Individual Innovation Index (I^3): Assessment and Enhancement

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ABSTRACT

Inculcation of innovation in organizations and the strategies to assess, monitor and promote the same are prevalent. However, individual innovation assessment and a methodology to improve individual innovation are still in their infancy. This paper stresses the importance of individual innovation for the progress of individual and therefore, for the organization and the country. We introduce an assessment metric, Individual Innovation Index (I^3), to calibrate innovation of an individual. An intervention mechanism for transforming non-performers into performers is elucidated and validated with case studies pertaining to students in the context of education.

Keywords — Innovation, Individual Innovation Index (I^3), Innovation Metric, Assessment and Enhancement

I. INTRODUCTION

Innovation is one of the important factors or capabilities which influence the human productivity. Being innovative is no longer a desirable, but an essential qualification for success today, as it has become synonymous with increased efficiency and productivity. Although it has been widely agreed that innovation *per se* is crucial for an organisation's progress and development, and in turn for a country's development; the importance of innovation today is percolating increasingly downward from the organisation to the individual level. Traditionally, innovation is seen as platform for economic benefits. Innovation for increased productivity is a fundamental source of healthy economy. However, over a period of time, the focus shifted from positive '*economic*' effect to positive '*wellbeing*' effect. This shift brought about a different perspective and had given a greater impetus to '*individual innovation capacity*' from the current focus on organization, industry and country level innovation development. The goal of innovation is to bring a positive change and or, make someone or something better (Heyne *et al*., 2003). It has been argued that the value created by single customer experience, and the access to local and global resources; are two key pillars of innovation in all businesses (Prahalad and Krishnan, 2008). It is believed that the business processes must connect to skills, attitudes and orientation of managers. It is now being suggested that the innovation metric is not proportional to the investment in research and development and the money spent, but rather depends on the people behind these innovations and how they are guided for long term benefits (Linzmayer, 2006). Penchant for individual innovation has therefore become the key for organization success. We now realize that innovation is a time consuming process and its success is not just based on the outcome of the product, but the capacity to produce new ideas, the ability to innovate, its management, team work, organization's internal receptivity for innovative ideas and overall direction towards innovative culture (Luoma-aho and Halonen, 2010).

II. INNOVATIVE CULTURE

Innovation is considered as one of the attributes of culture development. Anthropologists point that culture is a complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society. It is developed over a period of time from individual traits, inherited from parents, family members, friends, society, ethnicity, country, geo-graphical region, environment *etc*. The development of innovative culture is therefore influenced by importance given to

creativity, capacity, network, risk appetite, family's influence, friends' association, location, caste, creed, religion, educational background, industry orientation, country's vision and related factors. Developing an innovative culture therefore is a journey, which requires significant efforts and setting a new cultural perspective.

Innovation can be studied at four levels - National level, Organizational or Industry level, Educational level (Institution specific or Student specific) and Societal level (Citizen specific or Community specific). It is now well accepted that higher education plays a very vital role in revitalizing and redefining the face of national innovation system. Higher education plays a major role in knowledge absorption, knowledge creation, knowledge output, knowledge diffusion and creative output (WIPO, 2012). National / Industry / Organization innovation index is directly dependent on educational innovations and knowledge dissemination initiatives. Ringo (2002) argued that knowledge generated out of higher education institutes will spill over into industrial sector in the form of university spin offs, faculty consultation, student internships at industry and industry sponsored research. For the same reason industrial firms tend to locate near universities to motivate industrial clusters, to become proxy to innovative output and availability of human capital.

Technology today is changing at a rapid pace, and the time for technology to reach the market is crashing; resulting in wider ramifications on the skill-building exercise. Therefore it would be rather prudent to realize that the leapfrogging technological advances prevalent in all the domains would increase manifold. In next decade, we might encounter 'overnight technology' - technology which has reached market today becoming obsolete tomorrow. Envisaging such a scenario we strongly feel that the technology based skill development strategy for education, which is currently in vogue, would be passé. We therefore believe an education system centered on today's problems and/or individual passion which we feel can build long term sustainable solutions. We believe that innovation and leadership are two important skills which are needed perpetually for development of individuals, organisations and countries, these should be integrated into the education system as well, for empowering our next generations and for providing them an eco-system for sustainable future; thus necessitating the *Inspire to Innovate* mission, which forms the scope of the present study, *i.e., focussing on the assessment* of *individual innovation of a student of higher education, and also a process to enhance the innovation among students.*

III. INDIVIDUAL INNOVATION

Attempts to define the multidisciplinary facets of innovation suggest that innovation is a multistage process whereby organizations transform ideas into improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their market place (Baregheh *et al*., 2009). We opine that the same process applies to individual innovative capacity. This process enables and transforms ideas to *wellbeing* - better quality of life, higher competence, right attitude, belief, culture and better cognition levels; which again impacts individual economics and in turn organizations, industry and country development. Hence, focus on individual innovation should become one of the prime requirements for organization and country's long term sustenance and development.

