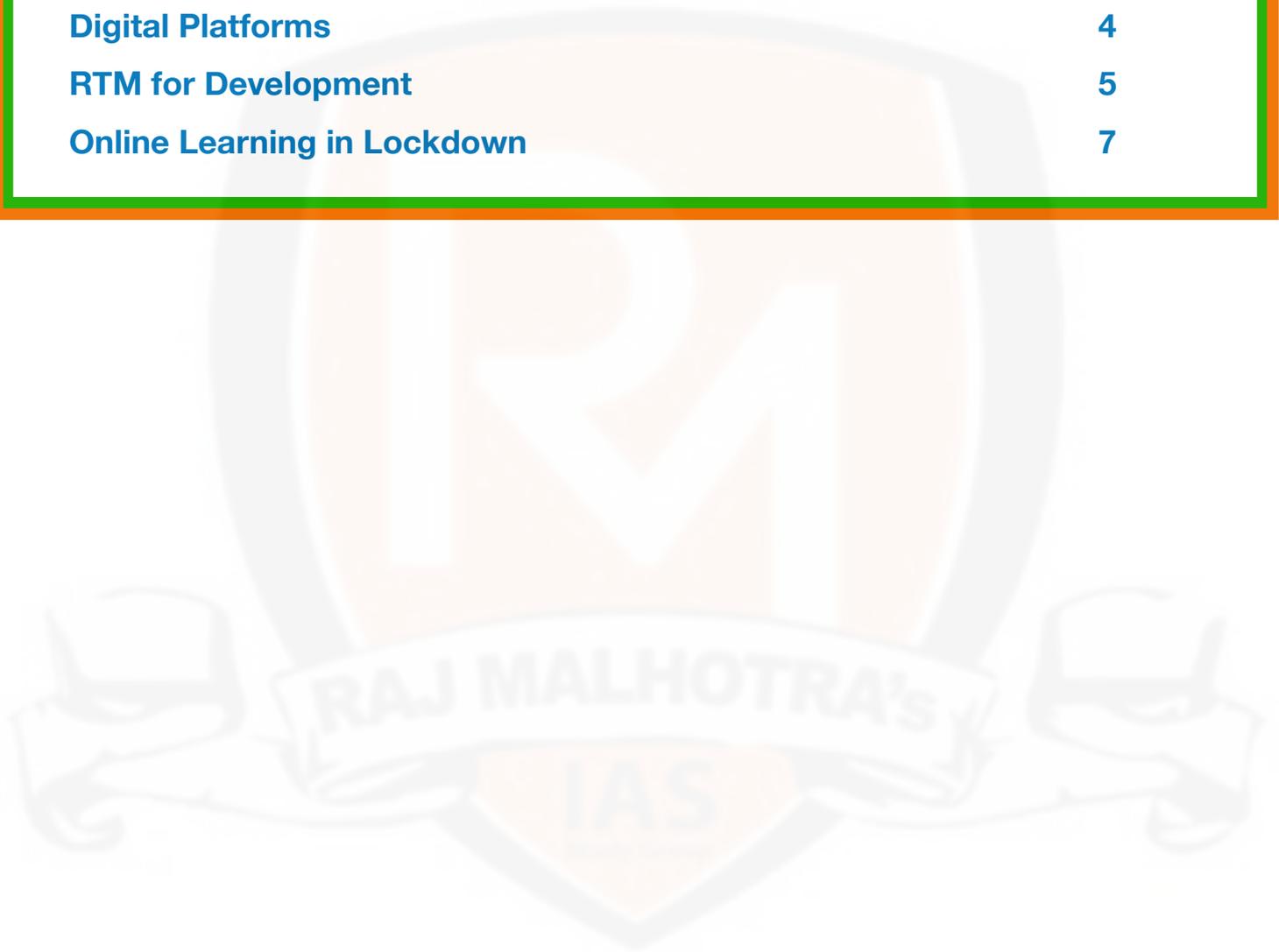


YOJANA - TECHNOLOGY

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Industry 4.0

Industry 4.0, also known as the Fourth Industrial Revolution, it encompasses three technological trends driving this transformation - connectivity, intelligence and flexible automation.

