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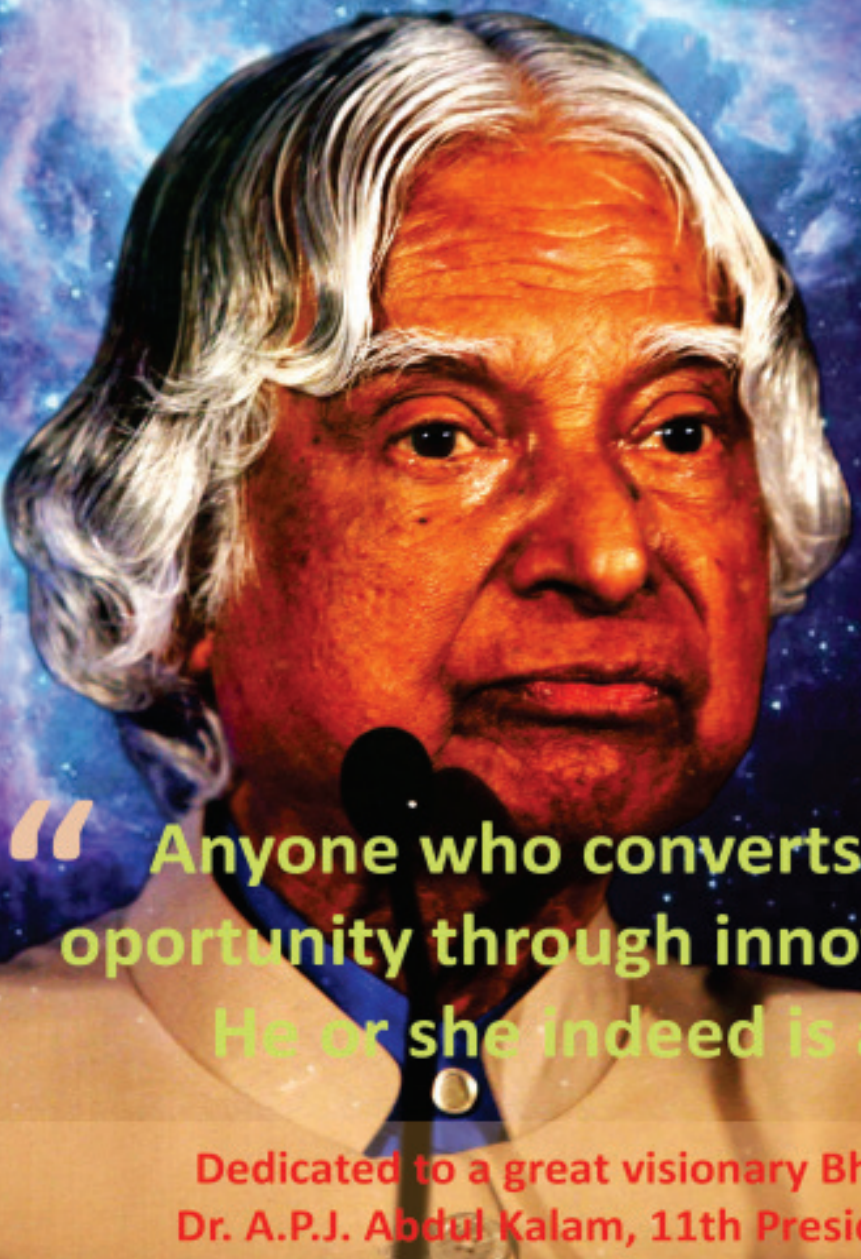
innovate India

A magazine promoting the culture of innovation



Promoting Innovation in India

Innovation: A Way of Life

"Anyone who converts a challange into an oportunity through innovation creates wealth. He or she indeed is a leader, are you?"

Dedicated to a great visionary Bharat Ratna
Dr. A.P.J. Abdul Kalam, 11th President of India

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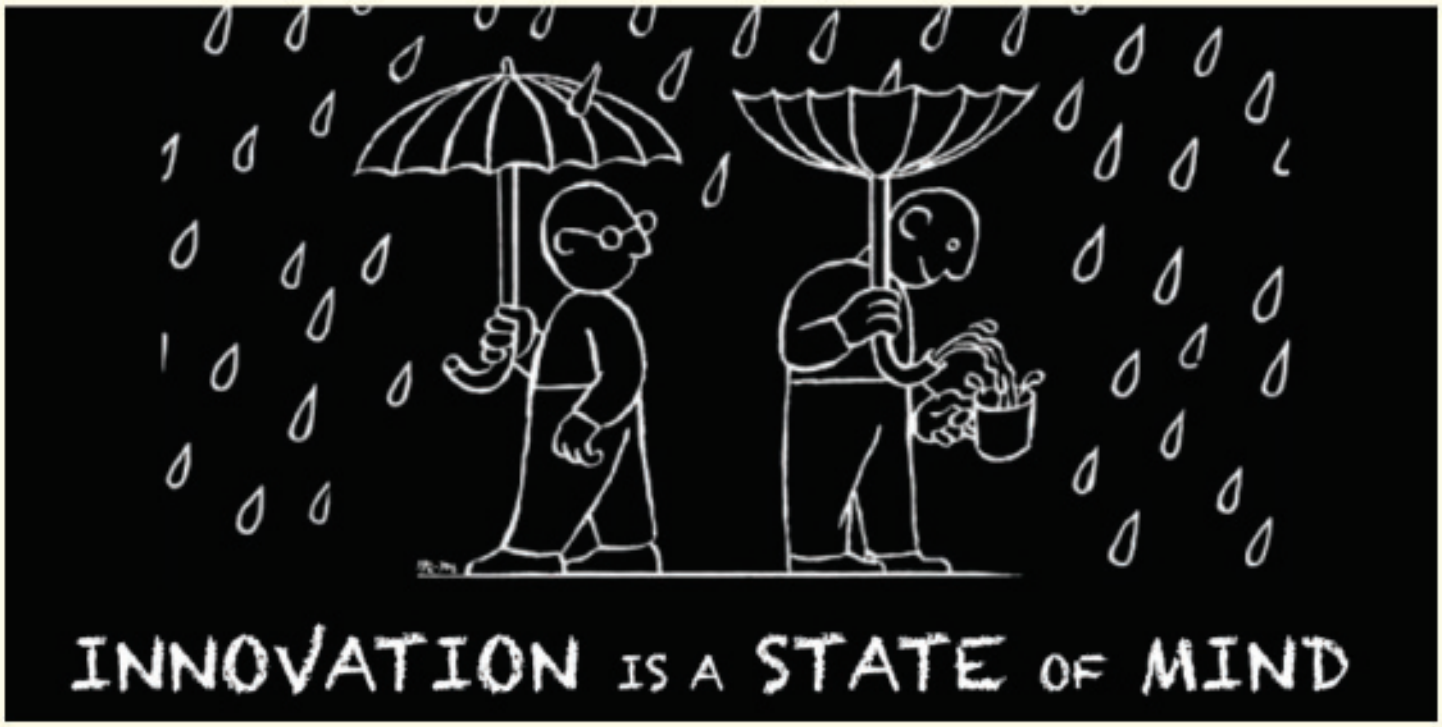
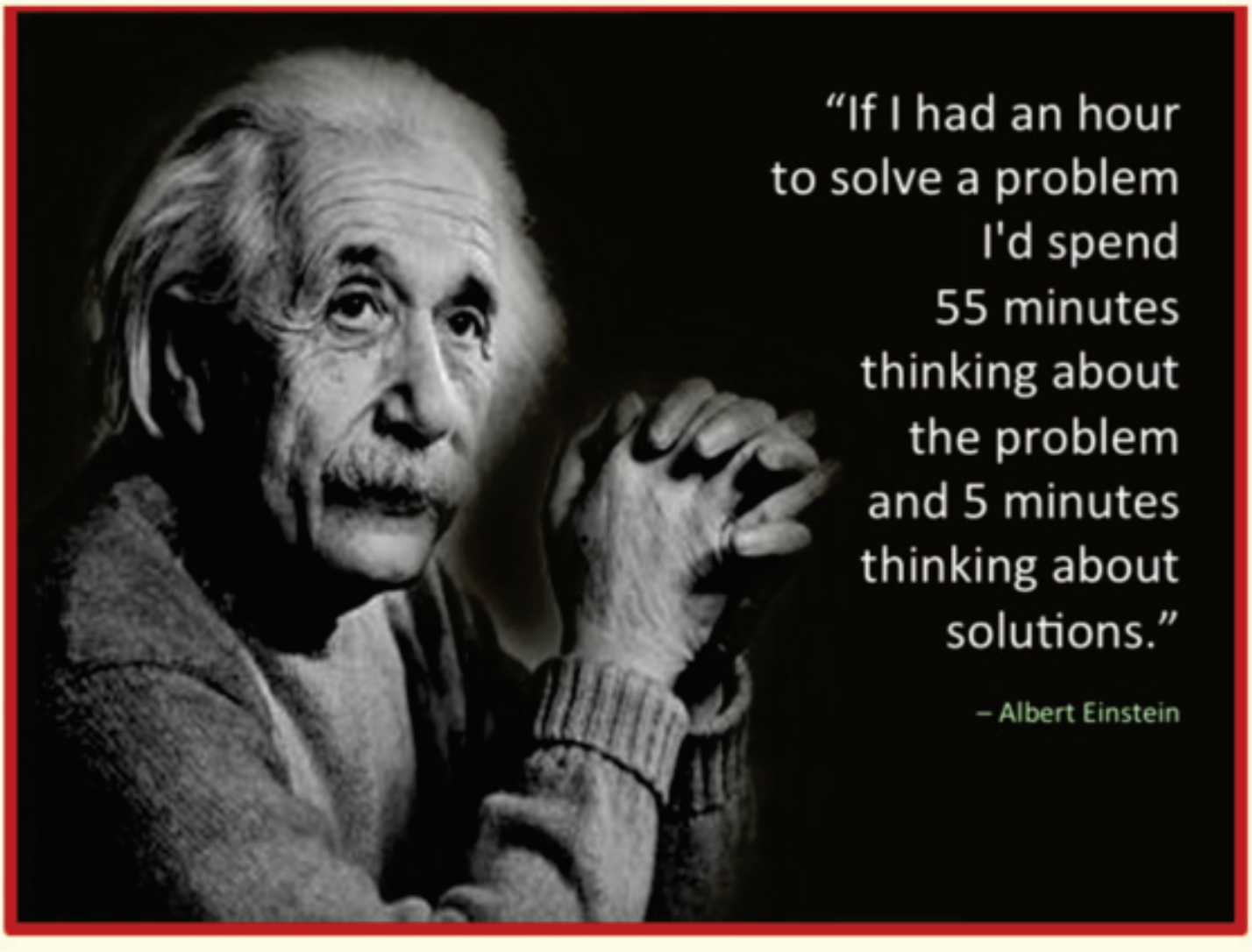

INNOVATION IS A STATE OF MIND


"If I had an hour
to solve a problem
I'd spend
55 minutes
thinking about
the problem
and 5 minutes
thinking about
solutions."
– Albert Einstein

innovate india

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Editorial

It is rightly said that "*everything begins with an idea*." Henry Ford says, "*The air is full of ideas. They are knocking you in the head all the time. You only have to know what you want, then forget it, and go about your business. Suddenly, the idea will come through. It was there all the time*." In fact, the ideas are continuously generated in our minds. Initially most of the ideas seem to be foolish and absurd. Idea leads to innovation and innovation paves the way for growth and progress of an individual, society, nation and the world. Therefore, there is a need to exploit the power of idea and to promote the culture of innovation among the people. According to Albert Einstein, "*If at first the idea is not absurd, then there is no hope for it*." For promoting the culture of innovation, it is imperative to provide a conducive environment. Roosevelt says, *"Great minds discuss ideas, average minds discuss events and small mind discuss people."* Discussing ideas itself indicates the greatness of the minds. Thus, the students coming up with any kind of new and innovative idea should be encouraged and be discussed regularly on a platform.

During the last one decade, innovation has emerged as a key driver in socio-economic growth all over the world. Technological innovations have revolutionized in almost all walks of our life. Recognizing its importance, the government of India has also taken a number of initiatives towards strengthening the innovation ecosystem and promoting the innovations in different sectors. In fact, India is now, rapidly marching to become a global innovation hub. Though, a number of innovations are being done in different sectors, but the information about such innovations is not percolating down to the people, particularly in the remote areas. Great scientist and former President of India Dr. A.P.J. Abdul Kalam had also advocated to create an innovatively empowered society. Under 'Startup India' scheme of the Govt. of India, our Prime Minister Shri Narendra Modi has also resolved to make 10 lakh students as successful innovators. Recently, the HRD Minister Prakash Javdekar has also stressed on innovation and research at all levels.NITI Ayog has started a nation wide scheme named as Atal Tinkering Labs in selected schools for encouraging innovation at school level.