Leaders of industry which innovate continuously point out that, innovation leadership is a passion for learning, it is humility in front of mistakes and errors – understanding that they are necessary elements to learn faster than the others (Deschamps, 2008). Farr and Ford (1990) defined Innovative Work Behavior (IWB) as an individual's behavior that aims to achieve the initiation and intentional introduction (within a work role, group or organization) of new and useful ideas, processes, products or procedures. Jeroen de Jong and Deanne den Hartog (2010) performed calibration on IWB for working class employees, by means of a survey questionnaire covering various elements like how often an employee pays attention to issues that are not part of his daily work, enthusiasm for innovative ideas, convincing others to support innovative ideas, contribution for implementation of new ideas, making various suggestions to improve process or product, customer orientation and techniques. Studies have shown that there is correlation

between innovative behavior of employees and the leadership style of the supervisors, and observed that an individual is capable of innovation and adaptation (Chao *et al*. 2011). Organizations can also profit from bottom-up innovations which are initiated by individual employees. To trigger the bottom-up innovation, individual employees need to be both willing and also be able to show innovative behaviour (Jeroen de Jong, 2004). There is significant relationship between entrepreneurial competencies and innovative behaviors (Koc and Yavuz, 2010). Studies have also shown the fruitlessness of the traits approach and indicated that researchers should focus on what the entrepreneur does and not who the entrepreneurs are (Oskarsson, 2003). Research on the various innovation specific tenants, suggest that there is a good correlation between total R and D experience per employee and the innovation capability The individual characteristics such as sex, age and personal attitudes did not have strong impact on innovative behavior in organizations, but structural characteristics and environmental input had strong impact. Studies have also shown a good correlation between innovation and individual innovation behavior based on five facets - opportunity exploration, creativity, formative investigation, championing and application (Oskarsson, 2003); thus prompting the definition of innovative behaviour as all individual actions directed at the generation, introduction and application of beneficial novelty at any organizational level. Availability of role models was also found to have a significant positive influence on employees' innovative behavior. Mentoring activity is clearly a critical factor in supporting creativity as it is a critical component of innovation influencing the transition from idea generation to idea implementation (Ahmad, 2009). Research has shown that an individual proactively plays a significant role in advancing ideas into innovations, in addition to perseverance by individual. Even though advancement requires input from a large number of people, and creating the image of a shared effort was perceived to be important, usually every advancement phase was heavily dependent on a single individual driving the cause forward (Tidd and Bessant, 2009; Bjorklund *et al*., 2010). It is therefore believed that creativity is the critical foundational element of the innovation process. The 'spinach' model of creativity combines the elements needed for successful creativity in individuals with strong cognitive skills, well-developed personal characteristics and supportive social and environmental factors (Cropley, 2006). Along with the eight principals of innovation - curiosity, play, intuition, collaboration, diversity, failure, courage and momentum (Foley, 2010) - we now realize that real advance in science or any field is facilitated by creative imagination in raising new questions, exploring new possibilities to regard old problems from a new perspective. Innovation supports this questioning trait. Thus, critical questioning becomes one of the important traits of innovator, in addition to the human desire which is the fundamental motivation of all action. Innovation starts with a strong desire to do something new. Innovators possess positive desire to solve a problem or fulfill a passion. The key for innovation, therefore is to become a dispassionate observer by not taking things for granted - watching for inconveniences and inconsistencies, for possible gaps, following technology trends, capturing every idea, creating a master list of problems, reviewing the master list of problems and finally taking action. Curiosity and the desire to do new things, encourages the innovator to observe things closely and help in building concreteness to the idea.