Industrial revolutions -

- The **first industrial revolution** came with the advent of **mechanisation, steam power and water power**.
- The **second industrial revolution** revolved around **mass production and assembly lines** using electricity.
- The **third industrial revolution** came with **electronic and IT systems with automation**.
- The **fourth industrial revolution** is associated with **cyber-physical systems**.

What is 'Fourth Industrial Revolution'?

- Industry 4.0 describes the growing automation and data exchange in technology and processes within the manufacturing industry, including: The Internet of Things (IoT), Cyber Physical Systems (CPS), Smart Manufacturing, Smart Factories, Cloud Computing, Additive Manufacturing, Big Data, Robotics, Cognitive Computing, Artificial Intelligence and Blockchain etc.
- This automation creates a manufacturing system whereby the **machines in factories are augmented with wireless connectivity and sensors** to monitor and visualise an entire production process and make autonomous decisions. It is further estimated that **wireless connectivity** and the augmentation of machines will be greatly advanced with full rollout of 5G.
- The fourth industrial revolution also relates to **digital twin technologies**. These digital technologies can create virtual versions of real-world installations, processes and applications. This can then be robustly tested to make cost-effective decentralised decisions. These virtual copies can then be created in the real world and linked, via the Internet of Things allowing for cyber-physical systems to communicate and cooperate with each other and human staff to create a joined up real-time data exchange and automation process for Industry 4.0 manufacturing.

Shift in approach -

- Companies are radically overhauling entire systems of production, management and governance on a constant basis of change. We have unprecedented processing power, storage capacity, and access to various avenues of knowledge
- The days of simple product innovation are dwindling. Currently, the technology, talent, and new innovation ecosystems are emerging; building greater complexities into our final innovation offerings. Intelligent automation and technology are fuelling this new industrial revolution.
- Organisations everywhere are facing mounting pressure to transform-to shift from production-centric business models to new models focusing on creating and capturing different sources of new value propositions.
- Industry value chains are being radically redesigned to accommodate connected worlds being more reliant on everything being digital. As we continue to design manufacturing to be fully connected-up, we can adjust faster, scale differently, and deliver quantities to varying cycles of demand.
- New materials are making our assets more durable and resilient, and data and analytics provide valuable feedback needed to build even better services and performance for the future. Innovation is the unlocking mechanism.
- The consequences of the fourth industrial revolution can be seen in the shifts of our emphasis taking place around innovation. Industry is focusing more on technological innovation.

AIM: Fostering Innovation

To promote a culture of innovation and entrepreneurship in the country, Atal Innovation Mission's objective is to develop new programmes and policies for fostering innovation in different sectors

of the economy, provide platform and collaboration opportunities for different stakeholders, create awareness and create an umbrella structure to oversee innovation ecosystem of the country.

Six major initiative taken in the first year of its establishment -

1. **Atal Tinkering Labs** - Creating problem-solving mindset across schools in India.
2. **Atal Incubation Centres** - Fostering world-class startups and adding a new dimension to the incubator model.
3. **Atal New India Challenges** - Fostering product innovations and aligning them to the needs of various sectors/ministries.
4. **Mentor India Campaign** - A national Mentor network in collaboration with public sector, corporates and institutions, to support all the initiatives of the mission.
5. **Atal Community Innovation Centre** - To stimulate community centric innovation and ideas in the unserved/underserved regions of the country including Tier 2 and Tier 3 cities.
6. **ARISE** - To stimulate innovation and research in the MSME industry.