Now, in view of the present initiatives of Government of India like Make in India, Startup India, Digital India, Atal Tinkering Labs, etc, the role of technical education becomes more important to harness the creative potential of the large young population of the country. Moreover, the inclusion of large number of manufacturing industry and IT industry have generated a huge demand for quality and skilled manpower in the country. As a matter of fact, in the present age of competitions and technologically fast growing society, our youth particularly the students needs to be futuristic and innovative. For that purpose, besides technological empowerment of the students, they need to be encouraged to be entrepreneurs and innovators. Keeping it in view, a great visionary and a successful grass root innovator Shri Lakshman Prasad along with a few likeminded people has planned to bring out a bilingual quarterly magazine on innovation. The magazine aims at creating awareness about innovation & creativity; developing innovative attitude among the people and thus inculcating a culture of innovation in the society particularly among the youths.

Each issue of the magazine will include conceptual articles on fundamentals of innovation and case studies on innovations in the field of agriculture, rural development, industry, education, technology, politics, society, environment, business and management, etc. It will also include articles on entrepreneurial innovations, startups, indigenous & grassroots innovations like Jugad; idea factory, out of the box solutions, innovators-our path finders, news & views on innovations, book reviews on innovation and reviews of research studies & papers on innovation, etc. As per our knowledge, there is no such magazine in India which focuses exclusively on innovation and related aspects. We hope that this unique publication will itself be an innovation and it will help in promoting the culture of innovation in India.

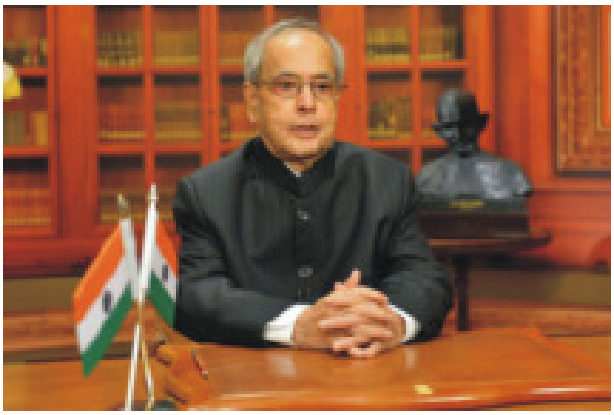
The inaugural issue of the magazine is dedicated to the great promotor of creativity and innovation–our former President Dr. A. P. J. Abdul KalamI hope you will like this issue and will help us in taking up this movement a long way by way of providing your feedback , promoting this magazine and contributing articles on any kind of innovation in the above-mentioned areas and related issues. I am sure, with your support, we will be able to create a culture of innovation in the society and inspire the people, particularly the young generation of our country to think innovatively and do innovations in their fields.

—Chief Editor, Innovate INDIA

Innovation – A Way of Life

❑ Shri Pranav Mukharjee

Vi-ce Chancellors of central universities, Directors of IITs, NITs, IISc/ IISERs, SPAs, IIITs, NIPERs; Heads of other institutes and civil service academies; Faculty members;Officer trainees of various civil services; My dear students:



Shri Pranav Mukharjee

I am glad at this opportunity to interact with you at the beginning of the new academic session. At the start, let me welcome all the students who are new to universities and other centres of higher learning. Also, my compliments to the officer trainees who are undergoing their probationary training at their designated academies. I started the practice of addressing the academic community in higher education in January 2014. This is the sixth such occasion and I must confess that I eagerly look forward to this periodic interface on e-platform. For making me connect with you all, I thank the National Knowledge Network and the National Informatics Centre teams.

India is the world's largest youth-populated nation. Over 600 million people in India out of a total population of 1.28 billion are below the age of 25 years. We have an abundance of creative, restless and inquisitive minds. In the networked environment of today, we need the power of youth to realize the full potential of an aspirational India. For this, *creative thinking and a desire for innovation must become a part of our day-to-day lives*. So, I have chosen to speak to you on "Innovation: A Way of Life", today.

> "creative thinking and a desire for innovation must become a part of our day-to-day lives"

Friends, India's economic performance over the last few decades has been commendable. Yet, we are confronted with enormous problems of poverty, inequality, unemployment, resource scarcity, and poor infrastructure. While we need cutting edge technologies for rapid creation of world-class infrastructure and its maintenance, we also need solutions for including the excluded ones in the development process. As the democratic aspirations rise, we have to find new ways of reducing disparities. Many times, we cannot solve the problems by merely redoubling our efforts. We need to change the approach, the design, the delivery method and the means. On account of our size, diversity and complexity, our circumstances are unique. Adopting global models for development can at best be of limited use. Our development model has to be linked to the aspirations of our people and must respond to their needs. Innovations must preserve our diversity and benefit the wider spectrum of the society.

Friends, Innovation has many facets. Some innovations are *transformational* in nature where the changes are disruptive. The digital revolution with its products impacting the daily lives of millions – from top to the bottom of the socio-economic pyramid - is one such example. Then there are '*pro-inclusive*' innovations that by modifying an existing technology significantly lower the price of a product or a service making it affordable to middle and lower income groups. It includes 'frugal' innovations that retain only the core functionalities of a product like a low-cost car or a low-cost airline. Another category is *social innovations* that are primarily aimed at providing socially useful

services for which clients may not have the capacity to pay. Yet another dimension of innovation is '*grassroots' innovation* that is undertaken by local communities who close the gap between unmet social needs and inadequate delivery system by developing creative solutions themselves.

> ***"The idea of imagination, experimentation, innovation and entrepreneurship (IEIE) has to be instilled from childhood".***

Friends, today I want to share with you some lessons that we have learned over the last four years through a variety of initiatives taken in the Rashtrapati Bhavan. I will also outline the challenges that confront us in making India more compassionate and collaborative to meet the social needs. I am happy that Prime Minister in his recent *Mann ki Baat* has exhorted countrymen to create an innovation eco-system. He talked about a very positive initiative Atal Innovation Mission, to promote innovations and start-ups all over the country. I agree completely with his message of AIMing to lead through Innovations. The idea of unleashing creativity of children is also the right one.

The idea of imagination, experimentation, innovation and entrepreneurship (IEIE) has to be instilled from childhood. I am told that Department of Science and Technology is starting a programme: MANAK (Million Minds Augmenting National Aspirations and Knowledge)with NIF's support to find at least two innovative ideas from each of the half a million schools and take the worthy ones forward.

Friends, the next question is how do we take the inclusive innovation movement forward? India may have lagged behind in some of high tech innovations but when it comes to developing solutions to everyday problems, we have made a difference. I have been hosting innovation scholars besides writers and artists as my guests at Rashtrapati Bhavan for the last three years under an in-residence programme where innovative minds come together to "recharge their creative batteries". I will call upon educationists, corporate leaders and community leaders to think of extending such recognition to creative and innovative people of our country. No matter how busy you are, find some time in a year for such people for igniting your imagination.

To celebrate the spirit of common people to take charge of developmental destiny through their own creativity and innovation, Rashtrapati Bhavan has been hosting a week-long Festival of Innovation. In this festival, global roundtables and other interactive sessions provide innovators, entrepreneurs and financiers a platform for conversion of ideas into marketable products.

In my capacity as the Visitor of 117 central institutes of higher learning, I had given a call to these institutes to set up innovation clubs. There are now over 85 such clubs, innovation incubators and hubs in central institutions of higher learning.

On 19th May, 2016, Rashtrapati Bhavan became a smart township. For us, a smart township means a humane, hi-tech, heritage and happy township which ensures an enhanced quality of life that contributes to the well-being of its residents. I think our smart cities, towns and villages, as we develop them, too must be humane, hi-tech and happy leading to the creation of a technology-driven but compassionate society.

Friends: I hope to see a developed India in my lifetime. Our collective dream will be fulfilled only when we build upon creative ideas of all citizens, by providing them pathway to persevere, sustain, and make a difference.

I suggest nine *SUTRAS* to invigorate India's march towards a more inclusive, diverse, sustainable and innovative society:

1. We should not snub children when they ask questions to which we have no answer. We should admit our ignorance, seek relevant information from those who may know and whet their curiosity. Unless our children learn to question, experiment, their imagination will not expand; and their innovative potential will not be realized.

2. We should promote and reinforce a scientific temper by questioning our beliefs which are not compatible with scientific way of thinking. The futuristic societies build upon unconventional ideas. They are not afraid of failures; they take risks and forgive well intentioned mistakes.

3. Innovation clubs and tinkering labs should be set up in schools, colleges and research institutions. Youth must learn to *search, spread*, and *celebrate* inclusive innovations and *sense the unmet social needs* of communities in their hinterland. I have seen paddy transplantation in my village when women work with their feet in water, back bent in painful posture for hours transplanting paddy. Why cannot we improve and design affordable manual paddy transplanter? Why

the pace of technological change is slow in the activities that women undertake? Let us commit ourselves to work towards addressing all these problems in a time bound manner. We should also become sensitive towards the problems faced by working class, elderly, and specially-abled, of our country. Only then will compassionate creativity blossom.

4. We should build viable and *sustainable bridges between formal and informal knowledge systems*. With climate change risks, and uncertainty looming large on the horizon, the knowledge of the communities which have lived with these uncertainties for millennia cannot be ignored. As resources become scarce, we will have to learn to share more and more. The value system which promotes public and common good over individual interest should power individual entrepreneurship.

5. We must give due recognition to cultural, technological and traditional skills while implementing our employment guarantee schemes and skill development programmes. *Nobody is, truly speaking, unskilled*. A knowledge society has to harness unique strengths of each person. We should also encourage artists, performers, sculptors, etc., to teach their art to our children in schools, and nurture younger generation which may like to contribute towards *cultural economy*.

6. I have been interacting with vice chancellors and directors of various institutions of higher learning during the last four years. I have impressed upon them to promote innovation in every subset of education so that younger generation grows with a creative and problem solving mindset. We should bring our educational system in line with contemporary societal expectations.

7. There are many simple problems that we face in our daily life but we learn to live with these problems rather than find systematic solutions. We need to overcome the deeply-embedded inertia in our psyche and constantly ask ourselves: how can I solve this problem? Can I still try, no matter if I fail a few times?

8. We must develop a sense of immediacy. Time and tide waits for none. In a fiercely competitive environment, to be in a hurry and have some impatience is a necessary virtue.

9. We must not tolerate inefficiency, shabbiness and poor quality work. Our endeavor should be to achieve high standards of aesthetics and performance while providing goods and services.

There is a lot more that can be and should be done. I will be happy to hear from you about the ideas you have for making India a creative, compassionate, collaborative and innovative society. Our government wants to use your ideas constructively. The knowledge and culturally rich but economically poor deserve our support for a more dignified future. If we overcome some of our inertia, stop complaining always about what is wrong around us and instead focus on what is right, bright and creative, we can indeed change our work culture and the mindset. Great nations need to reinvent their social mores, and redefine social aspirations to include the last in the line.

I wish you a very healthy, happy and successful future. Stay engaged with creative and compassionate forces in our society. That's how India will become not only a developed but also a caring and sharing society. Thank you. Jai Hind.

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Nine Sutra to Invigorate India's March towards Innovative Society

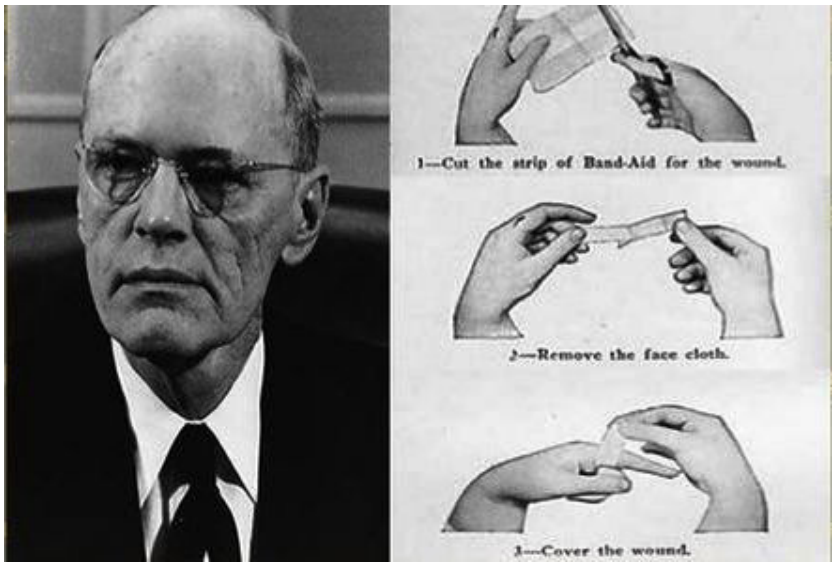
1. Do not snub children when they ask questions.
2. Promote and re-inforce scientific temper.
3. Set up Innovation clubs in schools and colleges.
4. Build bridge between formal and Informal knowledge system.
5. Give recognition to cultural, technological and traditional system.
6. Promote innovation in every subset of education.
7. Find systemic solution to daily life problems.
8. Develop a sense of immediacy.
9. Endeavour to achieve high standards of aesthetics performance.