Interestingly, in accordance with the mantra of '*failing fast, but failing smart',* the internet giant *Google* and the investment banking firm *Charles Schwab*, embraces their missteps as opportunities to learn about the customers to reposition themselves for future success. Both companies consider their failures as cheap but customer insights as invaluable. Therefore, it is important to realize that failure is also an integral step in the process of learning and innovation.

Attempts to define the multidisciplinary facets of innovation suggest that innovation is a multistage process whereby organizations transform ideas into improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their market place (Baregheh *et al*., 2009). We opine that the same process applies to individual innovative capacity. This process enables and transforms ideas to *wellbeing* - better quality of life, higher competence, right attitude, belief, culture and better cognition levels; which again impacts individual economics and in turn organizations, industry and country development. Hence, focus on individual innovation should become one of the prime requirements for organization and country's long term sustenance and development. It is imperative to appreciate that, innovation is not only applicable to an organization but it is applicable outside the

organization. It is applicable in education, for solving societal problems and for accomplishing day to day activities. We stress that for successful innovations, individual's effort and creativity are crucial. Individual pro-activeness and team work are critical for successful implementation of an innovative idea. Though generally, innovation is measured at organization's context and the individual innovation is measured under organization's scope, it is important to have tools and metrics outside the context of an organization. Therefore, we exhort that the cultivation of individual innovation and measurement of the same will have a profound impact on not only the individual, but also on organisation and the society at large.

IV. ASSESSMENT OF INDIVIDUAL INNOVATION INDEX (I^3)

But how do we assess an individual's innovation capabilities and how can we influence an inexperienced or disinterested individual to transform into a highly productive innovator, is the moot question. We believe that for individuals to transform into innovators, an ecosystem that develops mature thinking as a continuous process is essential. Hence, it is imperative to groom individuals to acquire appropriate disciplines and equip them with the ability to apply them, to excel in all situations. Coupled with this, we also feel that the right environment, ample resources, uninhibited interactions with peers and a healthy competitive culture is paramount for transforming individuals into successful innovators in a shorter time scale. In this section, we discuss the factors influencing individual innovation, an Individual Innovation Index (I^3) assessment framework and a methodology to improve the Innovation Index with appropriate recommendations.

I^3 assessment is designed as the outcome of two parameters - individual innovation capacity and. the living environment of the individual. I^3 (Individual Innovation Index) Assessment is based on mapping individual traits (efforts / capacity) *vs.* individual's living environment. Individual traits towards innovative thinking, ideas and products are mapped on X axis. Individual environment (*conduciveness for innovation*), family, society and educational background, organization's (in which the individual is working) attitude towards innovation, the physical location, country *etc.* are mapped on the Y-axis.

Accordingly we propose to assess the individual's innovation propensity based on the following traits - desire and curiosity, creativity, out of box thinking, critical questioning, positive attitude, willingness to solve problems or fulfill passion, unbiased observation, challenging assumptions, ability to accept failures, ability to work in uncertain environments, vision and planning, team work, networking, practical orientation, analytical ability, critical thinking, risk taking capability, inspiring others in the team, prototyping and experimenting ideas, ability to publish, ability to obtain copyrights and patents, ability to implement the plans, ability to negotiate ideas and achieve results for the novel ideas, learning from past results, following the technological trends, and working towards win-win situations.

Keeping in view the multi-disciplinary facets of innovation, we also propose to assess an individual's living environment based on the following parameters - flexibility and freedom at home and work place in sharing ideas, lesser family/social/financial constraints, family and peer support for - risky propositions and uncertain environment, innovations and inventions, location attracting knowledge workers and access to knowledge sources and a wide variety of intellectual skills, patents, intellectual property rights, incubation centers, R & D laboratories and centers of excellence for implementation of ideas, access to investors and investment, institution having less hierarchical structure, location having background of social revolutions or social innovations, having mentors promoting constant support, providing constructive feedback, location attracting small business firms which work on multiple disciplines, access to various tools and technologies which promote innovation.

