

Creating an enabling environment for fostering R&D creativity

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Original: 11th January 2007 Revised: 14th January 2007

There are many Indians who have taken inspiration from the first citizen of the country and are promoting the idea of igniting young minds to foster creativity. Country-wide efforts are being made through innovation foundations and other associations to encourage young Indians to pursue creative ideas. At the same time, however, the nation is not doing enough to unleash the creative potential locked in its resource-strapped educational institutions. We are seeing academic administrators falling into a trap of exercising needless controls in a manner prescribed by various accreditation bodies. Mindless control, as we know, stifles creativity.

Various reports (see list of references) indicate that the National Knowledge Commission (NKC) has been forwarding some refreshing recommendations in support of greater autonomy to the schools, departments and faculty. While the debate on autonomy will continue, there is no doubt that autonomy with accountability can yield better results than any centralized form of control exercised by non-independent accreditation bodies. With globalization of trade in services we will be facing intense competition from foreign education providers. Therefore, universities taking proactive steps to exercise greater autonomy would be better prepared to meet the fierce competition that we are soon going to witness in this country. Academic administrators, in turn, can contribute by giving freedom to the individual through policies that decentralize controls. An enabling environment would like to see the academic program having a process orientation where the faculty (as a service provider) is brought close to the student (the consumer).

KIIT University has different schools, departments and programs, which will be eventually engaging in serious academic and research pursuits. At present, while there are some isolated cases of funded research activities within some departments, there are many who are yet to start. Therefore, the objective of having this R&D periodical to showcase the research activities of this young University is a necessary condition to stimulate research thinking. But it is not a sufficient condition. We can move towards sufficiency by encouraging an environment that would accommodate mutually exclusive yet collectively exhaustive ideas to be ventilated.

KIIT has the potential to initiate such ventilation of ideas through multidisciplinary research. It is a small University but has different schools representing the Sciences, Engineering, Management and other upcoming disciplines. The R&D wing from its inception in August 2005 has been trying to create awareness for promoting interdisciplinary interactions. Our views have been forwarded from “multiskilling the craftsman” (see Box-1) to “sensitizing the science student” (see Box-2) to “bridging the divide between technology and management”. A SWOT analysis of the R&D wing was presented in the School of Technology emphasizing the need for closing the gap between technology and management. The TOWS matrix (see Box-3) suggests some strategies that could be adopted to take R&D to greater heights.

To exploit the above potential we need (a) an appropriate organization structure having cross-disciplinary representation and (b) an effective growth-oriented information technology (IT) policy to create geo-neutral and time-neutral capabilities. Both need to be combined in a manner that would create facilitating-capabilities for promoting interdisciplinary research while not inhibiting domain-specific specialized research. While specialized research could be decentralized, uninitiated interdisciplinary research could be centralized. Both, however, will need support systems for efficient and effective information assimilation and dissemination.

Research creativity should not be restricted to a small group or department. Managing R&D creativity requires a process-orientation aided by an appropriate IT infrastructure. To be in line with the NKC recommendations, most of the existing Universities would have to re-engineer their processes. KIIT being a young University has the advantage of starting with a clean slate design. The deemed university status provides enough autonomy to bring freedom to the departments and individuals. Because of rapid advancements in science and technology we need to create a learning environment that would foster learner-centric programs and modules. Information and Communication Technology can be used as an effective medium to create virtual collaborative networks. This would facilitate sharing of benefits ranging from pedagogic innovations to other research initiatives and findings that may promote improved academic standards.

Box-1

Multiskilling the Craftsman

(Prof. Kaushik Sahu, Director-R&D, KIIT-DU)

An online job advertisement on the Internet goes like this:

This employer is ideally seeking a former craftsman with Mechanical Engineering and multiskilling experience, capable of organising and leading a group of craftspeople. Role(s) that best describe this job: Mechanical Engineer or Mechanical Supervisor. Qualification: Trade qualification. The salary range is dependent upon level of experience. Job type: Contract.