Note: ***This is the text of one of the speech delivered by the former President of India Shri Pranab Mukharjee while addressing the Vice Chancellors and Directors of Central Universities, IITs, NITs and IIITs, etc. In the interest of the people of India, it has been thankfully acknowledged from the website of the President of India.***

BAND AID

An Innovation Evolved from a Love Story

Band aid is today an essential component of every first aid box. But, do you know that merely 10 years ago there was no band aid. Even for the dressing of very minor injuries, a person had to wait for an assistant. As told by Vigyan Ratna Laxman Prasad to Mr. R.S. Dass, there is an interesting story behind it. He told that the band aid evolved as the part of a love story of a newly-wed couple of a lower middle-class family.



Early Dickson

Early Dickson was a cotton supplier to medical giant Johnson and Johnson. When Earle got married, his beautiful wife Josephine used to keep herself busy in household chores to turn her home into heaven and in that effort usually suffered with cuts, bruises and burns on almost daily basis. In the evening when her husband would return, he would apply medicine and dress the injury, because for any dressing normally both hands are required. During his absence, it would have been difficult to do dressing of her cuts and wounds herself. This worried Earle a lot. He started thinking of ways and means through which his dear Josephine may dress up her wounds single handedly on her own. This was an idea to find solution to a problem. He performed experiments and finally prepared band-aid.

For preparing band aid Earle spread surgical tape on the table, cut and pasted square pieces of cotton-gauge at regular intervals on it. Further, he secured the tape with cotton strips so that it may easily stick to the skin and may also be removed with ease when injury is cured. This proved to be so helpful that he showed his aid to his boss. The astute businessman was quick enough to perceive the business prospects for the invention and started its production in 1920 with the brand name Band Aid.

The sale of band aid steadily increased and it got popularized as a first aid device the world over. Earle Dickson also rose in position on the staff of Johnson and Johnson as the sale of band aid increased and got retired as its Vice President in 1957. It is important to mention that the Band Aid is still the highest earning product of Johnson and Johnson and the company is improving it as per market requirements.

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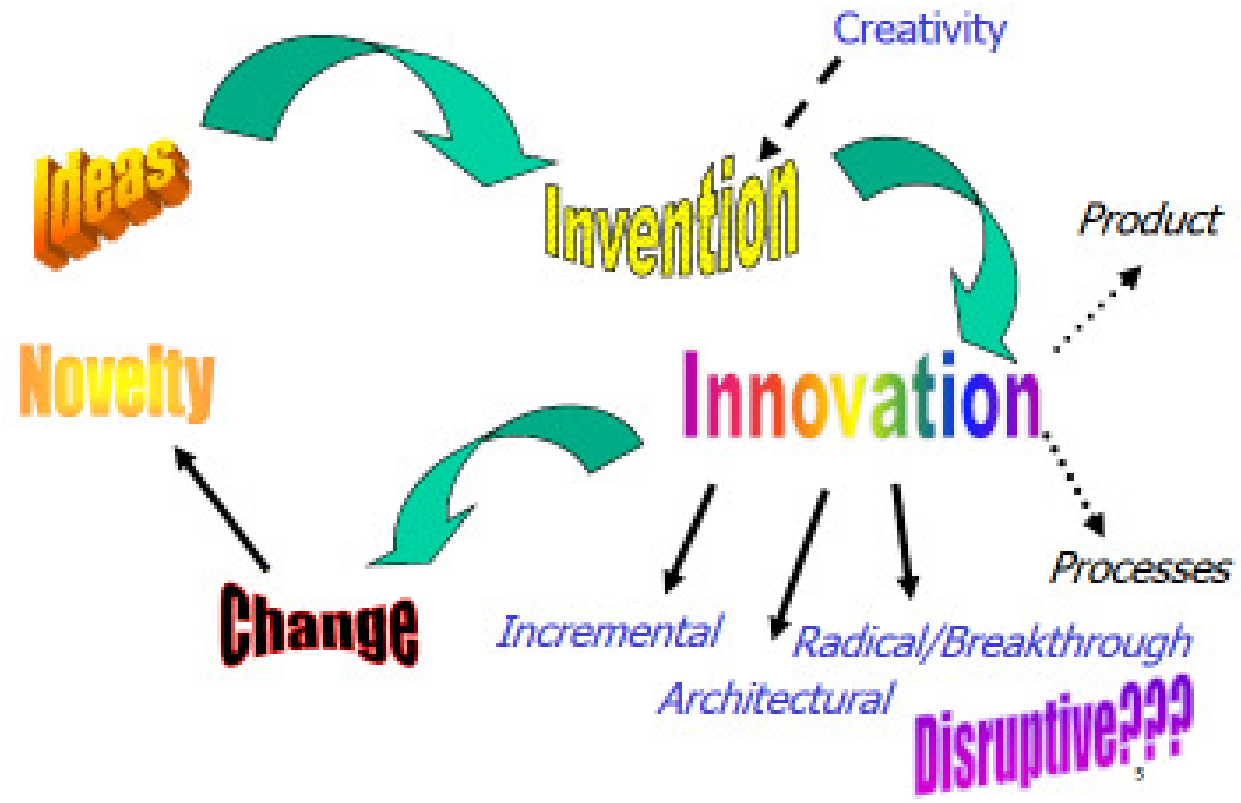
"The five essential entrepreneurial skills for success: Concentration, Discrimination, Organization, Innovation and Communication"

–Harold S. Geneen

What is Innovation?

❑ Dr. Oum Prakash Sharma



Presently, the term 'innovation' is being used very frequently in almost all walks of our life. Most of the business houses, industries and educational institutes have special provisions for promoting innovation. Not only this, knowingly or unknowingly we also do a number of innovations in our day-to-day life. Do you know what does 'innovation' mean?

Many a times, it is noticed that many of us consider innovation as the introduction of new technologies. It is true that innovation has led to the development of several new technological products and processes, but the fact is that innovation is much more than just the introduction of new technologies. Let us see how innovation is being defined by different dictionaries and researchers.

According to the BusinessDictionary.com "*an idea, to be called an innovation, must be replicable at an economical cost and must satisfy a specific need. Innovation involves deliberate application of information, imagination and initiative in deriving greater or different values from resources, and includes all processes by which new ideas are generated and converted into useful products.*"

The University of Melbourne perceives innovation as "*something new or improved, having marketable potential, including refinement of existing technologies, or development of new applications for existing technologies.*"

According to the Wikipedia *Innovation is a new idea, more effective device or process.* Further it says that *innovation can be viewed as the application of better solutions that meet new requirements, inarticulated needs, or existing market needs.* This is accomplished through more effective products, processes, services,

technologies, or ideas that are readily available to markets, governments and society. The term innovation can be defined as something original and more effective and, as a consequence, new, that "breaks into" the market or society.

As per the Merriam-Webster Dictionary *innovation is the act or process of introducing new ideas, devices, or methods*.

According to a report 'Something new under the sun: A Special report on innovation', by Vaitheeswaran, Vijay published in the Economist on October 13, 2007, *"Technically, 'innovation' is defined merely as "introducing something new;" there are no qualifiers of how ground-breaking or world-shattering that something needs to be - only that it needs to be better than what was there before*. The report further mentions that when an organization requests "innovation services" from a consulting firm, they are not clear what are they exactly requesting. This is because of the fact that different people perceive innovation differently. That is why, it becomes more important to understand the proper meaning of innovation.

Marc Chason, Motorola Labs defines innovation as "*The actions required to create new ideas, processes or products which when implemented lead to positive effective change*." Further it says that while invention requires the creation of new ideas, processes or products, innovation moves one step further and requires implementation of the inventive act. Innovation also implies a value system which seeks to derive a positive outcome from the inventive act. For example, actions which lead to a negative performance metric would not be considered innovative, even if they met the requirements of novelty and enabling actions.

In view of the above mentioned definitions, we can come out to a consensus that "*Innovation is something fresh which may be new, original, or improved that adds value*." In fact something new cannot be enough for the definition of innovation unless there is value addition. Here it is important to be noted that the "something" could be a process, product, or service and can start as small as your ideas and thoughts in your brain. In that case, it might just be innovative thinking.

In simple terms we can say that innovation means doing something new, different, and smarter or better that leads to positive difference in the product, process or service. It is also viewed as the application of better solutions to existing problems and inarticulate needs. It is about identifying and /or creating new approaches to do what we have been doing. The term innovation may refer to both radical and incremental changes to products, processes or services..

Evidently, innovation is the key to the growth and progress of an organization. It is true that the organizations that do not innovate effectively may be destroyed by those who do. In fact, innovation is linked to performance and growth through improvements in efficiency, productivity, quality, competitive positioning and market share, etc. Normally the unspoken goal of innovation is to solve a problem.

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References:

1. Business Dictionary, http://www.businessdictionary.com/efinition / innovation.html
2. https://en.wikipedia.org/wiki/Innovation
3. http://www.merriam-webster.com/dictionary/innovation
4. 'Something new under the sun: A Special report on innovation', by Vaitheeswaran, Vijay, Economist on October 13, 2007,
5. *Marc Chason, Innovator – Making Innovation Real, Vol.1, Issue-1, May, 2008*

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Innovation can be defined as the process of implementing new ideas to add values to the system, process, product or processes.

Building An Innovative Society

❑ Vigyan Ratna Lakshman Prasad

Mankind has made remarkable progress in the 20th Century. Science and technology took astonishing steps to transform the world and the human life. It is in this century when most of the inventions that define our present life styles and point to our potential for further progress were devised. If the automobile, the telephone and the telegraph were already known to man by the end of the nineteenth century – the first two as rare and exotic inventions available only to a privileged few – their development and their ubiquity in the 20th Century could certainly not have been imagined. Not only are these widespread today, but everything else that we associate with modern life came to light in the 20th Century – the aeroplane, the motion picture, the television, the computer. Illness like smallpox, polio and tuberculosis no longer ravage the world as these used to. These maladies, which a hundred years ago were fatal, are now containable and often curable. For an affluent minority, life is full of conveniences and pleasures unimagined a century ago – from the microwave oven in the kitchen to the television and laptop in the living room and e-mail device in the office. In economics, the twenty first century has culminated as the century of globalization, at the risk of sounding tautological, a world-wide phenomenon.

In the last century, we have seen the miracles of science. Science gained the knowledge of the dance of galaxies in outer space, as also the dance of micro-particles in the womb of the

atom. While continuing with this search for the mysteries of the material world, science should simultaneously redouble its quest for those as-yet-unknown ways leading to human happiness and comforts for all in the new millennium.

Economics of the 21st Century

In every country around the world, trade barriers are being lowered, imports and exports increased, foreign capital avidly sought, legal systems being brought into

line with the needs of international business, tax and property laws being re-examined against foreign standards, and restrictive rules and regulations are being scrapped. The role of the state is increasingly being re-defined as that of providing an 'enabling environment' or a framework so that its citizens could pursue their aspirations. More and more economies are being 'plugged in' to the global system in what is a self-reinforcing process. (This is not to echo the advocates of globalization who blithely suggest that we have moved from a world dominated by super powers to a world dominated by market power).

Economics of the 21st Century does not provide just more money for a few but more choices for the consumers and more jobs for the multitude. Liberalization must produce not only foreign cars for the affluent, but work for the unemployed, food for the hungry, shelter for the homeless, medical care for the poor, education for the illiterate and money for the needy. We have to fulfil this dream through innovations and innovative management techniques.

Knowledge-centred Innovation

The country is, in this context, making pressing demands on science and technology. We are looking for new knowledge and new products in the new century. We are especially looking for knowledge and products that will further reduce human misery, remove hunger and want, and improve the living conditions of the people at large. While doing so we have to protect environment.

Achievement of the above objectives calls for greater cooperation among the scientists and technologists in formulating policies, as well as their implementation directed towards innovations of new products and processes for the well being of the people of the country.

In order to make India innovative, it has become necessary to establish bridges between the traditional approach of research and global demand for innovation. This is where creation of knowledge-based innovation becomes important.

Knowledge without innovation is of no practical value. It is through the process of innovation alone that knowledge is converted into wealth and social good, and this process takes place from firm to firm. When one looks at India today one feels that centuries of subjugation has perhaps undermined our capacity for innovation and creativity. We cannot anymore allow the 'I' in India to stand for imitation and inhibition, it must stand for innovation.

Innovators are those who do not know that it cannot be done. Innovators are those who see what everyone else sees but think of what no one else thinks. Innovators refuse status quo, they convert inspirations into solutions and ideas into products.

Building such innovators will require an all-pervasive attitudinal change towards life and work a shift from a culture of drift to a culture of dynamism, from a culture of idle prattle to a culture of thought and work, from diffidence to confidence, from despair to hope. Revival of Indian creativity and the innovative spirit needs to be made into a national movement today in the same spirit and on the same scale as marked the country's freedom struggle.

Forward and Backward Linkages

The processes of innovation have both forward and backward linkages. The forward linkages will involve technology innovation and production chain, with the consequent process of diffusion representing a further forward linkage. For India, equally important is the backward linkages which pertain to literacy, science education, public awareness, the mass media and the use of innovation in science itself to further these.