The individual's traits (I_t) and the individual's environment (I_e) are assessed based on responses by individuals to two parts of a questionnaire comprising of questions regarding traits and environment. The individual is required to choose one of the four answers supplied to each question. Depending on the

particular answer selected by individual to each question scores are allotted. The individual's traits I_t, are measured in terms of a normalized score, varying from 0 to 1, based on the self assessment of the responses to the questionnaire (*Appendix: Part A*) alluding to individual's traits. The individual's environment / influencing parameters I_e, are measured in terms of a normalized score, varying from 0 to 1, based on the self assessment of the responses to the questionnaire (*Appendix: Part B*) alluding to the living conditions and environment of the individual. Based on self assessment the scores from individuals are mapped on to one of the four quadrants, and are broadly classified in terms of the quadrants in which the traits of the individual vis-à-vis the individual's environment are mapped. Individuals mapped on the first quadrant ($0 < I_t < 0.5, 0 < I_e < 0.5$) are categorized as Seekers. Individuals mapped on the second quadrant ($0.5 < I_t < 1, 0 < I_e < 0.5$) are categorized as Challengers. Individuals mapped on the third quadrant ($0 < I_t < 0.5, 0.5 < I_e < 1$) are categorized as Loungers, while individuals mapped on the fourth quadrant ($0.5 < I_t < 1, 0.5 < I_e < 1$) are categorized as Performers. There is special category called Pioneers, who are set to emerge towards Performers quadrant from Seekers quadrant. We define the Individual Innovation Index (I^3) as $I^3 = \Sigma (I_t, I_e)$. The values of the Individual Innovation Index, I^3 can range from 0 to 2. Using this definition of I^3 we can classify an individual as, Seeker, Challenger or Lounger, for $0 < I^3 < 1$; and as a Performer, for $1 < I^3 < 2$. The purpose of the quantification of the Individual Innovation Index is therefore, is to not only assess the innovative qualities of the individual, but also to help in formulating a mechanism to drive the I^3 value of the individual from less than 1 towards a range of 1 to 2. It is believed that assessment in frequent intervals reminds, regulates and rejuvenates individuals towards Innovation and finally leads to an innovative culture.

V. RESEARCH METHODOLOGY

We have adopted the survey method of quantitative research by designing a structured instrument (questionnaire) which was to be answered by individuals, chosen from different backgrounds and geographical locations involving large sample sizes. It is well accepted that innovation assessment and enhancement is a systematic process and can be carried at four levels- National, organizational, educational and societal. Among these levels, education is seen to represent one of the primary components of human capital formation (Lawal and Iyiola, 2011); and therefore plays a very important role in revitalizing and redefining the face of national innovation system - by infusing inputs to organisations and the industry. There is strong correlation between creative climate (education system, self expression, openness, opportunities), creativity (knowledge workers, creative clusters and occupations), R&D (publications, brand, patents) and Innovation (environment, entrepreneurship, FDI, well-being, finance/market/business sophistication) (Hollanders *et al*., 2009). Evaluating innovation as part of professional courses has thus become very important to increase the probability of students becoming innovators in the real world (Elizondo, L. A. *et al*., 2010). Thus one can argue that national /organizational innovation index depends on the activities of the human capital of higher educational institutes and therefore students should rightly portray the individual innovation index of society at large. The primary goal of the instrument design was therefore, to assess individual student's innovation propensity and the living environment, with the following specific objectives:

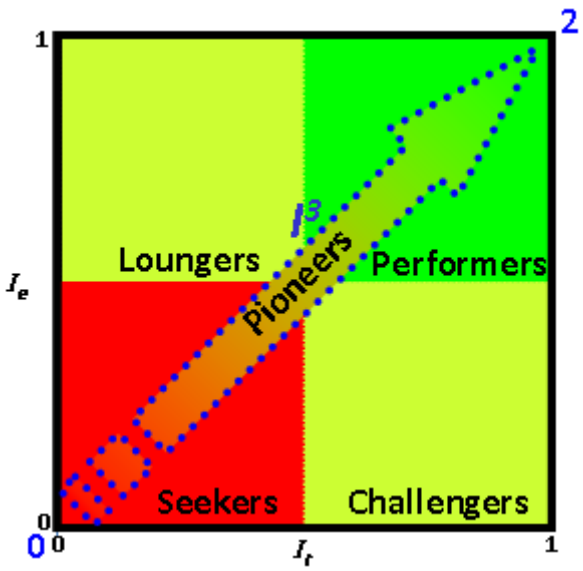
1. To assess student's individual innovation index and position student in innovation assessment matrix with respective to innovation traits vs. their living environment
2. To understand appropriateness and applicability of the age, educational background for student's innovation assessment

Against the backdrop of the above objectives, we formulated following hypothesis and evaluated the same.

A. Hypothesis

Most of the students in the current Indian education system neither have innovative traits nor live in environment supporting innovation, and therefore, their individual innovation index is low.