Note the word “multiskilling” – a very important quality that is needed to be imbibed by the craftsman of the future in a globalized economy. Before the industrial revolution, the craftsman was the owner, producer and also the salesman of his own hand-crafted work. With the advent of industrial revolution came the mass production era and these entities got separated - the owner moved up in the hierarchy, the salesman moved closer to the market, and the worker (our craftsman of the early days) was “trained” to standardize his skills to become the extended arms of the machine. This resulted in a business era where the manpower requirement was advertised through posters saying “hands wanted” – sort of implying that you don’t bring your brains to work. Training was imparted only to develop standardized skills in different trades and creativity in the workplace was not given any recognition. I have personally come across some ITI trained personnel with brilliant and innovative ideas which got little recognition in their respective places of work. Some of them gradually lost all their motivation in coming up with new ideas. In a not-so-competitive economy, the reward systems were not in place to recognize the innovative skills of such workers.

With markets opening up, things have started changing. There are much greater opportunities available in the unorganized sector for technical entrepreneurs wanting to convert their ideas into commercial realities. From a 2003 ILO-based study conducted in the states of Orissa, Andhra Pradesh and Maharashtra we note the following:

- There is a huge requirement of skills in the unorganized sector than in the organized sector. The unorganized sector employs 92 per cent of the national workforce and produces 60 per cent of GDP.
- The report concludes that the development of skills for the unorganized sector should be incorporated into the formal skills training system.
- Some ITI principals have highlighted the importance of an occupation called *fabricator* – a truly multi-skilled occupation giving scope to enter the unorganized sector.
- There are requirements for industrial trades and non-engineering trades (for feeding the service sector). Some important sectors with high employment growth are agro-business, forestry, tourism, community and personal services.
- Establishment of community services center as an entry point to self employment. These centers engage various workgroups for rendering support to communities.
- There is a need to reform the craftsman training system by making it more market oriented. Further, there is a need to improve the internal efficiency of the training institutes.

Other opportunities are highlighted in a strategy document drafted by the National Manufacturing Competitiveness Council (NMCC). It has submitted its recommendations and the Government of India has recently approved a proposal for the ten year national manufacturing initiative. NMCC recognizes the importance of skill development in the manufacturing sector and highlights the need for 20 million skilled workers by the year 2015. The nation needs to produce 1.5 million technically skilled workers per year. To meet global competition the country needs to produce a variety of complex products in large volumes. As stated in the strategy document “manufacturers will require **workers able to use judgment and other thinking skills** in the operation of advanced manufacturing processes and in the maintenance and repair of complex automated production equipment”.

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Box-1 (Continued)

A recent press release (see box) from the Prime Minister's office shows the Government of India's intention of promoting the Industrial Training Institutes of India with public-private partnership.

Manufacturing Competitiveness Initiative to be launched

January 13, 2006
New Delhi

Prime Minister Dr. Manmohan Singh chaired a meeting of the National Manufacturing Competitiveness Council. The meeting covered a wide range of issues relating to the development of domestic manufacturing sector. The following important suggestions of the Council were approved by the Prime Minister:

1. A ten-year National Manufacturing Initiative will be launched, with a focus on firm level and macro economic initiatives required to make domestic industry globally competitive.
2. The time-bound implementation of the recommendations of the NMCC will be done through a Mission mode. A Manufacturing Competitiveness Mission will be launched to ensure implementation of policies recommended by the NMCC by relevant ministries.
3. The NMCC will review periodically the implementation of its recommendations by various stakeholders.
4. The policy work of various ministries related with manufacturing sector will be coordinated through an apex mechanism on the lines of the existing Trade and Economic Relations Committee.
5. The Government of India will take up on a priority basis with State Governments the issue of upgrading and increasing training institutions for blue-collar, skilled and semi-skilled workers. The meeting recognized the urgent need to quantitatively and qualitatively improve the supply of labour force in a wide range of industries. State Governments will be encouraged to promote public-private partnership in the management of industrial training institutes (ITIs).

