Unlocking
Research Enterprise

Stakeholders such as students, faculty and government can be motivated to do research on problems that impact the society in areas such as infrastructure, energy, health, climate change and environmental projects

Seshadri Ramkumar

Professor, Texas Tech
University, USA

May it be a bold rhetoric! Can we build researchers and unlock the potential of research enterprise? The answer lies in the development of COVID-19 vaccines in a record time. About 95 million people have been vaccinated at least one shot in the United States. Such a miracle did not happen overnight. It is investments in fundamental research that led to translational one leading to life saving medicines.

Research and exploration of knowledge has been part of human DNA but as the world advances, pressures have increased to come-up with technologies to feed the population, save human life and environment. Among the many requirements, in the knowledge economy, universal

access to knowledge is important to bring equity. This is what education achieves and research occupies an important part in the equation. Research and development in all aspects has transformed the economies of nations like the United States, Germany, Israel, China and India.

Research Planning and Investments

Revolutions in IT, manufacturing and biomedicine have created positive outcomes. It came as a result of many years of investments in research, funded by public and private resources. The disruptions such as internet and many incremental developments have relied on solid foundations in primary and higher levels. Global growth and advancements are demanding more than school and college education. Since the early 1980s, many private engineering and technological institutes in India have built necessary workforce needed to feed the global IT sector.

The present pandemic has highlighted the need for such field specific study. While biomedical countermeasures such as vaccines are primary line of defense, personnel protective equipment and physical distancing play their parts in providing the necessary safety. As world advances and problems evolve, multidisciplinary approaches are needed to come-up with solutions. In this scenario, disciplines such as biomedicine, manufacturing, human psychology and communication science are involved. Also, emphasis on mission-linked research that takes grand challenges and skills needed to find solution with better engagement with the society is highlighted.

While undergraduate education lays good foundation, next phase of higher education should enable students to interact with stake holders, i.e., society and industry depending on the field

of specialization. Given the time and resource constraints, collaborations are necessary to advance research and find timely solutions. Say, in the case of Indian institutes, partnerships can be established with research centers under the Council of Scientific and Industrial Research, in addition to engaging with private sector.

NextGen Research Workforce

Can we create researchers? Can we create interest in higher education and carrying out inquiry and laboratory research. Additionally, aptitude, hard

> **"**
> **Aptitude, hard work, awareness of problems and opportunities are helpful to develop a career as a researcher immaterial of the field of study.**

work, awareness of problems and opportunities are helpful to develop a career as a researcher immaterial of the field of study. While creating a researcher may be a tall order, strategies can be carefully planned and executed. Stakeholders such as students, faculty and government can be motivated to do research to address problems that impact the society such as infrastructure, energy, health, climate change and environmental projects.

While these projects have necessary buy-ins, due to budget constraints, India government has insisted on agencies to have some amount of financial independency and generate resources through private sector support. This is a good step in right direction as it enables: 1) accountability; 2) relevancy and need; 3) deliverability and 4) transparency. Projects like infrastructure involve multidisciplinary talents such as engineering, manufacturing and economics. Such projects also attract the support of political parties of varied ideologies and interest as they support job growth. President Biden's administration is expected to propose a US$ 3 trillion

initiative to boost infrastructure in the United States, which is hoped to grow the economy—a timely need indeed.

Research Strategies

Research need not be confined to ivory towers such as academia and research institutes. Research need not be limited to science, technology, engineering and mathematics (STEM). Inquiry can be comprehensive and involves, science, humanities, social science, communication disciplines. Currently the pandemic has categorically highlighted the importance of collaboration among different

disciplines. While investments in basic science by government established the foundation, involvement of private sector and international collaborations resulted in vaccines in record time. However, support from logistics and communication sectors enabled the delivery of vaccines—again emphasizing the importance of working with partners.

Stakeholders should work together to develop creative mindsets right from high schools. High school students can involve in short term projects in research laboratories or engage in

internships with practitioners such as musicians, architects and journalists. Universities are forming partnerships with local school districts to create necessary pipelines. In Western countries, high school students earn college level credits and get into the mold of research and creative endeavors.

Industry-Academia Alliance

Research experience for undergraduates is becoming common phenomenon in universities, particularly in STEM disciplines. However, such practices must be encouraged in arts and humanities as well. "Universities are increasingly recognizing the value of extracurricular, high-impact educational practices in preparing undergraduate students for the workforce or further professional/academic training. These practices include involvement of undergraduates in research and creative activities, engagement in entrepreneurial programs that put ideas into action, service-learning course work, and certain types of study-abroad and internship programs. These

relationships are often life-changing and frequently lifelong, benefitting both the student and the mentor," stated Provost Michael Galyean, chief academic officer at Lubbock, USA-based Texas Tech University.

Industry-Institute collaboration and support for translational research will enable targeted research that creates major impact in the society. These may also help with growing "Start-up Culture," much needed for economic growth and job creation. Israel's strength in its research ecosystem helped it to be a Start-up Nation. Countries like India are now focusing on this aspect to create jobs and be reliant in advanced technologies such as medicine and defense.
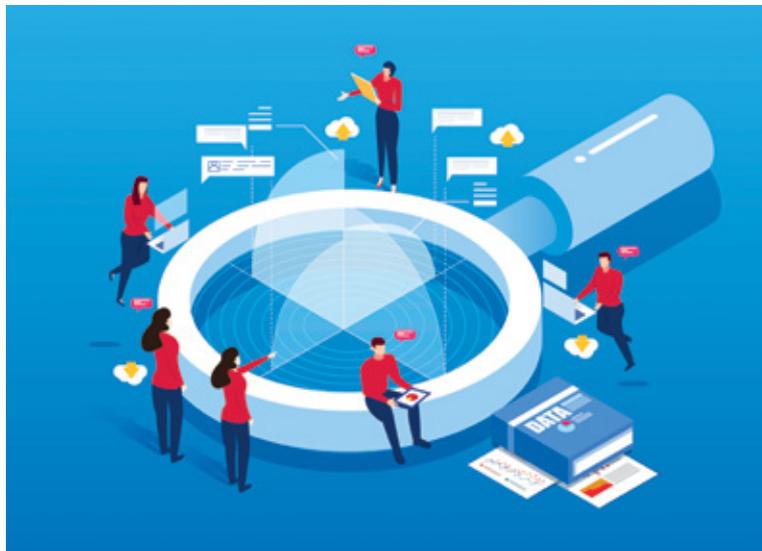
Universities of the Future

While Universities have become good centers of training undergraduate students, future universities must stand on four pillars: 1) training global citizen scholars; 2) mission linked research; 3) service to professions and disciplines and 4) engagement with the society. Training students to look at the world as a global society emphasizes a comprehensive education imparting both field specific expertise as well as soft kills. Research must tackle basic and translational aspects handling both local and global problems. This will also involve national and international collaborations. COVID-19 has highlighted opportunities in virtual interactions and engagements—a positive development.

As with every difficult situation there arises new opportunity. This has been the case with COVID-19. Necessity to tackle global problems that need multidisciplinary skills has become clear. Research initiatives that are grand requiring multiple talents and skills are the need of the hour. ♛