Our instrument (questionnaire) was designed to proceed in an orderly and specific manner and in order to take care of the ambiguities and inflexibilities in questions, feedback and comments were received from pilot samples and the said questions were restructured, so that we could arrive at instrument for assessment of the individual innovation index. Figure 2 shows the flow chart of instrument design and the various steps adopted in arriving at the final structured instrument for research. Each item in the flow chart depended upon the successful completion of all the previous items. It may be noted that there are two feedback loops in the flow chart to allow revisions to the methodology and instruments.



I^3 Assessment Matrix	Significance
Seekers	Individual efforts towards innovation are weak and capacity is low to medium. Individual's environment is neither conducive nor supportive to innovation. Persons falling into this quadrant need external and internal motivation. Given the right platform and with reasonable efforts, they can progress to either to Challenger or Lounger quadrant.
Challengers	Individual's innovation propensity and their capacity is medium to high. These leaders have high potential for change. However they are living in low to medium conducive environment. Given a little support, they can easily move on to become Performer quadrant.
Loungers	Although individual's efforts towards innovation and capacity are low to medium, they are living in medium to high conducive environment. This group has lot of opportunities to explore and need inspiration from external sources to innovate. Given inspiration and justification to their available opportunities, they can move towards the Performer quadrant.
Performers	Individuals mapped into this quadrant have proven their capacity and leveraged the living the environment and conditions, which are conducive to innovation. Once a person is mapped on to this quadrant, it requires sustenance and constant motivation to make further progress.
Pioneers	An individual located in Seeker quadrant who can be helped to leapfrog to the Performer quadrant.

Figure 1: *I* ^{3} assessment tool. Mapping the individual as a function of individual traits and individual's environment.

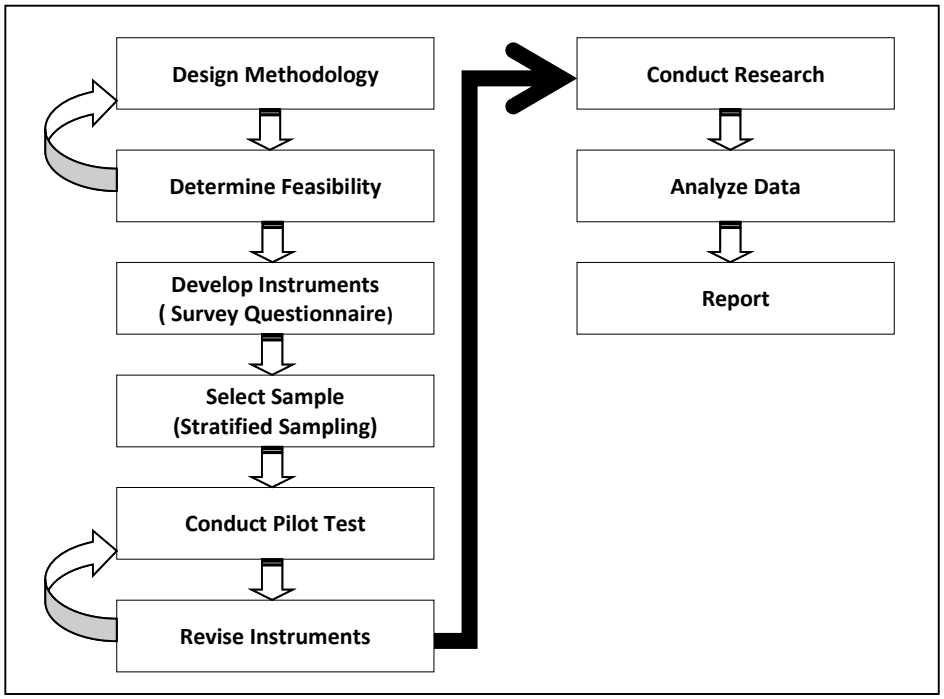


Figure 2: Flow chart depicting the steps taken for the design of the structured instrument and subsequent research.

A structured instrument (survey questionnaire) has been used to collect data from the individuals in order to understand students' innovative traits and their supporting living environment. The final instrument has evolved after refinement during 3 phases. We have administered the survey to various age groups and finally we finalized to run this survey with 3rd year engineering students, 2nd year polytechnic students, 1st year Master of Science students and 2nd year Master of Business Administration students from a wide spectrum of educational institutions located at different geographical (viz. urban, semi-urban, rural) regions. The structured sampling technique was used in the study for all phases. It took 9 months to finalize / evolve the instrument (survey questionnaire) and determining the target age group / educational background of respondents.