The Ministry of Science and Technology has also initiated programs for supporting innovative ideas. Their Technopreneur Promotion Programme (TePP) aims to support the creative technical entrepreneur who is keen to undertake innovative community-based projects with immediate commercial implications.

Finally, as the job ad above shows, times have changed. We are moving to an era of mass customization where customers will be looking for variety in the form of goods and services – at an affordable price. And the workplaces will be looking up to craftsman with cross-skills and multiple skills.

Reference:

1. Industrial Training Institutes of India: The Efficiency Study Report (2003) by the Subregional Office for South Asia ILO, New Delhi. <http://www.ilo.org/public/english/region/ampro/cinterfor/news/gasskov.pdf>
2. The National Strategy for Manufacturing (Draft 2005-06) by the National Manufacturing Competitiveness Council (NMCC), Udyog Bhavan, New Delhi and InFocus Programme on Skills, Knowledge and Employability (IFP/SKILLS) ILO, Geneva. http://nmcc.nic.in/publications/strategy_paper.pdf

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Source: KUSHALI, The Technical Magazine from ITI, KIIT (February 2006)

Box - 2

Sensitizing beyond the science discipline

(Prof. Kaushik Sahu, Director-R&D, KIIT-DU)

This article is meant for students of the +2 Science College of KIIT. The significance of this article, hopefully, will be realized much later in your career paths. Thus, I urge you to discuss this with your mentors who have been guiding you based on their own valuable experience.

The professional landscape is fast changing and the requirements of the Indian society cannot be insulated from the global winds of change. Creativity and teamwork are the necessities of the day. Teamwork does not mean all individuals have to think and act alike. Teamwork that fosters purposeful creative thinking in individuals is the requirement of the day and days ahead.

To foster creative thinking it is important for young minds not to restrict their thinking to certain pre-defined “limiting boundaries” of our Educational system. Too much importance to the limiting boundaries may force you into compartments that may stifle your creativity. The first sentence of this article itself shows that the compartmentalization process has begun. Thus, the “Science compartment” is different from the “Arts compartment”. In due course you will be guided into more specific compartments. You will be choosing either engineering or medical or some other discipline as your career option to further your studies. By the time you graduate with a professional degree you will be further compartmentalized (into the various sub-disciplines of your respective fields). Some may move on to acquire post-graduate degrees and diplomas in Management. Again there will be further compartmentalization into finance, marketing, operations, systems and so on. By this time you would be so much used to defining a turf around you that you will start working towards the larger interest of your “own limited turf” at the cost of the larger interest of the larger system. When each entity gets into protecting ones own turf you may have unhealthy conflicts between sub-systems (say the operations Vs finance or marketing) within the larger system (i.e., the business as a whole). However, if the business is able to derive maximum benefits by keeping this turf battle at a healthy level of conflict, then we have a proper team in place to foster purposeful creativity. Such organizations encourage team members to look beyond their own specific domain of interest. To meet the needs of such organizations it is important for you to train yourself.

According to a web-based (<http://www.indiatogether.org/>) article titled “Science Education on slippery path” by Summiya Yasmeen our Science Educators have other worries. Their prime focus is on the neglect of the science education due to paucity of funds. According to the article “the Indian economy’s investment in research and development (R&D) is too low for providing intellectual, creative and monetary satisfaction”. Here is another excerpt: “*The Human Development Report 2004 indicates that only 25 percent of all students enrolled in tertiary institutions are studying maths, science and engineering programmes (cf. China's 53 percent) while the number of researchers engaged in R&D in the country is a mere 157 per million of the population (cf. China's 587). Between 1980-2000 the number of scientific papers from India included in the Science Citation Index fell from 14,987 to 12,227, whereas China's grew from 924 to 22,061.*”

While the concerns of our Science Educators are quite valid, there is another dimension in the data above. The above data also indicates that there is a vast majority who belong to disciplines other than those mentioned above. It is, therefore, important for young scientists to develop sensitivity to these other disciplines in order to meet the needs of the society. Also, the changing professional landscape is forcing organizations to develop partnerships across departments, such as, science, engineering, medicine, management and law. Thus, multidisciplinary avenues are opening up leading to opportunities in bio-technology, bio-engineering, environmental design, advanced materials and nanotechnology. At this stage of your career you can start your training by making entities (including yourself) in the “science compartment” develop a certain amount of sensitivity to the needs of the “arts compartment”. Such sensitivity will also help you in translating your own ideas into commercialized outputs appropriate for the Indian socio-economic environment.