Types of Innovations

There are mainly three types of innovations. First there is the large system innovation such as a man on the moon mission or the green revolution; second, incremental innovation such as the development of an improved fax machine; and third, radical breakthrough including accidental innovations.

1. ***Large System Innovation :*** Large system innovations invariably take place in formal systems of innovation, namely universities, industrial R&D laboratories. India has done well in large system innovations. The programmes in strategic areas, green revolution and white revolution are indicative of our successes breakthrough leading to the antibiotic industry.

2. ***Incremental Innovation:*** Incremental innovations take place in industries which continuously innovate to create products, which displace their own products with the fear that otherwise their competitors will do it for them. In the absence of competition in the marketplace, Indian industry has not put demands on innovation, but no more can they afford to do this now. We do hope that the new millenniums innovative spirit will propel our industry to change course since that alone will survival or success in an extremely competitive world market.

3. ***Radical Innovation:*** As regards radical breakthroughs, which gave rise accidentally to antibiotic industry and modern chemical and plastics industries, India cannot, unfortunately, claim any major breakthroughs that owes its origin to an accidental discovery. We need an innovative mind to spot accidents when they happen. After all, eyes do not see what the mind does not know. With the new innovation movement, we will expect many more such radical breakthrough to come out from India.

Sector-wise Classification of Innovation

The above mentioned classification of the innovations can happen in any sector or area including society, schools, community, politics and legal, etc. Based on the sector or area in which a particular innovation takes place, the innovation can be classified as follows:

1. ***Community Innovation:*** Innovators do not exist just in formal laboratories. Millions of them exist in villages, in homes and on the streets. To encourage community innovation, it is necessary to scout, support, spawn and scale up the grassroot innovation. This will generate employment, on one hand, and it will use natural resources sustainably through linking of innovation, enterprise and investment, on the other. The initiative already taken by the Government of India by setting up the National Innovation Foundation has been playing a crucial role in making this happen.

2. ***Social Innovation:*** Beyond S&T – based innovations mentioned here, the concept of innovation is a much wider one. It is particularly important to recognize the need of social innovation. Innovation in India's social, legal and economic institutions, in the system of their governance is as crucial as innovation in products and production processes of its economy. If paper becomes more important than people, if bureaucracy overrides innovative spirits, if risk-taking innovators are ignored, if decision-making times are larger than new product life cycles, then innovation cannot survive. We must also recognize that innovation cannot arise by itself; it is generated and sustained through the efforts of the people.

3. ***Political Innovation:*** Political innovations are also important to shape political thinking. ***The*** current political system in India needs innovations to clean the political mess created by the politicians due to their vested interest like making money, patronizing own community persons, grabbing land and building. A stable government can govern the country in much better way than the unstable government. Transparency in political system at different levels is important for better and effective governance. The politics of *'Gaya Rams and Aaya Rams'* is a dangerous trend in our political system. Therefore, innovations are needed to evolve a better system free from various malpractices currently prevailing in our political parties.

4. ***Legal Innovation:*** Justice delayed is justice denied. It is very true in the case of our country as our judicial system takes unduly long time to dispose of cases. It is not only time consuming but expensive too. The people lose faith in judicial system when years are taken in delivering judicial verdicts. There is an urgent need to develop innovations for simplifying cumbersome procedures and curtailing delays. There is a considerable scope for innovations to improve our judicial system for speedy and effective justice.

Enabling Environment for Innovation:

It is imperative that we create an enabling environment in which innovation flourishes. In its absence, innovators will either play safe and not innovate, or they will leave to become a part of other innovative societies which encourage innovation. India has seen this to its dismay; since a lot of its young sons and daughters are migrating to other countries, not due to the lure of the physical income alone, but

because of the psychic income that they gain in those innovative societies. India must resolve to reverse this process as we have already entered the new millennium.

Creating a Silicon Valley in India

Silicon Valley has become so important in the world in a short time that it has turned into an innovative society. The question that arises is: who have made it possible? No doubt, our bright young Indians have greatly contributed to make it what it is. A world-renowned software company in Silicon Valley employs about 6,000 Indian engineers, technologists and management personnel out of a total 10,000 employees. Of these 4,000 are IIT graduates and post-graduates from India. The same pattern is evident in other software companies in the USA. Why do Indian genes express themselves in Silicon Valley? Why can they not express themselves in India? How can we create Silicon Valley in India? The answers are obvious. We have first to reverse the brain-drain from the country, which will be possible only if we create conducive environment to enable our genes to express themselves in Indian Universities, industry and R & D laboratories.

Cremation of Anti-innovative Approach

Unfortunately, in the last few decades an anti-innovative approach of learning has crept into our educational system. The basic reasons are:

- an unproportionate shift towards objective-type curriculum under which the student has to rely more on his memorizing capacity than his thinking and creative faculty;
- the cut-throat competition for getting oneself admitted into engineering or medical colleges; and
- the pressure from parents on the students to somehow remain a topper in the class.

This has made the bright young generation to turn into mental 'athletes' rather than the knowledge-seekers and thinkers. Since the young minds are not motivated to enter into the domain of creativity and innovation, they are easily attracted by the glamour of modern commerce and business. This is the reason why most of the best brains from our IITs today are going for business management and Indian Administrative Services, rather than for creative engineering for which they were grooved at an exorbitant amount of public money.

Revival of knowledge and Wisdom

Keeping this scenario in mind, we must bring back the spirit of the glorious innovative India of the bygone millennia to once again turn India into a nation of creative persons, innovators, original thinkers and down-to-earth teachers (gurus) of contemporary science and technology.

Unfortunately, we did not lead the world in the second millennium because we lacked in original thinking, creativity and innovation. We can reverse the trend in current millennium. Indeed, we have an opportunity to unleash the resurgence of an innovative India. To meet the challenges of international forces successfully, we cannot afford any longer to remain indifferent to scientific and technological developments to build India as an innovative society.

An innovative society, created through an enabling environment for innovations, will not only make the people creative but will also generate intellectual capital which will be real asset as well as a driving force in the current era of globalisation and liberalisation. Intellectual capital must be the *mantra* of new economy in the current millennium.

❑❑

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"To raise new questions, new possibilities to regards old problems from a new angle, Requires creative imagination and marks real advance in science."

–Albert Einstein

Nature Inspired Innovations

❑ Ram Sharan Dass

There is a continuous cycle of creation and destruction in nature. What comes into being is sure to become non-existent, but at the same time to re appear again in a different more stable form. Crude forces of nature give rise to crude, large but simpler structures. Subtle forces of nature create smaller, but more finer, more complex structure.

Biosphere is a big community in which various biotic and abiotic components continuously interact to create and resolve problems arising in their co-existence. Adaptation is a very slow but highly efficient method through which nature resolves the problems faced by living organisms to adjust to their environment. Each species of organisms may adapt to its environment in its own unique way, therefore one problem faced by different species may find different solutions, each suiting best to their forms, functions and life styles. So the millions of years of process of evolution has worked out to almost every problem encountered by living organisms.
Man has developed the ability to learn ways of nature and use them to gain dominance on all other species. The story of the area of innovations is not very long but growing with amazing outcomes.

Birds inspired flying machines

Though man has observed the flight of birds with awe and appreciation for centuries, the practical feasibility of man's flight like birds was explored in the beginning of sixteenth century by Leonardo da vinci. Vinci produced a number of works and more than 500 sketches dealing with the machines of flying and the nature of air. He drew the attention of inventors towards this wonderful possibility but no actual breakthrough was realised till 1903 when Wright brothers heavier than air machine stayed air borne for about a minute in Kitti Hawk, North Carolina. It took just another decade for the first commercial passenger flight to become a reality.

Crystal plane inspired by a leaf of a water lily

The first nature inspired design was created by Joseph Paxton who built 990,00 squire crystal palace for the great exhibition, using criss-crossed girders to support nearly 300,000 glass panes over a vast, open space. Paxton got the inspiration for building such a massive but strong and durable structure from the leaf of a water lily in which interconnecting ribs help it to support huge weights in water.

Velcro inspired by Burdock Burrs

The most commonly used example of a nature inspired man-made product is Velcro which was got patented by Swiss engineer George de Mestral in 1955. After

Burdock

Velcro

Janine Benyus

returning from a hunting trip in Alps, Mestral found his dog covered with burdock burrs. When put under a microscope he found that there were hook shaped structure on the seed which got entangled in the loops of the fur. He designed Velcro which in 1960s NASA used in its space shuttle to prevent objects from floating in zero gravity conditions.

The name bio-mimetic to bio-inspired technologies was given by American bio physicist Otto Schmitt in a paper presented at the Biophysics congress, Boston.

Other Nature inspired innovations

Small innovations continued over the time: In aviation industry taking cue from shark skin NASA and 3M succeeded in reducing drag on jet planes by fixing small indentations on its surface with the help of glue. Lufthansa could achieve the same effect with the help of paint. Architect Mick Pearce taking cues from the self cooling mounds of African termites designed East gate centre in Hazare, Zimbabwe in which Chimneys are installed in such a way that a temperate environment is maintained inside without any need of conventional cooling/heating systems.

But nature inspired innovations were brought to centre stage of scientific inventions by Janine Benyus, when in 1997 she published her book Biomimicry: Innovations inspired by nature. Since then the number of bio-inspired innovation patents is increasing in leaps and bound.

Janine Benyus now educates and gives consultations to big corporations to design, create and incorporate nature inspired innovation into their practices. In 2010, she founded Biomimicry 3.8 an institution through which she teaches the basic principles involved in bio inspired innovations and how to use them. Benyus says nature knows what works, what is appropriate and what lasts here on earth. According to her, in its 3.8 billion years of evolutionary practice nature has already found marvelous solutions to most of the challenges we face. Her solutions are not only benevolent but also sustainable. This is so, because, biomimicry is governed by the nine basic principles given by Jamine Benyus.

Nine-basic principle of Biomimicry

1. Nature runs on sunlight.
2. Nature fits only the energy it needs.
3. Nature fits form to function.
4. Nature recycles everything.
5. Nature rewards cooperation.
6. Nature banks on diversity.
7. Nature demands local expertise.
8. Nature curbs excesses from within.
9. Nature taps the power of limits.

So, whenever we are challenged by a problem, let us look towards nature for an advice. Just find out an organism living in similar situations and what special changes nature has brought to its form and functions and you are sure to see a ray of light for your problem too.

We will carry on this story and talk of examples of Nature Inspired Innovations in different fields in the coming issues of Innovate India.

❑❑

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Digital Medical Pendant

An Innovative Device to Track Medical History of a Person

Many a times it has been seen that a person gets sudden health problem or an unfortunate accident and requires emergency treatment, but he/she is not able to communicate the problem and his medical history including the information about cronic desease or acute reaction to certain medicines, if any. In such a situation unknowingly applying medication to such persons may be fatal. Similarly in case of child immunization, there may a possibility of missing of an immunization shot which could jeopardize his/her life or body organs. Particularly, in a country like India having diverse socio-economic, educational and geographical variations, it becomes challenging to ensure that every child has taken every shot of vaccination. Efforts have been made in different parts of the world to find innovative solutions to the above cited problems through technological interventions.

Quoll Digital Medical Pendant

One such an innovative initiative is making of a device called 'Quoll Digital Medical Pendant' developed by Mr. John Actifed while working with Australian Pharmacies. According to him this digital medical pendant can deliver peace of mind for users through medical security. The Quoll Digital Medical Pendant is basically seen as multipurpose scanable device having an electronic chip inside it.

The innovative features of the Quoll Digital Medical Pendant are as follows:

- The necessary information about a person's medical history required by a medical professional can be uploaded in seconds, anytime anywhere. The information can be uploaded and updated as often as necessary.
- The information uploaded in it, can be highly useful when a person requires emergency treatment, but he/she is not able to communicate in serious conditions like coma due to diabetes or strings, intolerance to prescribed medicines, acute reaction to certain drugs, heart conditions, and epileptic events etc.
- It can identify the specific medical issues of a person and can offer him clear directions on who to contact and what to avoid in a particular situation.
- Simple scan of the code on the flipside can display the life saving information uploaded in the pendant.

KB Pendant

A similar innovative attempt to bridge the gap of immunization has been made by the Khushi Baby (KB) team having members from India and US. They have developed a digital pendant carrying a baby's medical history and imminisation details.

Some of the innovative features of the KB Pendant are given below:

- It is water proof, digital, rewritable pendant having an electronic chip.
- Whenever required, a health worker can scan it and can view the details of baby's immunization and health record by using a smart phone.
- It can be used even in rural areas without electricity and internet connectivity.
- In order to increase its cultural adaptability in the society, the pendant has a black thread in it. The KB necklace uses a culturally appropriate wearable near field communication device integrated with a digital tracking system.
- It tracks the isolated rural community and thus trying to bridge the gap in routine immunization through data management.

They have also developed a mobile app, which would show the health status and record of vaccination. Using this mobile app, a health worker can also update the current status of vaccination of the child, including the information about the missed vaccine, if any. As per an article published in the Times of India dated August 8, 2016, from April to August, 2016 more than 200 babies had been using the KB pendant systems in Rajasthan.