Initiatives under Atal Innovation Mission -

1. **Atal Tinkering Labs - at school level** - Over the last two years, AIM has launched the establishment of thousands of Atal Tinkering Labs enabling students from grade 6 to grade 12 to have access to and tinker with innovative tools and technologies like 3D printers, robotics, miniaturised electronics do-it-yourself kits, thus stimulating a problem solving innovative mindset to solve problems in the community they are in.
2. **Atal Incubators at Universities, Institutions, Industry Level** - To promote creation of a supporting ecosystem for start-up and entrepreneurs, AIM has been establishing world-class incubators, called Atal Incubation Centres (AICs) in universities. Institutions, corporates etc would foster world-class innovative start-ups and become scalable and sustainable.
3. **Atal Community Innovation Centres** - To promote the benefit of technology led innovation to the unserved/underserved regions of India including Tier 2, Tier 3 cities, aspirational districts, tribal, hilly and coastal areas, AIM is setting up Atal Community Innovation Centres with a unique partnership driven model wherein AIM would grant up to Rs 2.5 crore to an ACIC subject to a partner providing equal or greater matching funding.
4. **Atal New India Challenge** - To create product and service innovation having national socio-economic impact, AIM has launched over 24 Atal New India Challenges in partnership with five different ministries and departments of central government.
5. **Applied Research and Innovation for Small Enterprises (ARISE)** - To promote innovation in a phased manner in the MSME/Start-up sector AIM will be launching ARISE along with partner Ministries so that great research ideas are converted to viable innovative prototypes followed by product development and commercial deployment.
6. **Mentorship and Partnerships** - To enable all the initiatives to success, AIM has launched one of the largest mentor programme and management program "Mentor India - The Mentors of Change" to partner with Public Private sector, NGOs, Academia, Institutions etc.

Social Media : The Force Multiplier

The beauty of new age social media tools lie in their universality and pervasiveness. The Government of India has been at the forefront of the emerging trends - it has rapidly adopted the latest digital technologies and embraced new forms of social media communication tools in the discharge of its governance and administrative duties.

Most government departments and agencies now maintain an active presence on the popular social media channels. Indian Government agencies are using social media as a force multiplier in their work -

1. **Crisis/Disaster Management** - During an unexpected crisis or a disaster, the government machinery springs into action to emphatically communicate to citizens the SOP (Standard Operating Procedures) to be adopted. Social media is now increasingly being used by governments to reach out to citizens during such crisis.
2. **Citizen engagement** - One of the best roles social media can play is to act as a medium for continuous engagement between governments and its citizens. The Indian Government's MyGov platform has proven to be popular with citizens in this regard. Apart from MyGov, other

social media channels are used by the Indian Government to promote citizen engagement, participation, and transparency in this important relationship.

3. **Citizen grievances and support** - Social media has emerged as a very impactful, real-time channel for citizen grievances and support. Many citizen services maintain active accounts on social media and encourage citizens to directly reach out with their grievances. Given all this is happening in full public view, there is pressure on the service providers to resolve the issue, while appearing fair, transparent, and responsive for everyone to see.
4. **Law and order** - Amongst governmental agencies, police departments are arguably one of the most active users of social media channels. This is because their jobs hover around real-time, public facing situations, which are frequently subject to rumours, false alerts etc.
5. **Hiring and Recruitment** - Some government agencies are using social media hiring channels for attracting best-in-class talent for their job vacancies.
6. **Foreign relations** - Social media bridges the distance between nations on the internet. Many government agencies are using social media channels effectively to engage with their foreign counterparts. Embassies and foreign consulates are active on social media, engaging with each other or sharing important updates to their citizens.
7. **Business and Industry relations** - Government agencies partner with businesses, industry bodies and trade organisations on a regular basis for policy consultations, networking etc. Businesses play a key role in driving social media's impact by contributing significantly to the internet economy via advertising, paid services etc.
8. **Live traffic updates** - Real time traffic updates and advisories get regularly shared in the metropolitan cities via the local Traffic Police social media accounts. These updates are helpful to commuters in avoiding traffic jams or taking detours to save time.
9. **Government procurement** - The government (as an entity) is the largest producer and buyer of goods and services in the country. Its buying (or procurement) is largely based on open tendering process, which gives everyone a chance to participate in an unbiased, non-discriminatory way. Hence, tender notices have to be published publicly on the main outreach channels. With social media, e-tendering notices are getting posted as against traditional tenders advertised in newspapers.
10. **Crowdsourcing ideas and innovation** - Crowdsourcing is a popular activity on the internet, where you can get to tap into the collective "wisdom of the crowds". MyGov is leveraging crowdsourcing, by hosting a "Logo Design Competition" for an upcoming government heritage complex. Citizens are invited to contribute their logo entries for the contest, which has an accompanying cash prize to generate excitement and motivate participants.
11. **Citizen Service delivery apps** - Government has launched several service delivery apps for its citizens. Social media is a key channel to drive awareness about these apps and get people to download them and use them. The two examples of these apps are DigiLocker and UMANG.
12. **Transparency and Accountability** - Citizens want ready access to government departments and its functioning officers. Given the size and expanse of the official setup, it is often not easy to figure out who is the concerned officer-in-charge (whose jurisdiction the case falls) and their contact details. Social media can come to the rescue in some cases. Such measures reduce bureaucracy, while promoting transparency and accountability in the eyes of the citizens.