Source: Vigyan, First Edition, Science Magazine by KIIT Science College, (April 2006)

Box-3

TOWS MATRIX FOR RESEARCH & DEVELOPMENT AT KIIT-DU

Prof. Kaushik Sahu, Director-R&D (26.8.2006)

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| <p>OPPORTUNITIES</p> <ol style="list-style-type: none"> 1. New knowledge economy 2. Education sector poised for growth 3. High end BPOs (KPO and RPO) 4. Professional landscape becoming more multidisciplinary 5. CTTC, CIPET, Infocity, proposed SEZ looking for qualified manpower and perhaps collaborative ties 6. Manufacturing units to be set up in Orissa (Investments) 7. Ministry aware of the systematic neglect to our state | <p>SO Strategies → Use strengths to take advantage of opportunities</p> <ul style="list-style-type: none"> • Use the IT infrastructure to project the faculty and their work (S3O1,2,3) • Meaningful MOUs to develop collaborative ties • Strengthening the campus connect programs to support high-end BPOs | <p>WO Strategies → Overcome weaknesses by taking advantage of opportunities</p> <ul style="list-style-type: none"> • Proposed RCC: For collective brainstorming to promote interdisciplinary research (W4O3) • Encourage faculty to participate in the knowledge economy (W1O1,2,3). Not just teaching. • S.I.A.R.T initiative |
| <p>THREATS</p> <ol style="list-style-type: none"> 1. Competition (Domestic as well as Foreign) 2. Research-oriented faculty leaving for greener pastures 3. External forces using their lobby to stifle our growth (Note: R&D means growth) 4. 5. | <p>ST Strategies → Use strengths to avoid threats</p> <ul style="list-style-type: none"> • Actively collaborate with domestic and foreign counterparts • Formalize ties with IITs and IIMs • Attract/retain faculty who can give undivided attention to KIIT for a longer period of time. | <p>WT Strategies → Minimize weaknesses and avoid threats</p> <ul style="list-style-type: none"> • Seed money for research • Provide incentives for research • Systematic cycle of planning and reporting (to work out a realistic and achievable R&D budget) |

List of References:

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3. "National Knowledge Commission wants university system revamp" reported by Urmi A. Goswami, Economic Times, Wednesday, January 3, 2007.
4. "India's groves of academe enriched" by C.Jayanthi., The New Indian Express, Wednesday, December 6, 2006.
5. "FDI to spell well for higher education" by Sunny Verma & Priti Patnaik, Economic Times, Tuesday, December 5, 2006.
6. "Educating Government – No Over-Regulation of Overseas Varsities" Editorial, Economic Times, Thursday, November 30, 2006.
7. "FDI in higher education needs vision" by Gautam Chikermane, The New Indian Express, Thursday, November 30, 2006.
8. "Autonomy comes closer but debates persist" reported by A. Deepa, India Together, 24 April 2006, <http://www.indiatogether.org/2006/apr/edu-autonomy.htm>

About the author



Dr. Kaushik Sahu graduated in Mechanical Engineering from UCE Burla (1984) and finished an Industry-oriented Master's degree from REC Rourkela (1986). He holds a Ph.D. from the Mechanical and Industrial Engineering Department, University of Massachusetts at Amherst, USA (1991). Dr Sahu started his career as a faculty in 1986 and has since then put in several years of [teaching and research experience](#). He is currently working in the Area of **Design for Supply Chains**. He was the Chief Coordinator of the AICTE sponsored COMPUTER AIDED PRODUCT AND PROCESS DEVELOPMENT LABORATORY under their

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