It is hoped that this type of innovative digital devices will have multipurpose applications useful for the people. We need to be sensitive to the local problems and find out such innovative and cost effective products and services.

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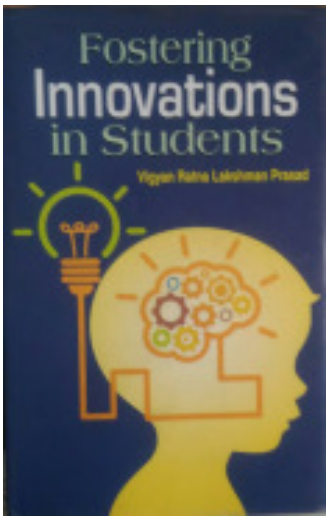
Book Review

Title: Fostering Innovations in Students.

Author: Vigyan Ratna Lakshman Prasad.
Publisher: Prabhat Prakashan, 4/19, Asaf ali Road, New Delhi-110002
Edition: first, 2016; No. of pages:112
Hard bound, Price Rs. 200.



The book under review is an introduction to the subject of innovation written in simple language in question-answer form. It is a result of interaction of the author with lakhs of students of different age groups, sex, social cultural million and educational levels. The author has tried to answer the various questions related to innovation frequently raised by the students during those interactions.

The book is divided into 18 lessons, each dealing with a new aspect of innovation covering from process of innovation to information about patients and commercialization.

The author is of the firm mind that:

- The seeds of innovation should be sown in young minds and our schools (even the primary schools) should serve as incubation Centre for innovations.
- An innovation does not necessarily require any background education or socio economic background or system it support, an urge to innovate is enough for innovation.
- An innovative idea itself is important and it should be conserved until it is developed into a sellable product.
- Once the prototype of commercially viable product is developed, the Government support for its Commercialization must be available.

The book is made more student friendly by dispersing quotes from famous, recent, Indian innovators and adding an exercise at the end of each chapter. However, points to ponder could have been much more thought provoking.

The book is written by a real-time innovator who has more than 20 patents in his name and using his earnings for philanthropic work so it has glimpses of his long experience. I am sure the books will be noticed and appreciated by the workers engaged in the field of innovation.

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"Innovation is an evolutionary process, so it's not necessary to be radical all the time."
– **Marc Jacobs**

Rational Outlook

Key for Innovation in Rural Development

❑ Dr. Manish Mohan Gore

Giving out of the box ideas is innovation. In our daily lives, we usually discuss general things and happenings. If anyone gives any idea which is unique, that will be called as innovation. Innovation can be defined as the application of new ideas to the products, processes or other aspects of the activities of an organisation or a country at large that leads to increased *value*. This value benefits the consumers of the organisation as well as citizens of any country.

India faces considerable challenges when it comes to strengthening its innovative capacity and the need to improve education in terms of access and quality for a larger share of the population. India's increasing demand for innovative products and services – resulting from a rapidly growing economy and purchasing power – as well as the demand for solutions to some of India's domestic challenges like pollution, health care and education, connectivity and communications, etc. provide significant opportunities for European companies but also demands to promote innovators of India for the sake of rural as well as urban development.

Need of Innovative Attitude for Rural Development

Around 70% population of India lives in villages. Most of the Indian villages are facing several day-to-day problems. These are related with their living conditions, agricultural practices, land usage, electricity, sanitation, hygiene and health, etc. Unless the development of Indian villages takes place, our country at large cannot be developed. Government, public-private partnership and non-government organisational efforts will prove meagre, if individual engagement is not done. For this to happen three things are required – first awareness about the problem, second willingness to solve it and third readiness for behavioural changes. Citizens both men and women can be made aware about the problem along with the logical solution. They may be convinced through learning by doing or logical thinking approach. This is the process of scientific temper in which villagers can be motivated to engage in rational decision making in their daily life. Villagers solve their day-to-day problems through traditional mind sets and if they are ready to switch over to rational thinking, this change is itself innovative.

We know, education is the power. Human is intelligent by birth. Intelligence is the gift of nature given to human being. In our scientific name (*Homo sapiens)*, sapiens is derived from 'sapient' which stands for intelligent. We have biologically provided logical mind. But logic can be applied both in good and evil deeds. Only the education shapes human mind as wise and beautiful. From savage life to civilised one, we have been reached gradually. This did not happen overnight. Education, exploration, invention and innovation have played pivotal roles in creating a developed and civilised society. In this process of making rural India Innovative, logical thinking and rational outlook plays a key role. .

Rational outlook

In fact, scientific attitude gives rational outlook to the society and this is innovative perspective itself. Long times ago, Gautam Buddha said, '*Do not believe what you have heard, do not believe in tradition because it is handed down many generations, do not believe in anything that has been spoken of many times, do not believe because the written statements come from some old sage, do not believe in authority or teacher or elders, but only after careful observation and analysis, when it agrees with reason and it will benefit one and all, then accept it and live by it.*'

This statement should not be misconstrued as a call for indifference or a flippant attitude. If we carefully observe and analyse the above statement of Buddha, we can find a scientific temper or rational thinking that Buddha has highlighted. Such temperament causes positive attitudinal changes among public. They then, give up following the things blindly. They start questioning, reasoning and reach to a rational conclusion.

Children possess inborn curiosity and there questions are unique. Age, family and society mould them in a modified youth, man or woman. Resultantly, that childhood

curiosity is supressed. Many a times, we take unjust decisions in our lives knowingly. We don't apply logic there. But, it is essential that we always nourish our childhood within ourselves and never get rid of questioning habit. Our time tested values and good practices are equipped with rationality. But unfortunately new generations do not bother those significant value systems. For example the habit of putting water, grains or bread on house roof for the birds, comes from our value system. These are invaluable and timeless values to conserve our nature. If we add more value to such value systems that will be innovative approach.

The utility of science, technology and innovation will be paramount in achieving aim of rural development as it is most important and effective tool for ensuring poverty alleviation, food security, life skilling, and educating masses. But only scientific and rational outlook can help us determine whether a technology is in harmony with nature or not. Else, it may adversely affect our natural resources, flora and fauna. Only on inculcating this rational and logical thinking, we will be able to achieve the goal of sustainable development. We must remember that survival of human beings is linked with the survival of living organisms and environment.

'To know' is the root of 'science'. Curiosity is the basis behind any discovery, invention and innovation. Western science and its workers attempt to open new windows while we usually watch the world from those already opened windows. We must remember that unless new window opening tendency is strengthened and inculcated, damn new exploration in science, technology and innovation will not be occurred.

Innovation can play crucial role in the upliftment of rural India and for this purpose; the culture of innovation needs to be absorbed among every strata of society. To fulfil this, there is a dire need of creation of awareness about need of innovation and its benefits in our lives.

Technological innovations ease our lives. These should be used in a sustainable manner and only to the extent they do not interfere with the nature and ecosystem. The key to a developed and prosperous village lies in the sensible and rational usage of technological innovations which are in harmony with nature.

In India, government is committed to ensuring adoption of innovations by the public so that public welfare can be achieved. Through ensuring inculcation of innovations in association with science and technology especially among rural and marginalised population, the goal of sustainable development can be fulfilled.

❑❑

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Innovative Ideas

A Torch with an Additional Bulb

❑ Md. Alisher

A young mind is the sharpest mind. It learns quick and acts quicker. The education system today focuses on books and rote-learning, but times are changing as these young geniuses, who chose to take a different path, have proved. They have picked machines over books and ideas over words. The IGNITE competition held by National Innovation Foundation – India is a platform that is giving these young minds a place to experiment and innovate, and come up with something extra ordinary. One of such interesting and impressive innovations by a student Md. Alisheer of class 12 of KSS College, Lakhisarai, Bihar is given here.

The idea is to have another bulb below the main bulb of the torch so that light is available near the feet of user and also for people following the user. Once Alisher was returning home with his grandmother at night. As he was using his torch to show his grandmother the way, he could not see a pit himself and fell into it. Idolising Abraham Lincoln, he likes writing stories and wishes to join CBI to rid the country of corruption.

Note: This idea has been reproduced from the NIF website in the interest of the budding innovators.

An Innovative Method of Saving Grains from Rats in Tribal Areas

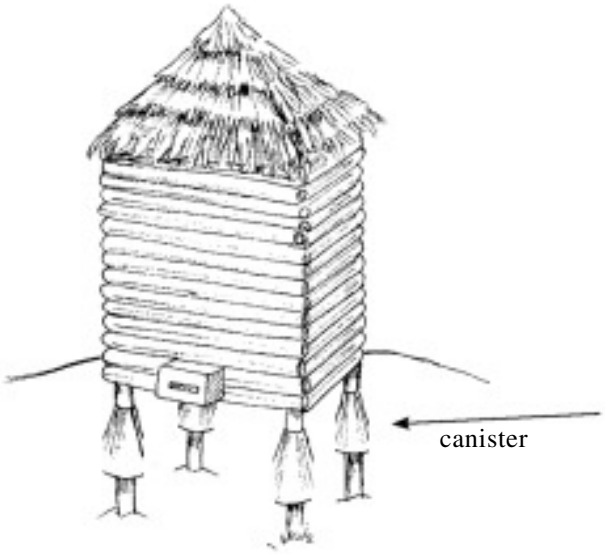
❑ **Prof. N.K. Ambasht**

We come across several unnoticed innovations in our daily life. I would like to cite here one interesting example of innovations in rural area. In fact it is a very interesting and innovative solution to a very serious problem of huge wastage of grains by the rates in the remote tribal villages of Chhattisgarh.

Usually the tribal people store their grains in containers made of mud kept in some shaded part of their houses. As these containers are made of mud, the rats usually make holes at the bottom and destroy a lot of grains. It was a very big problem to protect the grains from the rats.

The farmers thought of a solution and made a wooden platform a little higher from the ground level, thinking that the rats will not climb to the higher platform. But this idea was of not of much use. The rats could easily climb up to the bottom of the mud container through the sides of the platform and thus they continue to destroy the grains. Their financial position was also not so good to purchase metal containers of that size to store the gains, the problem continued. But they did not stop thinking for a better and effective way.

Now, a very new and innovative idea clicked in their mind. This time instead of making a platform on four sided walls, they made four pillars on four corners of the square shaped platform made of wooden logs. The mud container filled with grains was kept on this platform. The idea of making four pillars also could not prove to be the complete solution, as the rates could still climb up on the pillars and reach up the container. A step further, another idea came into their mind for minimizing the possibility of climbing of the rats up to the platform. This time they took four empty canisters normally used for storing and carrying oil



Innovative storage system

and ghee etc. The upper lids were removed. Before placing the wooden platform on the four pillars, one empty canister of cuboidal shape was kept on each pillar in inverted way keeping its bottom up. The side walls of the canisters were kept a little above the ground so that the rats could not climb on the canister's walls. Thereafter, the mud container having grains was kept on the so innovatively designed platform.

Now, when the rats tried to climb up the pillars they could do so easily up to the inverted bottom of the canister. But they were not able to climb up on the wooden platform. This innovative trick got very popular and thus helped the tribal people in saving their grains from the rats. There would be many other such grass root innovations in our traditions. Effort should be made to identify and record such innovations.

❑❑

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Mudra

An Innovative Device Helping Deaf-Mute People to 'talk'

IMAGE: Kind courtesy Amrita University

A number of innovations are being done all over the world. In our country also innovations are taking place to solve the societal, environmental and economic problems. Recently, we read a story about an innovative device -Mudra, developed by Mr. Apurva Venkat, a student of Amrita School of Engineering, Bengaluru. The highlights of this innovative device are shared here thinking that it may inspire our young innovators and researchers to be more sensitive towards social problems and the people around. Further, they may be inspired to develop such innovative products, processes and services for betterment of the society.

What lead this Innovation?

There is a large number of people across the world who can not listen and speak. For a common person it becomes difficult to communicate with such persons. Recognizing this problem, four students from Amrita School of Engineering in Bengaluru, Mr. Abhijith Bhaskaran, Mr. Anoop G Nair, Mr. Deepak Ram and Mr. Krishnan Ananthanarayanan thought of developing a smart glove that can recognise commonly used gestures in India and translate them into voice, so that a common person can understand what they want to say.

How 'Mudra' Works?

Mudra glove can be worn like any other riding glove. Once worn, the glove recognises hand gestures in all possible directions and angles, using flex resistors, accelerometer and gyroscope. The corresponding output is transmitted as speech through inbuilt speakers. The glove can currently recognise numbers from one to 10, and gestures frequently used by Indians corresponding to words such as goodbye and thank you.

According to Mr. Anoop Nair, they have used a combination of finger gestures and hand movement to help detect and understand an action. In fact, they have feeded about 70 words that correspond to various actions in the gloves. This can be extended further as well.