Digital Platforms

During the ongoing COVID19 pandemic, timely information, direct information to the poor, needy and vulnerable groups can help save many lives and at this point the digital apps developed by the government are playing an important role in responding to the crisis.

1. **Aarogya Setu App** - The AarogyaSetu app enables the people to assess themselves the risk for their catching the coronavirus infection. It calculates this base on people's interaction with others, using cutting-edge bluetooth technology, algorithms and artificial intelligence.
2. **Chatbot** - Government of India has launched a Whatsapp chatbot so that the citizens can get instant and authentic answers to all of their queries relate do the Coronavirus pandemic.

3. **Corona Kavach** - It is a COVID19 tracker application, created by the Ministry of Electronics and Information Technology in collaboration with the Ministry of Health and Family Welfare. This application provides users with real-time location of infected users who have activated the 'Kavach' feature.
4. **COVID19 Feedback** - This application has been developed by the centre to get direct feedback from people who have undergone coronavirus treatment in the country.
5. **SAMPRAC** - Defence Research and Development Organisation (DRDO) has developed an app named 'SAMPARC' to enable tracking people under quarantine. It is a software that includes an app that can be installed on the smart phones of the infected patients. It is a server-side application that is used by the state authorities to track the patients.
6. **Direct Benefit Transfer** - It is a scheme by Government of India to transfer the benefits and subsidies of various social welfare schemes like LPG Subsidy, MNREGA Payments, old age pension, scholarships etc directly in the bank account of the beneficiary. It has been crucial in implementing the PM Garib Kalyan Yojana that was rolled out to provide relief to the poor and vulnerable amid the COVID19 crisis.
7. **SAHYOG** - The Survey of India (SoI) has developed an e-platform that collects geotagged information on the nation's critical infrastructure in order to help the government and public health agencies take critical decisions in response to the current COVID19 pandemic situation. The platform has geo-located information of hospitals, testing labs, quarantine camps, containment and buffer zones as well as information on biomedical waste disposal sites. The mobile based application, called SAHYOG, works as a key tool in helping community workers carry out the government's objectives of door-to-door surveys, contact tracing, deliveries of essential items and to create focused public awareness campaigns.
8. **BHIM App** - Bharat Interface for Money is an Indian mobile payment app developed by the National Payments Corporation of India, based on the Unified Payments Interface to help in facilitating e-payments directly through banks as a drive towards cashless transactions.
9. **RuPay** - It is a card scheme, conceived and launched by the NPCI to fulfil the RBI's vision to have a domestic, open and multilateral system of payments. RuPay facilitates electronic payment at all Indian banks and financial institutions.
10. **UMANG App** - Unified Mobile Application for New-age Governance is a Government of India all-in-one single unified secure multi-channel multi-platform multi-lingual freeware mobile app for accessing over 1200 central and state government services in multiple Indian languages.
11. **SWAYAM** - It is an online education programme initiated by the Government of India to achieve the principles of education policy by providing access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. The Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy. It is done through a platform that facilitates hosting of all the courses, taught in classrooms from Class 9 till post-graduation to be accessed by anyone, anywhere at any time.

