Address by

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Principal Secretary to the Hon'ble Prime Minister of India

** Foundation Day Lecture on**

**Role of Technology in Shaping Education - The Future Vistas**

Shri NK Singh, Chairman, the 15th Finance Commission; Shri Amit Khare, Secretary to the Government of India, Department of Higher Education; Dr. R. Chidambaram, Chairman of the Board, IIT Jodhpur; Prof. Santanu Chaudhury, Director IIT, Jodhpur; Shri S. R. Vadera, Chairman of the Foundation Day Committee; members of faculty and staff, esteemed alumni and my dear students,

I am delighted to participate in the Foundation Day programme of the Indian Institute of Technology (IIT), Jodhpur. I thank Prof. Santanu Chaudhury and his team for inviting me to the celebration. I would also like to thank Shri NK Singh who encouraged me to be with all of you on this day. We were to visit IIT Jodhpur campus some months ago, but we could not do so due to COVID-19.

Today, IIT Jodhpur completes 12 years of its existence and enters the 13th year. For an individual, this would mark the onset of the ‘teenage’ phase of life. In this phase of life, foundational changes occur; not only physical characteristics but ideas, relationships and core inner values developed in this stage, influence your future.

This institute, with a dozen departments, offering a broad spectrum of B.Tech, 46 post-graduate and PhD programme options, in a wide range of subjects and disciplines, today embarks on its ‘teenage journey’. This would imply evolution through collaborations and friendships, and encourage critical thinking and deepening of an attitude of scientific inquiry. In the post-COVID world, as technologies evolve, this will impact social, economic and human activities in a more comprehensive manner.

I congratulate all of you at the beginning of this new phase in the life of your Institute, when it begins a journey that looks uncertain and challenging and yet if used wisely, is full of promise and opportunity.

I have been asked to speak on the *Role of Technology in Shaping Education – the Future Vistas*. Coincidentally, the programme is organised using a technology platform, without all of us traveling to Jodhpur which would have meant more time, travels and other aspects of logistics. So, the topic for today, in my view, is in sync with the way we are interacting. However, it also deprives us of face-to-face interaction, seeing for ourselves the ambience of the institute, and experience the warmth and hospitality of all of you. This brings out the dilemmas and limitations: the relevance, use and efficacy of technology that could pose new challenges in the coming years, particularly in the post-COVID world.

Over the past five years, I have had several opportunities of addressing students on the occasion of their convocations. I would often speak a few words on how technology was changing the way we live and work, and how “game-changer” ideas such as smartphone revolution, artificial intelligence (AI), augmented reality (AR), robotics, blockchain technologies and Internet of Things would usher changes in a much faster pace than ever before. But, I never expected that the situation would be transformed so dramatically so quickly. During the last six months, things have changed in a way one could not imagine earlier. Role of technology has become predominant. There is no doubt that in the coming days the pace of evolution will be much faster and the transformation will be more widespread and comprehensive. This impact will be felt much more strongly in the field of education.

Technology enabled learning can bring in not only transformational change in delivery of online education experience, but it can also enhance and supplement regular classroom-based pedagogy. It could offer more flexibility and learning support than the traditional formats. Technology offers teachers the opportunity to become more collaborative and extend learning beyond the classrooms. Educators could create learning communities comprising students, fellow educators and experts in various disciplines around the world. This environment of enhanced collaboration offers access to instructional materials as well as resources and tools to create, manage and assess their quality and usefulness.

In recent years, use of digital technologies in higher education has received much attention across the world. Across the country, Government of India is encouraging several e-learning projects under the National Mission on Education through ICT initiatives such as SWAYAM, SWAYAM-Prabha, National Digital Library, e-Yantra, Virtual Lab, that are helping students as well as teachers in up-skilling as well as providing them quality resources. In addition, these efforts are leading to creation of knowledge tools that impart not only quality education and accessibility, but also encourage creativity and innovation, particularly among young students.

Most of you would be aware that only four days ago the New Education Policy (NEP) 2020 was announced. The New Education Policy, replacing the earlier policy introduced 34 years ago, envisages major reforms in the education system. The emphasis is on holistic and multi-disciplinary education with flexibility of subjects and provisions for multiple entry and exit. It focuses a great deal on technology use and integration. It gives a thrust to technological innovations for the purpose of improving teaching-learning and evaluation processes, supporting teacher preparation and professional development, enhancing educational access and streamlining educational learning, management and administration, including processes related to admission, attendance and assessment.

If I could quote at some length:

The NEP recognizes that:

*India is a global leader in information and communication technology and in other cutting-edge domains, such as space. The Digital India Campaign is helping to transform the entire nation into a digitally empowered society and*
knowledge economy. While education will play a critical role in this transformation, technology itself will play an important role in the improvement of educational processes and outcomes; thus, the relationship between technology and education at all levels is bi-directional.

It goes on to say:

New technologies involving artificial intelligence, machine learning, block chains, smart boards, handheld computing devices, adaptive computer testing for student development, and other forms of educational software and hardware will not just change what students learn in the classroom but how they learn and thus these areas and beyond will require extensive research both on the technological as well as educational fronts.

It is proposed to set up an autonomous body, the National Educational Technology Forum (NETF) to provide a platform for free exchange of ideas and use of technology to enhance learning, assessment, planning, administration and so on both for school and higher education. The NETF will maintain regular inflow of authentic data from various sources including educational technology innovators and practitioners. It will engage with a diverse set of researchers to analyse the data.