B. Phase 1- Pilot Survey: Assessment of professional college level students:

The target was engineering students (I and II year) of all branches of one the premier engineering colleges of Andhra Pradesh, India. Total number of students surveyed was 109. Questions were framed to understand student's innovative traits and their living environment. Assessment consisted of 40(forty) 5-point scales and personal background questions

The survey revealed that:

- Most of the students showed higher optimism towards innovative capabilities. *As a consequence, most of the students fell in the Performers quadrant, which was at variance to the actual performance as we were continuously monitoring them for 9 months.*
- As the 5-point scale responses which were to be chosen by the individuals were not jumbled, respondents followed set patterns, inadvertently or purposefully.
- As the individuals were asked to respond to 40 questions in addition to the personal background questions; the survey became tedious and time consuming, and sometimes the respondents did not follow the language or the essence of the question.
- Though students from 1st and 2nd year have showed greater optimism in survey but in reality they didn't exhibit any innovation over a period of 9 months. We observed that the broad reasons were no sufficient time and strong commitment. In fact we have asked and helped all the 109 students (along with a team of subject experts) to commit for any innovation. In spite of frequent personal

reminders, we found only 35 students volunteered to work towards an innovation. We found frequency of the examinations in the educational system, the living environment as well as the individual desire levels became hindrance to fulfill their original commitments.

Based on the feedback and pilot assessment experience, we simplified the assessment questionnaire in terms of number of questions and language, randomly jumbled the responses in order not to bias the respondent with any set patterns and also restricted the responses to 4 scales (choices) instead of 5 scales. In addition, we reduced the number of questions to 20 from 40 and also translated the instrument into the local language (Telugu). After the modifications of the structured instrument we conducted another pilot survey amongst a larger heterogeneous sample of school students and also personally explained the questions during the interaction sessions before the actual conduct of survey.

C. Phase 2- Pilot Survey: Assessment of school level students:

The target was 6th to 10th standard students. Nine schools chosen were from Urban/Rural/Tribal (both Corporate and Government schools) regions. The total number of students surveyed were1264. We observed different perceptions according to school location, financial background of students and the student's attitude towards assessment which are shown in the Table 1 below along with sampling details. The survey revealed that students showed unrealistic optimism in their responses, which resulted in pushing their assessment index and mapping them as Performers. The prime reason for this optimism was established to be the result of the way the questions were paraphrased, as most of questions are related to qualities and less towards probing actual innovations developed in the past and their corresponding experiential moments.

School	Location	No. of Students Surveyed	Remarks about students
1	Urban (Corporate)	143	*Uninterested Students of above average financial background*
2	Tribal	177	*Enthusiastic Students having poor financial background*
3	Tribal	113	*Enthusiastic Students having poor financial background*
4	Tribal	116	*Enthusiastic Students having poor financial background*
5	Rural	172	*Neutral Students having poor financial background*
6	Rural	150	*Neutral Students having poor financial background*
7	Rural	163	*Neutral Students having poor financial background*
8	Rural	69	*Neutral Students having poor financial background*
9	Urban (Government)	159	*Neutral Students from poor financial background*

Table 1: Details of Pilot survey – School Students Assessed

On hindsight, we also realized that that individual innovation assessment may not be applicable to school students. We surmise that the major reason may be a lack of proper orientation in schools and also the education system *per se* as the current education system and the peer pressure from friends and family support predominantly theoretical knowledge in schools. The overwhelming conclusion we could draw was that the t*ribal and rural students in spite of their financial background and location disadvantages, showed more curiosity and enthusiasm towards innovation.*

Weightage for responses to Part A (Innovation Traits) and Part B(Innovation Environment) were introduced as follows: Responses related to 'High Propensity' and 'Conducive Environment' were allotted 4 marks, next level responses were allotted 2 marks, the further level responses were allotted 1 mark and the responses of 'low propensity' and 'low conducive environment' were allotted 0 marks. The

normalized score for Part A and Part B was obtained as the sum of the scores of Part A and Part B divided by 60 (15 questions × 4 marks). That is, the values of I_t and I_e were designed to vary between 0 to 1.