RTM for Development

The use of real-time monitoring (RTM) to support national systems strengthening is growing, primarily due to the ubiquitous penetration of mobile phones into global audiences.

India is no stranger to RTM systems, having been one of the early adopters of mobile and digital technology in the low-and-middle-income world. It has 1.6 billion telecommunication subscribers in the world, as of March 2019 (TRAI, 2019) and has been adding nearly six million subscribers per month (TRAI 2019).

Initiatives -

- Ministry of Health's National Health Portal has shortlisted a whopping 72 monitoring platforms that have been authorised to track indicators from health records in hospitals to mapping water supply sources (2020).
- From maternal health to nutrition and water, sanitation and hygiene (WASH) to improve planning, monitoring and decision making efforts.
- During the COVID19 pandemic response, it has become an even greater priority to invest in RTM models that adhere to physical distancing protocols.

- Real-time monitoring that allows low-touch data collection and dissemination would therefore be best in this context, as proven before during the Ebola and H1N1 outbreaks, both which had similar contact restrictions.

Significance of RTM systems -

When implemented, RTM integration helps to -

- Provide a monitoring platform for communities and governments to track progress towards shared goals.
- Identify supply, demand and bottlenecks in service delivery chains.
- Increase accountability of government to the rapid delivery of services.
- Improve service delivery to hard-to-reach communities through informing corrective measures.
- Assess and educate consumers and beneficiaries on relevant knowledge, practices and attitudes.

RapidPro -

- In 2014, UNICEF, in partnership with Nyaruka Ltd, released RapidPro, a globally accessible and free open source routine data systems application. RapidPro “collects data via short message service (SMS) and other communication channels (eg voice; social voice; social media channels) to enable real-time data collection and mass-communication with target end-users, including beneficiaries and front line workers.
- It has been successful in helping UNICEF and other organisations deliver timely data to government partners and others to help inform key policies and programming decisions.
- RapidPro has been developed to be a ‘global public good’ by UNICEF and the ambition is to garner investment to encourage the buy-in of real-time monitoring systems in 110 countries by 2021.

Integration into various countries’ programmes -

RapidPro has been leveraged for a range of purposes across countries, from soliciting feedback from adolescents on what health issues matter to them to monitoring knowledge and attitudes around water, sanitation and hygiene programmes.

1. **Water, Sanitation and Hygiene Status in Rural India** - In 2019, RapidPro was piloted in two of India’s most populous states, Uttar Pradesh and Bihar which carried almost burden of open defecation globally at the start of Swachh Bharat Mission, to assess the status of sanitation services and related knowledge. This allowed governments to receive rapid inputs to questions the people were interested.
2. **U-Report : A global tool** - U-Report is a free messaging tool built using RapidPro in 2011 and is currently used by UNICEF and partners in 60 countries, benefitting 8 million users. Its objective is to encourage participation of youth, through popular social media channels, in a safe environment in which they do not feel judged for asking about critical or sensitive issues.
3. **Real-time Monitoring of Social Cash Transfer Programme in Nepal** - UNICEF Nepal supports the Government of Nepal in monitoring social cash transfers disbursed in ‘child grant’ expansion districts, through RapidPro. The RapidPro pilot started in 2018 and targets mothers receiving cash transfers from the government with SMS and IVR messages that help improve both governance accountability and knowledge within the beneficiary population.

Lessons learned -

- Flexible real-time monitoring options such as RapidPro are important for development. Accountability and transparency is hard to maintain and manage at a large scale, when hundreds of thousands to millions of people are involved in progressing towards a national goal. RapidPro offers a structured and low-touch approach that allows for just that, and ensures that the data is being analysed in accordance with the objectives defined without integrity loss.
- Integration requires time, capacity building and buy-in from multiple stakeholders with various perspectives. Governments and other users should cater for the time required to set up logistical arrangements internally and with data network operators, develop and pilot questions or messages that will be useful and not redundant.
- It is important to keep equity in mind, especially when seeking to include the most marginalised and vulnerable. While telecommunications seems to have saturated all markets globally, there are still many populations living at the edges of modern society’s resource spread, who perhaps would not be able to add their voice to monitoring systems that use tools they do not have access to.