In this context, Government of India is to set up the National Research Foundation (NRF), which will initiate and expand research efforts in technology. The NRF will indeed play an important role in advancing core AI research, developing and deploying application-based research and advancing international research efforts to address global challenges.

In recent years as technology has developed and evolved, there have been disruptions everywhere. This will have even more far-reaching effects in the post-pandemic world. I am happy to note that, with the support of the Department of Science and Technology, IIT Jodhpur has set up a Technology Innovation Hub on Computer Vision, Augmented Reality and Virtual Reality under the National Mission on Cyber-Physical Systems. In the present context, the role of educational and research institutions is extremely critical. It is their work, their research and innovation that will enable us to cope with the emerging challenges of the future.

The COVID-19 crisis has resulted in a tectonic shift in our education system. Major universities and higher education institutions have partially or fully shifted to online mode of teaching and learning and are reporting considerable success in their endeavours. Further, availability of world-class technology platforms have enabled educational institutions to have a smooth transition to online delivery mode.

Our understanding of COVID-19 situation continues to evolve. The need of social distancing will continue to affect traditional teaching and learning processes. A “new normal” in education might emerge which will possibly have a lasting influence on pedagogy and assessment and evaluation modalities.

While online education has many merits, it also has challenges. A few that come to my mind are:

• Conducting remotely-proctored examinations is perhaps the most important. It also requires pedagogical innovations by the faculty. Change in evaluation modality such as replacing examination by project or take-home challenges can provide some viable and cost-effective alternatives.

• Another challenge is that of conducting laboratory classes and hands-on exercises for remote students. There maybe a need to design and deploy a toolbox of online, virtual and remote labs that can be used in different courses to bridge this gap. It can be an alternative to the brick and mortar culture of an Blended learning, using a mix of online and on-campus resources could be an option.

• Another limitation is lack, or absence of, human-to-human touch. Face-to-face interaction in education has a different value which builds up the culture of an Blended learning. In a multilingual country like ours, language barriers create complexities. Cutting-edge research in text translation and machine learning aims to create deep-learning systems that can translate English lectures into a student’s native language. Similar technologies in voice recognition and text summarisation can transcribe an entire lecture and reduce paragraphs of text into relevant bullet points.

• Teachers will require suitable training and development to be effective online. One cannot assume that a good teacher in a traditional class room will automatically be a good teacher in an online class room. Capacity building of teachers will be crucial to the success of use of technology in education.

It is true that technology will create new opportunities and its adoption will be much faster. At the same time, technology that could have been subjected to greater regulatory security checks – such as use of artificial intelligence in healthcare – will likely be fast-tracked and deployed. A possible risk is that some people can be permanently left behind as the process of digitalisation is accelerated at a rapid pace. Inequalities could perhaps get aggravated and would need to be addressed.

We are today at a time that was never imagined before; a unique time in our lives. For days, weeks and months people are within the confines of home, with their families and loved ones, and living with a sense of uncertainty as to how the pandemic situation will develop. In an unprecedented way the entire world is fighting an invisible enemy. It has posed a great challenge to science and technology. The following quote from Arthashastra highlighting the relevance of wheel of time is interesting:

卡尔: पचति भूलानि, कालः संहते प्रजा: ||
काल: सुमेशु नाम्नि, कालो हि दुर्लक्षम: ||

It means, Time ripens all beings, Time destroys all creatures. Time is awake while all else sleeps, Time is insurmountable!

Time has thrown up several challenges for all of us. It is technology that can help us overcome the challenges. At the same time, new challenges arising by the use of technology are to be addressed by individuals and institutions through learning, teaching and education.

A major challenge comes from the digital divide. As the NEP recognizes, the benefit of online and digital education cannot be leveraged unless digital divide is reduced or even eliminated through considerable efforts, such as initiatives like Digital India Campaign and the availability of affordable computer devices. It is important that the use of technology for online and digital education addresses concerns of equity. People who are disadvantaged do
not become more deprived as time passes and education is much more digitalized.

I recently read, in a one Insight Report by the World Economic Forum, that over a century ago, at the time of the Spanish Flu when people were isolating themselves, many (mostly Americans) turned to telephone to get in touch with friends and family. At that time it was a nascent technology. Services quickly broke down due to rapid use. But, the Spanish Flu underscored how essential the technology of telecom was to modern society. In subsequent years in the twentieth century we all know how instrumental the telephone became in shaping the world as a “global village”. Possibly we are at a similar inflection point in time today. Years later, historians would look back and assess how today’s decision on digitalisation would shape us as individuals, societies and nations.

Our Prime Minister Shri Narendra Modi has given us a clarion call for Atmanirbhar Bharat. It goes much beyond being a self-reliant nation; it envisages India’s leading role in the global arena as a leader in technology and global supply chain of goods and services. At the same time, it is also a social change paradigm where every individual is encouraged to strive for excellence in what she does. In this context, the role of education and higher educational institutions such as IIT Jodhpur is extremely important. They pave the way for achieving excellence and realising national potential.

In the end, I once again congratulate all of you as your esteemed institute embarks on a new phase of a long journey. Possibilities are immense. My best wishes to the Director, faculty, staff, alumni and very special wishes to the students of IIT Jodhpur for Raksha Bandhan tomorrow.