Figure 2 depicts School Student's Innovation Assessment Matrix. The survey revealed that of the total 1264 students, Seekers were 10.3%, Challengers were 16.1%, Loungers were 7.6% and Performers were 66.0%. That is, 66% of students were mapped as Performers (matured innovators), which was unrealistic. On rational analysis and also on cross checks with a smaller sample of students, it was realized that school students lack the maturity to self-assess their innovative propensity.

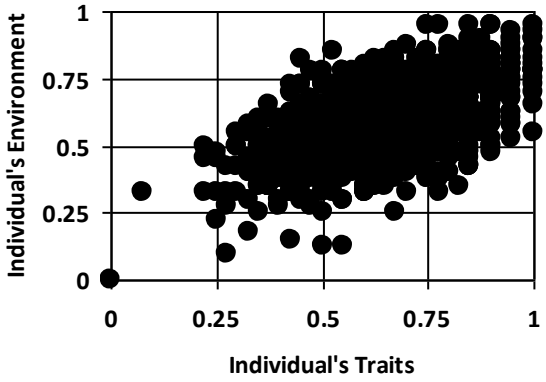


Figure 3: Innovation assessment matrix of school students.

Therefore, based on the feedback and lessons learned, the questions in the instrument were increased to 30 (Part A – 15, and Part B – 15) and personal background questions were added to understand their awareness towards innovation, goals, strengths/weaknesses, family background, demographic data etc., which set the context to normalize the assessment patterns. We also asked students to explain their innovation or efforts, if any with specific examples. Questions were also modified in such a way that equal importance on innovative traits and actual implementation experience was given. Multiple choices were jumbled so that there was no scope for recognition of set patterns in responses. Additionally, questions were paraphrased in such a way that inadvertent or purposeful errors are detected easily depending on individual's consistency towards responses. The questions for the structured instrument for final survey were so designed that they fall into four broad categories of Ideation, Research, Prototype, Promotion and Protection (as shown in Appendix).

Weightage for responses to Part A (Innovation Traits – 15 questions) and Part B (Innovation Environment – 15 questions) were introduced as follows: Responses related to 'High Propensity' and 'Conducive Environment' were allotted 4 marks, next level responses were allotted 2 marks, the further level responses were allotted 1 mark and the responses of 'low propensity' and 'low conducive environment' were allotted 0 marks. The normalized score for Part A and Part B is obtained as the sum of the scores of Part A and Part B divided by 60 (15 questions × 4 marks). That is, the values of I_t and I_e were designed to vary between 0 to 1. The final assessment basis for quantitative evaluation of responses was transformed into a computational algorithm which when invoked after submitting responses from individuals would provide the scores of I_t, I_e and I^3. During the assessment, care was taken to clarify and explain all questions to avoid ambiguity, if any.

Against the backdrop of the feedback and the knowledge gained from the survey of school students we embarked on a final survey covering mature students, pursuing their professional courses in technical and non technical institutions across a spectrum of geographical locations and hailing from various backgrounds. Table 2 summarizes the rationale in homing on to students in the median age of 19 belonging to tertiary and higher education categories for our study.

Educational Background	Age Group (years)	Proposed Assessment/ Enhancement model with specific customizations	Rationale
Higher Education (Engineering/ Management/ Arts/Commerce)	19-24	Student Innovation Assessment and Enhancement	Professional Maturity levels are high. Innovation is part of employability in future hence it is necessity to assess, monitor and enhance in this particular group
Tertiary Education (Polytechnic/ Technical Diplomas)	16-21	Student Innovation Assessment and Enhancement	Technical / Diploma students are required to nurture for innovation as they contribute for product and sustainable innovations in the industrial sector
Secondary Education	10-15	Student Creativity Assessment and Enhancement	In this age group, creative ideas and initiatives to enhance creativity is more applicable as their contribution to innovation world is minimal or not expected.
Primary Education	5-10	Child Creativity Enhancement	In this group, creativity assessment is not applicable as it will have psychological impact on the child. Hence enhancement tools can be adapted to the child centric.
Employee (Educated Working Class)	> 24	Employee Innovation Assessment and Enhancement	Assessment is customized to industry context. Initiatives are industry oriented.
Citizen (Educated or Uneducated)	>24	Grassroots Innovation monitoring and Enhancement	Monitoring will be in social context. Very high-level assessment for cultural or regional level assessment input. Innovation orientation sessions, social contests etc will help to motivate citizen to innovate.