Online Learning in Lockdown

The lockdown due to COVID19 has put the government on the tightrope leading the academic administrators in the country to plan a series of activities by the concerned ministry and various regulators including UGC, IGNOU, CBSE, NCERT, NIOS etc to find alternatives to ensure the continuation of education. Amidst this background, the department and regulators have started moving developing an online mode of education - as, hopefully, a viable alternative arrangement.

Past experiments in online learning -

- **SITE** - Satellite Instructional Television Experiment (SITE) was the largest communication experiment in the use of satellite in support of developmental and educational programmes in modern times. The telecast via this satellite began in India from August 1, 1975. ISRO with All India Radio took the responsibility of broadcasting ETV programmes to the selected villages in six states of Andhra Pradesh, Bihar, Karnataka, Odisha, Madhya Pradesh and Rajasthan, selected on the basis of their educational backwardness. The instructional objectives of SITE were in the fields of education, agriculture, health and family planning and national integration. About 2400 Direct Reception Television Sets (DRS) deployed for SITE were located in different cultural, linguistics and agricultural regions of the country.
- **INSAT** - Based on the success of SITE, India approved a proposal to launch a multipurpose and space communication system of her own called Indian National Satellite (INSAT) in 1977. The major objectives of INSAT were to produce and transmit varied programmes designed to awaken, inform, enlighten, educate, entertain and enrich all sections of the people in different parts of the country. It has also aimed to promote alternative approaches to education for children, youth and adults. Later, in order to further strengthen the alternate approaches to education, INSAT-1A and INSAT-1B were launched in 1982 and 1983, respectively. The local Doordarshan and Central Institute of Education Technology (CIET), NCERT were requested to produce relevant programmes. Later, IGNOU, UGC, CEC, NCERT, CIET, SIETs, NIOS, Department of Space Technology, etc all participated in the programme.
- **Gyan Darshan** - Gyan Darshan has completely become digital in the span of fourth year on January 26, 2004. It has expanded into a bouquet of channels namely GD-1, GD-2, GD-3, Eklavya and GD-4 Vyas. The primary target audiences of the channel are the students studying in undergraduate and postgraduate classes in universities and colleges all over the country, particularly in small towns. Students pursuing correspondence courses, teachers training undergraduate and postgraduate courses and also the staff of training colleges, and students appearing for various competitive examinations watch this channel.
- **EDUSAT** - On September 20, 2004, EDUSAT - the dedicate satellite for education in India was launched by ISRO. It is the first Indian satellite exclusively built for the use of education sector. The satellite is capable of providing high bandwidth two-way interaction by creating a private network of Satellite Interactive Terminals (SITs) and Receive Only Terminals (ROTs) installed over the country. IGNOU, NCERT, Visvesvaraya Technical University and Vigyan Prasar have very effectively utilised EDUSAT.

New age online learning -

With the education sector becoming digital due to the internet, new learning mediums have gained traction -

- **SWAYAM** - It is an online education programme initiated by the Government of India to achieve the principles of education policy by providing access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. The Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy. It is done through a platform that facilitates hosting of all the courses, taught in classrooms from Class 9 till post-graduation to be accessed by anyone, anywhere at any time.
- **Others** - With the digital revolution, the online streaming of lectures started with private players such as Zoom App for video conferencing. The use of Education Technology/Information and Communication Technology (ICT) is imparting education/learning on the driver's seat globally today.

Conclusion -

For the effective education, mere access to internet information resources is not enough. It is necessary to prepare the students beforehand to work with the information or to provide those, who use the distance form of education with special tasks designed to develop intellectual skills of critical thinking, working with verbal texts, multimedia environment, to create all kinds of so-called secondary texts (abstracts, summaries, essays etc.) to be able to work with information. In the short-run, the television holds a much more viable, equitable, cost-efficient and scalable alternative than online education. The current crisis has acted as a fillip to encourage digital education. It is equally important here to look for the judicious mix of Open Education Resources (OER) along with delivery of education via television/satellite.