Initially, the team had planned to use a camera device but it proved to be bulky and expensive. Again adding an innovative dimension, they shifted to flex technology. Each flex sensor costs them around Rs 750. The team used 10 flex sensors, an accelerometer and a gyroscope, taking the total cost to Rs 7,500. The camera device version would have cost the team at least Rs 70,000. A prototype of the glove, built in 16 weeks, is being tested at the Amrita Robotics Research Lab.The students say that the most difficult part of the glove, also their final-year project, was the design part.

It is not the first time that this team developed automated glove for deaf and dumb. In fact, such similar gloves using flex technology had also been developed by a team of students Team QuadSquad in Ukraine. But they used 15 flex sensors and gave the option to transfer the voice (recording) via Bluetooth to a mobile device and also to a computer. But the cost of the glove, which is called EnableTalk, is estimated to be $150 (around Rs 10,000). Another team of two students from the University of Washington also created a similar glove and called it SignAloud. The cost of this device is not known. In addition to it, a collaborative group from New Zealand and Malaysia are also working on a sign-to-text program, which translates gestures from Malaysian sign language to multiple languages.

Innovative Features of 'Mudra'

But as compared to the earlier gloves, the gloves developed by the Indian team have several innovative features. The innovative features of the Mudra gloves are as follows:

- These are cost effectiveness, easy to use and works on Indian sign languages,
- The smart glove recognizes commonly used gestures in India and translates them into voice,
- While the glove helps speech-and hearing-impaired people, it is multi-purpose as well.
- Once worn, it recognizes hand gestures in all possible directions and angles using flex resistors, accelerometer and gyroscope,
- These gloves can be reprogrammed for a range of applications in which motion-sensor technology plays an important role, such as gaming stations, virtual reality, remote control of devices, and the robotics and medical industry, etc.

Challenges Faced While Developing 'Mudra'

According to the team, there were some challenges also while developing the smart gloves. Some of them are given below:

- The design of the gloves was crucial, as a stiff hold was required on the fingers. For this purpose, a range of values was calibrated precisely for each specific position of the finger and the rest was filtered out.
- Calibration of values for specific positions was a time consuming activity and had to be very accurate.
- The movement of the hand also posed another challenge. Although the inertial measurement unit offered values, these were not accurate, owing to noise. Filtering techniques were adopted for precision.
- Since differentiating between various orientations and movements of the hand with only one sensor was proving to be difficult, the students developed a novel method of state estimation.

Once the Mudra glove comes in market, it can be a very good means of communication between deaf and normal peoples. Though, the team from India says that these may be more cost-effective, but in the absence of a proper comparative research study on what the other teams have done, it may be difficult to confirm. Even than the innovation by the Indian team is appreciable.

❑❑

"Innovators are those who do not know that it cannot be done. Innovators are those who see what everyone else sees but think of what no one else thinks. Innovators refuse status quo, They convert inspirations into solutions and ideas into products."

—Bill Gates

"Exploration is the engine that drives innovation. Innovation drives economic growth. So let's all go exploring".

—Edith Widder

Square Watermelons

Japanese grocery stores had a problem. They are much smaller than shops in the USA and therefore don't have room to waste. Watermelons, big and round, wasted a lot of space. Most people would simply tell the grocery stores that watermelons grow round and there is nothing that can be done about it.

That is how majority of people would respond. But some Japanese farmers took a different approach. If the supermarkets wanted a square watermelon, they asked themselves, 'How can we provide one?' It wasn't long before they invented the square watermelon.

The solution to the problem of round watermelons was solved as the farmers did not assume it was impossible and simply asked how it could be done. They found out that if you put the watermelon in a square box when they are growing, the watermelon will take on the shape of the box and grow into a square fruit.

This made the grocery stores happy and had the added benefit that it was much easier and cost effective to ship the watermelons. Consumers also loved them because they took less space in their refrigerators which are much smaller than those in the USA meaning that the growers could charge a premium price for them.

What does this have to do with anything in life or at your job? There are a few lessons that you can take away from this story which help you.

Lessons from the Story

1. **Don't Assume:** The major problem was that most people had always seen round watermelons so they automatically assumed that square watermelons were impossible before even thinking about the question. Things that you have been doing a certain way your entire life have taken on the aura of the round watermelon and you likely don't even take the time to consider if there is another way to do it. Breaking yourself from assuming this way can greatly improve your overall life as you are constantly looking for new and better ways to do things. This was one of the most difficult things

for me to do because most of the assumptions I make, I don't even realize that I'm making them. They seem perfectly logical on the surface, so I have to constantly make an effort to question them.

2. **Question Habits:** The best way to tackle these assumptions is to question your habits. If you can make an effort to question the way you do things on a consistent basis, you will find that you can continually improve the way that you work. Forming habits when they have been well thought out is usually a positive thing, but most of us have adopted our habits from various people and places without even thinking about them. I have changed a large number of habits that I have had after taking the time to question them and continue to do so. Some of them I have know idea where they came from while others I can trace to certain people or instances in my life. It's a never ending process, but by doing this, you can consistently strive toward making all aspects of your life more enjoyable instead of defaulting to what you have now.

3. **Be Creative:** When faced with a problem, be creative in looking for a solution. This often requires thinking outside the box. Most people who viewed this question likely thought they were being asked how they could genetically alter watermelons to grow square which would be a much more difficult process to accomplish. By looking at the question from an alternative perspective, however, the solution was quite simple. Being creative and looking at things in different ways in all portions of your live will help you find solutions to many problems where others can't see them. I am not a creative person, but I've found that the more that you look at things from different perspectives, the more creative I have become. It's a learned art and builds upon itself.

4. **Look for a Better Way:** The square watermelon question was simply seeking a better and more convenient way to do something. The stores had flagged a problem they were having and asked if a solution was possible. It's impossible to find a better way if you are never asking the question in the first place. I try to ask if there is a better way of doing the things that I do and I constantly write down the things I wish I could do (but currently can't) since these are usually hints about steps I need to change. Get into the habit of asking yourself, 'Is there a better way I could be doing this?' and you will find there often is.

5. **Impossibilities Often Aren't:** If you begin with the notion that something is impossible, then it obviously will be for you. If, on the other hand, you decide to see if something is possible or not, you will find out through trial and error. Take away the lessons from the square watermelons and apply them to all areas in your life (work, finances, relationships, etc) and you will find that by consistently applying them, you will constantly be improving all aspects of your life.

I am sure we can bring about change if we really want to. If we practice the above mentioned lessons, we will be more creative and innovative.

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Note: ***This story has been reproduced from the website https://sites.google.com with due acknowledgment in the interest of developing positive thinking and creating the culture of innovation in the society.***

"Innovation is life. When there is no innovation, there is stagnation"

—Narendra Modi, Prime Minister of India

"Vulnerability is the birthplace of innovation, creativity and change."

– **Brené Brown**

Setting Up of Innovation Clubs

❑ **Dr. Oum Prakash Sharma**

In order to be at the frontier of scientific discovery and invention, the students as well as the teachess in the school technical institutes and universities should be encouraged to think anti-conventional and develop ability to look beyond their discipline. In fact, colleges and universities can play a key role in providing a fertile ground for cultivation of world-changing, innovative and entrepreneurial ideas. For this purpose, there is a need for creating a culture of creativity, innovation and entrepreneurship in the schools, Colleges, technical and engineering institutes across the country.

This kind of organizational culture will not only stimulate the creativity and innovation among the students and teachers, but it will accelerate the transition of research and innovation from the lab to the field and market place. It will also encourage closure interaction and cooperation between industry, field and academia for overall growth and development of the nation.

Power of India

It is rightly said that *"everything begins with an idea."* Henry Ford says that *"the air is full of ideas. They are knocking you in the head all the time. You only have to know what you want, then forget it, and go about your business. Suddenly, the idea will come through. It was there all the time."* Ideas are continuously generated in our minds. Initially most of the ideas seem to be foolish and absurd. In fact according to Albert Einstein, *"If at first the idea is not absurd, then there is no hope for it."* For promoting the culture of innovation, the college and universities should provide a conducive environment for exchanging the ideas, among the students and faculty. Roosevelt says that *"great minds discuss ideas, average minds discuss events and small mind discuss people."* Discussing ideas itself indicates the greatness of the minds i.e. the students and faculty. Thus, the students coming up with any kind of new and innovative idea or innovation should be encouraged and be discussed regularly on a platform.

Need of Innovation Clubs

Now, in view of the present initiatives of Government of India like Make in India, Startup India, Digital India etc, the role of education sector becomes more important to harness the creative potential of the large young population of the country. Moreover, the inclusion of large number of manufacturing industry and IT industry have generated a huge demand for quality and skilled manpower in the country. As a matter of fact, in the present age of competitions and technologically fast growing society, our youth particularly the students needs to be futuristic and innovative. For that purpose besides technological empowerment of the students, they need to be encouraged to be entrepreneurs and innovators. Through this coloumn effort will be made to describe ways and means to foster the culture of innovation in schools and colleges. Setting up of innovation clubs in schools and colleges could be the best platform to discuss ideas and thus promote the culture of innovation in schools and colleges.

Setting Up Innovation Club

Hon'ble President of India as well as the Hon'ble Human Resource Development Minister have also asked all the central Universities and institutes to constitute Innovation Clubs. The Ministry of HRD under its scheme Avishkar has also directed the schools to set up innovation clubs. Similarly the NITI Ayog has also launched a scheme to set up Atal Tinkering Labs in the selected schools. In view of this the technical colleges and universities have formulated Innovation Clubs. In fact, such types of innovation clubs should be formed in all the schools, colleges, universities and institutes. Formation of Innovation Clubs will not only help in creating a culture of innovation, but it will also create a conducive environment for the teachers and students to do innovations.

Who can be the Member of Innovation Club?

To begning with Innovation clubs may comprise of imaginative students, teachers and other interested staff members of the school. Later on other students and teachers may also be involved in the activities of Innovation Clubs.

What Can be the Objectives of the Club?

Besides generating awareness about creativity and innovations among the students and teachers the basic objectives of the Innovation Clubs could be as follows:

- to identify and promote the grass-root level innovations by the faculty as well as the students; to provide a platform to share new and innovative ideas,
- to support and nurture the innovators both intellectually and financially, and
- to create a network of innovators and thus creating a culture of innovation in the schools, colleges and university.

What Can be the Activities of the Club?

In order to meet the objectives of the Innovation Club, a verity of activities can be organized on regular basis. The innovation club may organize periodic meetings of the club members to generate new ideas and identify innovations by students, faculty, and other staff of the school, college, university. In addition to it, other students, teachers and staff members may be invited to share their innovative ideas and skills and showcase their innovative products and processes in the form of semirars and conferasces. The club may also organize awareness campaign and various types of competitions like quiz, debates, posters, etc on creativity and innovations within schools/college/university. In fact, it can prove to be a very good platform to the students, faculty and staff to be engaged in the innovative activities and programmes related to institutes.

In order to publicize the news and views on innovations taking place within the schools and colleges as well as outside them, it may be a good idea to publish such information in the form a magazine or newsletter on innovation on a periodic basis, say monthly or quarterly. Such periodicals may be brought out in the printed form or even in the electronic form. In will not only encourage students to document their innovations and innovative ideas, but it will be a good means of disseminating their ideas.

The innovation clubs can act as effective mean of sharing ideas, mutual learning, networking, mentorship and creativity. The culture of sharing ideas will certainly cultivate the culture of innovation in the schools and colleges.

In this context, George Bernard Shaw has rightly said that *"If you have an apple and I have an apple and we exchange these apples, then you and I will still each have one apple. But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas."*

So, let us create a platform in the form of Innovation Club in all schools, colleges and institutes to integrate innovation in our education system.

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"When all think alike, then no one is thinking?

—Walter Lippmen

The Start-ups

Innovative Solution to Reduce the Gap Between Jobs and Job Seekers

❑ Shubhanshu Sharma

Doing Btech from a good engineering college then going for a higher degree in technical or management field and finally finding a job. This used to be a process of securing the future and was a common thinking of a student and his/her parents. At the same time, the number of eligible candidates started increasing and the job vacancies started shrinking. This resulted in the job scarcity.

Increasing number of graduates and stagnation in job opportunities has resulted into a big problem of unemployment. Now what to do for this problem? This was the time of finding some innovative solution to reduce the increasing gap between jobs and job seekers in India. Time to time many people thought of it. Some of such people who really wanted to secure their future but not by the conventional job taking process. Instead of seeking job in traditional way, they started thinking in a new and innovative manner by starting up their own ventures. This innovative thinking paved the way for the concept of 'Start-ups. Fortunately our Prime Minister Shri Narendra Modi has also given this idea a great boost by making it an ambitious scheme of the government of India.

What is Startup?

Before going further let us first understand what start up is exactly. A startup is basically a company new in market whose foundation stones are just laid down. Employees are very less in number and initial funding by some investors is required in order to run the company. Companies use innovative approach either in their products or in the way of giving their services to buyer. In fact, the initiators of such companies want to become their own boss. They dont want to work under someone else. From the past few years there has been a flurry of startups in India. Many persons with new and innovative ideas are coming forward and opening their own companies. Inspite of the huge risk factor involved in it, the number of startups are increasing. Startups like Flipkart, Olacabs, Myntraa, Zomato, hike, freshdesk, Zabong India, etc. are perfect proof of the fact that there has been a revolution in the thinking process of India. For example, the startups like flipkart and myntra has completely change the traditional way of shopping. Now we can order anything on just a click. Olacabs service are changing the whole picture of public transportation of India. People are thinking differently .Concept of startup is now solving the problem of increasing unemployment.

Innovative Features of Start-ups

Though the concept of startup itself is an innovation, but the start-up' as such has certain innovative features as highlighted below:

1. it promotes entrepreneurship and employment,
2. it helps in changing the mindset of people from job seekers to job provider,
3. it gives opportunities to work in partnership with like-minded innovators,
4. it gives unique platform for innovation and development, and
5. it has potential to reduce the gap between the jobs and job seekers.

Staring a 'Start-up'

In order to help these budding entrepreneurs, many big industrialist, business man are funding their money in these startups. Which in entrepreneurs language are called as Angel Investors. Even our government is also putting efforts towards this innovative change. It has started a STARTUP INDIA project. With the help of this scheme, government is providing a friendly environment to new generation to start something new and innovative. Government has made a provision of Rs. 10,000 crore funds to support startups in India. Besides it, tax exemption for starting three years,80% reduction in patent registration fee, launching app to create a platform for interaction and many more things are some of the attractions and support provision for setting up of Start-ups. Hopefully, this project will give a boost to many of the new startups. Government of India projects like SKILL INDIA and MAKE IN INDIA are also helping these entrepreneurs to come up with a new idea of their startups.

If we explore the pages of history, then we will find that in 1960 for the first time the entrepreneurial movement began in India by the setting up of NISIET(National Institute of Small Industry Extension Training). The innovation came in the mind of people is really changing the complete scenario of professional world. During Mahabharat Krishna said *that 'generations will change, new rituals will come, the time will not remain same forever, it will be changing continuously and so the ideas and thinking of humans*'. Here is the starting of innovative India in professional field. Many revolutionary ideas are coming up to change your lives. This is the power of innovation.

STAY CALM AND START A STARTUP!

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"Dreamers are mocked as impractical. The truth is they are the most practical, as their innovations lead to progress and a better way of life for all of us."

– **Robin S. Sharma**

EvoTag–An Innovative Device for Child Tracking

❑ Shilpa Mahna Bhatnagar

India, as a nation, is struggling to provide a secure environment to its citizens. The security issues are spread across gender, age or social strata. Each segment of the society is working rigorously on finding solutions to these issues, in addition to training and sensitization. While on one side, the security of small children at their tender age worry almost all parents and guardians in the country, there is also a need to secure old parents, especially for those who have to travel away from them in search of better livelihood.

Statistics only aggravate the fear. In 2007, the statistics on child sexual abuse in India were staggering, at more than 53% (http://www.childlineindia.org.in/pdf/MWCD-Child-Abuse-Report.pdf). Every one child in two had faced abuse. And sexual abuse is just one of the types of crime against children, others being trafficking, kidnapping and involvement in juvenile crime.

As parents of young children or children of old parents, the constant dilemma is to safeguard the family members when they are not near or move out of the area of influence. Distances create insecurity and also make the victims more vulnerable. Prevention based on accurate alerts and immediate actions are the key to dealing with these issues.

Why Technology now?

So why use technology now? And which technology one should use to solve these issues? Well, the answer lies in the ongoing mobile device revolution in India. India is now the second largest user base of Smartphones, crossing US at 220 million users as per statistics by Counterpoint Research in 2016. The government and telecom companies are aiming to bring a digital revolution at doorstep of every Indian at low cost. So, a solution that can be bundled in Smart phones is preferable. In addition, the advent of IOT technologies, like Bluetooth low energy, allow devices to be worn, with radiation levels a thousand times lower than cell phones. The technology is being used as baby monitors for infants due to its safety levels. Combine this with broadband connectivity and penetration; desired information can be transmitted securely to any place in the world in almost real time.

The Evoxyz Made -in-INDIA innovation –Evolution 1.0 with EVOTAGs

Incepted in year 2014, Evoxyz Technologies, a micro location enabled IOT platform organization started building a solution that could address the security needs as applicable to all people with varied vulnerabilities. The solution platform is made generic, be it for children in school, elderly at home or for women at work.

In 2015, Evoxyz started deploying security solutions using Evotags, its Bluetooth Low Energy devices on Evolution

Figure 1: Evotags worn by kids – Provide live safety location tracking to parents

1.0 platform, and now has them running successfully in multiple locations.

Figure 1 shows the different Evotags and associated Mobile Apps that are deployed for different schools in NCR region, as part of a product suite called Evoschool. Students wear the tags, as either normal printed I-Card or more fancy wearable options. Using the Bluetooth low energy trackers in school and buses, the parents are able to receive and see live location of the child at all times on their smart phones, inside the school or on the way between home and school. In addition to this, a patented complex algorithm runs a rule based system and alerts the school administrators in case of any suspect of a security incident. So, if a child's location is found anomalously different from that of her classmates or at a location forbidden for students, the alert to administration prevents a security incident. If the child disembarks from the school bus at a location different from designated bus stop, an alert is sent to administration and parents. Parents view live location of school transport too on their Smartphones. Since all data and processing is done in a secure cloud over the Internet, there is no need to maintain computer servers in school for this capability. In addition, Evoxyz is able to manage the solution remotely.

The same Evotag was subsequently enhanced for personal use as well.

Figure 2 shows how the same Evotag could be used for different purposes. So, if you are worried about losing your child when playing in the park or when visiting a mall, just use Evotag as a badge on your child and switch it on using your smartphone. The smartphone will alert you if the child moves away by a certain distance from you. Due to its motion sensing capabilities, the same Evotag when attached to the door can be activated as a watchman in the night. If there is a slightest movement of the door in the night, the Evotag will ring your phone.

Evolution 1.0 platform was developed with focus on micro location tracking, but with its ability to track the indoor and outdoor location of humans or devices precisely, is now being used for multiple purposes.

The Innovation Journey

As a part of the platform development various technologies were evaluated and integrated within the platform to meet wide variety of needs and audience. The initial focus was to provide solution to security issues, especially for children.

Evoxyz realized that the first step towards incident prevention is identification and communication of circumstances that could cause a security incident. Location is a key parameter of identifying any scenario. Thus precise identification and communication of location became a key decision maker in usage of the technology.

It is important that we communicate a precise micro location to the relevant stakeholders to take actions well in time. GPS has been established in the location technology field for quite some time with a phenomenal set of applications developed by organizations like Google. The key limitation of GPS is that it works well outside any premises, but it is unable to provide accuracy in indoor locations. To cover security issues, a technology that could map precise location to the level of few meters in indoor premises was needed. Thus, technologies like RFID, UHF, Wi-Fi and Bluetooth Low Energy that could detect user proximity were considered. For accuracy, software algorithms were considered which could help in identification of precise location.

Figure 2: Evotag useful for many uses through smartphone

Did it mean that GPS could not be used at all? The answer was negative. Each technology has benefits and limitations. Doing away with one technology and only focusing on others was not the right approach. GPS is a matured technology and works with extreme reliability in the outdoor locations. Hence a hybrid approach of GPS plus Indoor technologies is the answer to detecting the accurate and precise location of a user.

Subsequently, Evoxyz decided to map and use technologies based on use cases and the segment of users and areas where are to be deployed. All technologies are integrated in its IoT platform, called Evolution 1.0, so that it can service all use cases.

- Passive RF ID is a mature technology that is able to detect the identity of the person by means of an ID card and a RF reader. RF reader is a device that detects the user ID card uniquely and has the capability to send the information to any computing server for further analysis and actions. It can connect to the Internet through different mechanisms, for example, Radio Access Network, Wi-Fi or Ethernet. When a precise location of the RF reader is configured, the location of the person with the RF ID card can be associated as well. The technology is stable and cost effective. However, the problem is that it provides only point-in-time location, since it provides location information only when user swipes the card on the reader. Another problem for this technology is that it depends on manual intervention of swiping, and so in case the user is still in the proximity but has not swiped the ID the location will not be detected. This is particularly a concern area for small children, who are not expected to swipe at all instances.
- Technologies like Ultra High Frequency and Active RF ID reduce the issue of manual intervention like swiping of the ID as they have the auto detect capabilities. However, the distance range of detection of the user is still small, and hence many readers are needed to cover an indoor complex. In addition, an active RF ID consumes considerable power.
- Bluetooth Low Energy (BLE) provided solutions to most of the issues. It is a very low emitting, continuous broadcast location that keeps broadcasting information and are detected at higher distances. Due to low energy in transmission, the battery life runs from months to years. The readers detect RSSI value to provide an approximate distance. However, accuracy based on RSSI is limited due to BLE signals being susceptible to reduction of signal power due to any material between the tag and the reader. Evoxyz overcame this issue by developing complex software algorithms and estimate accurate distance based on readings from multiple readers in the same indoor complex.

Technology Innovations are not limited to an industry

As summarized above, a beneficial characteristic of BLE as a technology is that it is extremely low energy radiating and hence bears negligible health hazards. This enables the technology to be used for all, right from newborn babies to elderly people, and from small devices to large machines. From the technology standpoint, these IOT devices are future proof as they can easily be clubbed with sensors that detect body temperature, motion, and even heart rate in addition to transmitting its identity. This makes them ready for more use case like heath devices, intrusion detection, asset management and cold storages.

While lot of organizations and researchers are working on the BLE based IDs and have fair share of success, Evoxyz invested in complex algorithms in BLE Readers through which the accuracy of location inside a premise is achieved.

Today, Evoxyz is the one of the top organizations in the world transmitting accurate real location of children to their parents. The Evoschool App shows the child's footsteps moving around in the school from one location to another, inspired by Harry Potter's Marauder's Map. The Youtube video of Evoxyz's Evoschool solution deployed in a Gurgaon school, comparing it with Marauder's Map, has generated interest not only in India but also in many other countries.

Evoxyz is now building a complete platform around this technology that is a combination of hardware, software and intelligent algorithms. It collates IOT data with location information and presents it to solution providers like logistics supply chain managers, and Health care providers to take intelligent decisions.

A technology initiative that started with Child Security in schools is now taking giant leap to provide the same benefits to other industries as well.

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Innovations in Rio-Olympics

❑ Himanshu Sharma

Olympics is the biggest platform this world can offer to the best talent in the field of sports from the far-flung nations and the remotest locations on globe. Entire human race comes together every four years to celebrate the determined grit and witness the heights of perseverance a human is capable of. Like any other sector, a variety of innovations are taking place in the field of sports also. Particularly, the Opympics have witnessed such innovations in almost all areas including training, time keeping, judgement etc. Despite tremendous efforts athletes put in their training, they may fumble in their actual performances or their results may not be as expected. The reasons can vary from bad judgement to other external disturbances. Innovations play an important role in minimising such unwanted factors and let the athlete completely focus on his/her performance. Innovations can actually save an athlete's years of hard work from turning futile. For example,In the racing events, before photo finish was introduced in 1964 Tokyo Olympics, a placing judge who stood at the finish line had the final say in which participant has won. This method of determining winner was greatly erroneous and in events like 100m dash, where the competition now is for 1/100th of a second, appointing a human to determine the winner would have solved no purpose. Similarly, time keeping in athletic events is as important as determining the final winner. Even the looser of a 100m sprint event at Olympics is conscious of his performance and wants to keep track of his progress. Such small innovations proved pivotal in shaping the modern form of Olympics. Olympics have come a long way from using photo finish and time keeping for first time in Tokyo Olympics (1964) to virtual reality live streaming in Rio Olympics held on 2016. Recently concluded summer Olympics at Rio de Janeiro saw several such amazing futuristic technological innovations in sports, human body mechanics, broadcasting, judging and many other fields.

Need of Innovations in Sports

Apart from athletics, field events like soccer and hockey also calls for advance equipment for judging so that true spirit of sports is not compromised by foul play. Now, every inch of gameplay in under surveillance by drones, ultra high definition cameras and billions of spectators viewing the sport progress on their super high-vision television sets. When a game receives such a response, the management and refereeing federations are under tremendous pressure of conducting the match with minimum possible glitches, keeping record of each event and broadcast it gracefully across the globe. Not only remote spectators are important but audience sitting in the stadiums are of immense value. Every sports federation and local authorities are particularly concerned about their security and comfort. It is practically impossible to comfort every spectator present in the crowd, so innovations like surveillance balloons, x-ray scanners and radars come to the rescue of management.

How Innovations shaped the Rio-Olympics?

Let's have a look at how modern innovations shaped the summer Olympics at Rio de Janeiro.

1. More Robust Training :

The stellar performances at Rio Olympics were undoubtedly the result of years of hard work put in by the athletes, but with increasing technological advancements, sports preparations are no more limited to blind sweating and hours of beating on the craft. Athletes are now going for a more robust approach. Their training includes a wide variety of gadgets which assist the athletes and help them keeping track of their progress. These gadgets are in no way similar to the normal steps or calorie counters.

Punch Tracking sensors

High-tech gizmos like punch tracking sensors by a Y Combinator startup Hykso for measuring the force and impact of a punch was used by Canadian boxing team while training.

2. Specially Designed Equipments:

The level of competition offered by USA cycling team can be gauged by analysing the methods and tools they used for training. A specially designed track bike was used along with a special set of goggles called "Solo". The cycle and goggles were then combined via a cloud based application provided by IBM. Every bit of data like heart rate of athlete, cycle speed and power meter are integrated by the app and then after it is displayed in front of the eyes of the athlete by "Solo" goggles.

Solo Goggles

3. Precise and Effective Judgment :

Faulty judgement in an event as gigantic as Olympics can break hopes of a billion people and many countries in a snap. Degree of human involvement in judgement of an event depends on the extent of technicalities involved in the sport. A field event like soccer may not involve human collisions to the extent seen in events like boxing, wrestling, judo or any combat sport. For effective judging many innovations has come up. In London Olympics (2012), taekwondo athletes wore a specially designed vest with embedded sensors which could accurately tell whether the kick was taken on body or not. In Rio Olympics for the first time, fighters sported a head gear with sensors to keep track of the hits taken on head.

4. Underwater Lap Counters :

Omega was the official time keeper for third time in an Olympics. Omega came up with a brilliant innovation for long distance swimmers in form of underwater lap counters. It is not unknown for those who follow the sport that many distant simmers sometimes fail to keep track of the number of laps they've covered. While swimmers are racing back and forth in the pool, counters with large displays

Under Water Lap Counter

were placed beneath the surface. Every time a swimmer flipped off the wall, a sensor detected the direction change and accordingly updated the lap count on the screen, which the swimmer could easily see. Providing the counters didn't affect the judging or individual performances, but the swimmers could now solely focus on their performance.

5. Hand Worn Bracelete to Pay for Things:

Rio Olympics saw innovations not only in sports, but in other spheres of activity also. Visa collaborated with Brazillian bank Bradesko and came up with a

Hard Warn Bracelete

unique hand worn bracelet which allowed the spectators and other sports people to pay for things by hovering their hand over a sensor. Near-field communication powers this innovation. Similar type of system is used by Apple pay and Google Pay.

6. Use of Virtual Reality for Spectators :

One of the most iconic innovation showcased in Rio Olympics was the use of virtual reality for the spectators. Virtual reality is the tech of near future and it is being experienced at every platform, Olympics is no exception. Olympics Broadcasting Services (OBS), Getty Images and BBC and other parties in their respective capacities are trying to capitalize the market for virtual reality. OBS captured VR footage of sports like volleyball and athletics along with opening and closing ceremony was made available to international broadcasters. NBC made more than 100 hours of 360 degree VR footage available to Samsung Galaxy VR users.

Innovations and new technologies are paving a way for us into a new world. A world where machine to machine interactions are more so as to provide best comfort for their masters. A world where the habitable conditions of the only planet we have are not compromised. A world which brings every person closer than ever. Innovations are here to stay, not only as technological innovations, but any cliché which solves the dilemma of sustainable development.

Virtual Reality Spectaors

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"The tool that's most associated with the recent progress against malaria is the long-lasting bed net. Bed nets are a fantastic innovation. We can invent new ways to control the mosquitoes that carry the malaria parasite."

—Bill Gates

Students Must Rebel, Challenge Status Quo — Says HRD Minister

"children cannot innovate unless they are encouraged to be inquisitive"–HRD Minister

"India lacks in innovation in education as children are discouraged to ask questions in schools-something which should not be allowed to go on",-said Human Resource Development Minster Prakash Javadekar Thursday. He said: "Unless you rebel, unless you challenge the status quo, how can you innovate anything?"

The minister further said: "Innovation is a process of rebellion essentially. Unless you rebel, unless you challenge the status quo, how can you innovate anything," he asked, emphasizing the Modi government's focus on innovation in education. "Why do we lack innovation in India? Because, we don't allow questioning. We don't promote inquisitiveness. If a child asks questions in school, he is asked to sit down. This should not go on. We need to promote inquisitiveness, children should ask questions," the newly-appointed HRD minister said.

Javadekar said, "if children are encouraged to be inquisitive, innovation would follow as the status quo would be challenged and there would be transformation". He said, "PM Narendra Modi's mantra is sustainable development which does not adversely impact nature but ensures progress of all, for which innovation is the key". He said, "the development in the IT sector has brought a revolution in the media industry. Transformation is the result of new ideas.

Why do we lack innovation in India? Because, we don't allow questioning... If a child asks questions in school, he is asked to sit down.This should not go on.We need to promote inquisitiveness, children should ask questions.— HRD Minister

Hindustan Times, Friday, July 08, 2016

Infosys will focus on more innovation hubs in US:—Nandan Nilekani

He says India, US exchange share great deal of innovation models Infosys plans to set up multiple innovation hubs in the US — the largest export market for Indian information technology (IT) services firms — with its first centre in Indiana, where it will be hiring over 2,000 local engineers. The Bengaluru-based IT major will replicate its Indian model of hiring thousands of freshers from campuses and then training and deploying them on projects for customers, in the US.

"Increasingly, we are looking at how to create more innovation hubs in the US. We will be hiring 2,000 people

in Indiana to create local innovations. What we are realising is, over the decades we have built deep capabilities in creating learning infrastructure and capacity building, and that investment is very valuable," said Nandan Nilekani, chairman, Infosys, on Tuesday.

"(We are) hiring people locally and will see how using our learning infrastructure we can do capacity building for the future," he added.

Indian IT firms, which traditionally sent engineers to work on projects in the US, have been increasingly facing a political backlash, putting pressure on them to hire local employees. At the same time, a shift in how clients spend technology budgets towards digital projects, where engineers need to work with customers instead of remotely delivering software, is also pushing them to hire more local engineers.

Nilekani, who returned at the helm of India's second-largest IT services company in August, said the company would look to create more innovation hubs beginning with Indiana and use its deep capabilities in training to educate local people in new technologies. He said opportunities were there to exchange innovation models with the US companies, using India's digital initiatives.

The Infosys chairman said rapid changes in use of technology across businesses would require a new set of skills and Indiana was one of many such innovation hubs planned to supplement that. US Consul General to India, Robert Burgess, said the bilateral trade last year expanded to nearly $115 billion, an all-time high, while the two-way investment reached $40 billion. "We are seeing cooperation expand in new areas," Burgess said. India and US may have a great potential through sector-focused trade agreement. Paula Stern, chairwoman, The Stern Group Inc, said the two nations could benefit significantly through a sectoral agreement for cooperation on IT, e-commerce and cyber security. "I think it could jump-start a much broader geo-strategic relationship."

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Innovation real way to achieve country's prosperity:—HRD Minister

"Innovation is the real way of achieving the nation's prosperity and we can achieve it by allowing creativity and allowing young minds to experiment and letting their crazy ideas come out," Union HRD Minister Prakash Javadekar said. He was addressing students at KPIT Sparkle 2017 event.

"***We want to change this all and that is why we are bringing innovation as prime theme education, especially in higher education, and that is the policy of the Narendra Modi government***," Javadekar said.

The 3rd edition of the design and development innovation contest, in collaboration with the College of Engineering, Pune (COEP), received 1,500 ideas on the theme of Smart Cities from over 10,500 engineering and science students across India. Felicitating the winners of the contest, the BJP leader said though there are several organisations in the country they have become bureaucratic.

"*Bureaucratic approach can not lead to research and so research culture, research freedom and research methodology need to be developed*," he said. In order to bring the best of the best talent back to India, government has come up with Global Research Innovation Network, the minister added.

The contest received 1,500 ideas from over 10,500 engineering and science students across 300 colleges in India. The grand finale saw 35 top teams present prototypes of their solutions on Smart Cities. Team AlphaGears from the Mangalore Institute of Technology and Engineering won the Platinum prize of Rs 10 lakhs for their project on frictionless gear transmission system for vehicles using poly-magnets. Team Robo-X-Prime from R C Patel Institute of Technology, Shirpur, Maharashtra, won the Gold prize for developing an inspection robot for power transmission lines. The Silver

prizes were won by Team Robo-Climb from College of Engineering, Pune (COEP) for their autonomous vehicle solution called Wall Climbing Robot, which can be used for transportation of goods as well as humans over the distance and Team Traffic Eye from BITS, Pilani for their project Traffic Eye to check traffic violations.

The most popular project award went to Team Humanoids from Kalinga Institute Of Industrial Technology, Bhubaneswar, for their project on the device to control emission of exhaust gas using plasma technology, which results in less electric power consumption with no harmful gases discharged in air. Padmashree Dr. Kiran Karnik, Former President, NASSCOM, Ravi Pandit, Co-founder, Chairman & Group CEO, KPIT, Dr Raghunath Mashelkar Chairman of the Innovation Committee, KPIT were present.

Ref. PTI Feb 19, 2017

Happiness Junction

An innvative Initiative by Indian Railway

Recently the Indian Railway has an innovative initiative to create a happiness function for passengers at the Sonepur railway station in Saram District in Bihar. The idea is to facilitate the passengers to effectively utilize the time available with them while waiting for the trains. For that purpose, the railway has provisioned to provide certain facilities the television, recreational centre, kids zone, a book cafe, newspaper stall and several other facilities that passengers can avail during their waiting time. Another innovative feature of the happiness function is to introducing a charity section, where people can leave and donate the useless or excess items like clothes, books, shoes and bags, etc. that might be useful for the needy and poor peoples. From this junction the needy people can take away the item of their need and choice. In this way everyone could get a share of happiness in life by way of charity as it will bring colours in the life of the needy persons. According to the Divisional Railway Manager Mr. Manoj Kumar Agarwal this kind of innovative initiative in social sector is certainly a welcome step and may be replicated at other places. ❑❑

Imagination is not only the uniquely human capacity to envision that which is not, and therefore the fount of all invention and innovation. In its arguably most transformative and revelatory capacity, it is the power to that enables us to empathize with humans whose experiences we have never shared.

–J. K. Rowling

Innovate India

Guidelines for Submission of articles

Innovate India is a quarterly (January, April, July and October) bilingual (Hindi and English) magazine aimed at promoting the culture of innovation in the society. As per our knowledge, there is no such magazine in India which focuses exclusively on innovation and related aspects. This unique magazine is itself be an innovation.

Objectives of Innovate India

The basic objectives of the magazine are as follows:

a. Clarify the concept and meaning of innovation, creativity and invention etc. with suitable examples;
b. Create awareness about innovations around us;
c. Develop and nurture the innovative attitude among the people, particularly the young generation;
d. Inculcate a culture of innovation in the society particularly among the youths;
e. Collect, compile and disseminate the innovative ideas, products, process, etc. taking place in different fields all over the world;
f. Share innovative models, case studies and research experiences in the field of innovation and development; and
g. Facilitate coordination and networking among individual innovators and institutes across the world.

Suggested Areas for Contributing Articles

Articles are invited from the innovators, educationists and scientists for publication in the magazine Innovate India. The suggested areas for writing articles are as follows:

1. Conceptual articles on fundamentals of innovation and related aspects explaining theoretical aspects of ideation, innovation, creativity, etc. including issues and concerns of innovation;
2. Case studies on product, process and service innovation in the field of agriculture and rural development, industry, education, technology, politics, society, business and management, etc.
3. Articles on examples of grassroots Innovations around us including Indigenous innovations and Jugad;
4. Biographical profiles of innovators- Our Path Finders highlighting their innovations and other contribution; Articles on entrepreneurial innovations, startups, indigenous & grass root innovations like Jugad;
5. Write ups on innovative ideas and solutions to our daily life problems including out of the box solutions and practices; and
6. Any other related topic or area including news on innovations, reviews of book on innovation and reviews of research studies & papers on innovations, reports of the seminars & conferences on innovation, etc.

Submission Guidelines

1. All articles should be written keeping in mind the objectives of the magazine and the suggested areas for article writing.
2. Article should contain maximum 2500 words either in English or Hindi.
3. All articles should be submitted as Microsoft Word Document (.doc file) for English in Times New Roman 12 point font and for Hindi in Mangal or Krutidev font.
4. Images, if any used in the article should be in jpg format with proper captions.
5. Authors are requested to kindly give your brief profile also in about 100 words including email, mobile number and a coloured photograph.
6. The language of the articles should be simple and interesting
7. Article should carry a self declaration that 'the article is original and has not been published elsewhere'. Innovate India will not be responsible for any copyright violation. Plagiarism is not acceptable.
8. As the magazine is being published voluntarily in the interest of general public, there is no provision for any honorarium for contributing articles in the magazine.
9. Articles should be submitted by email at innovateindia@gmail.com

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"Once you have an innovation culture, even those who are not scientists or engineers - poets, actors, journalists - they, as communities, embrace the meaning of what it is to be scientifically literate. They embrace the concept of an innovation culture. They vote in ways that promote it. They don't fight science and they don't fight technology."

–Neil deGrasse Tyson


innovate INDIA
"There is a way to do it
better – find it."
—Thomson Edison