Table 2: Proposed Education - Age determination process for student's I³ assessment

D. Phase 3- Final Survey:

Target was students of 3rd year engineering (all branches), 2nd year polytechnic, 1st year M Sc, 2nd year MBA. Stratified sampling techniques were used to gather information. Total number of students considered was 366 (Female-137 and Male- 229) from following branches:

- B. Tech 140 from 2 engineering colleges (1 Urban and 1 Rural),
- MBA 75(Semi-Urban),
- MCA 15(Urban),
- M Sc 51(Semi Urban),
- M. Tech 6 (Urban),
- Polytechnic 79 (Semi Urban)

During the final survey, the average student age of the sample was 20 with students hailing from different regional backgrounds (Rural 110,Semi Urban 130, Urban 126), academic backgrounds (Last 5 years average academic background in terms of percentage of marks - *80% & above* – 234; *60 to 80%* - 113; *40% to 60%* - 4; *>40%* - 15. Thus the final survey sample represents data of respondents from varied environments and backgrounds.

We also claim that the final questionnaire - after making appropriate changes based on the feedback from pilot studies and the lessons learned thereof – is a robust structured instrument for eliciting information and making inferences on individual innovation.

The final survey was an attempt to assess individual innovation index of sample group and their positioning in innovation assessment matrix; in addition to identification of other motivation levels of the students

VI. RESULTS AND DISCUSSION

The key responses of the 366 respondents during the final survey are summarized as follows:

- 91% of the respondents agreed that failures were stepping stones to success. More than 90% showed sincerity, interest and curiosity to obtain concrete results. More than 84% expressed a desire to do something different and think out of the box. However, we observed that when it came to the real execution of ideas, more than 60% of the students have not gained any experience or were just trying for such experience.
- More than 95% of the students told that they neither have planned for collaboration nor having any such plans in the near future to develop innovation.
- 65% of students were only interested in employment and considered their long term goal as gaining employment.
- Only 24% students expressed strong capacity to work regardless of guidance in uncertain situations. This is one of the important traits required for innovator. However we feel that this trait can be fostered by mentoring.
- 61% of students claimed that they have tendency to guide, inspire and motivate teams.
- 78% of students claimed that, they work on technical and non technical issues which do not fall in the purview of regular curriculum or workload during their free times. However more than 91% agreed they do not to have any publications and or patents making a mark in the society with their innovations
- 71% of students felt that they do have moderate to high flexibility at home for working on innovation.
- 95% students felt they don't have enough access to R&D resources and people who work on innovative ideas.
- 77% students felt that they are accepted and supported by peers and society when they work for some company and be an employee with part time innovations. This signifies that there is lot of soft pressure on becoming employee rather innovator or inventor.
- 77% students felt educational institutions do not sufficiently support their for innovation
- 66% students felt that they have academic pressure for securing marks.
- 63% students felt although they have financial/social constraints, they still want to pursue their goals for innovation.
- 68% students felt their living conditions are amenable for innovative work.
- 95% students felt that there is a lack of awareness and availability of competent people for forming a full-fledged team in order to purse innovation.
- 72% felt that they have no or limited access to mentors.
- 89% felt that they don't have immediate access or intention for financial investment.
- 61 students' parents are from business background, 136 students' parents are in employment, 77 students' parents are having lower class employment, 92 parents are with self employment (*e.g.*, doctor or advocate or farmer etc).
- Large percentage of students mentioned that hard work, family, friendly behavior, honesty and self confidence are key strengths.
- Anger, laziness, sensitiveness, believing others blindly, public fear, emotion, wasting time (*e.g.*, chatting, TV *etc*), negative thinking were mentioned as major weaknesses.
- Most of the students aimed for short term goals. Large percentage of students would like to take employment as immediate goal followed by higher education. Few students aimed for societal help, innovation, entrepreneurship *etc*.
- 80% students would like to pursue work in their respective fields of expertise.
- 26% of students would like to pursue their passion towards helping society. Other passion areas mentioned were teaching, research, photography/painting, music, film direction, fashion/fabric design, cricket, movies, and agriculture.

- 53% of students mentioned that their siblings are still studying and having education environment at home.
- 28% of students responded positively with meaningful understanding about innovation. 31% of students have little awareness and 39 % of students don't have any awareness about innovation. However, very few people responded with their actual experience in innovations.

Based on the survey we observed that most of technical/non technical students in the current Indian education setup who are on verge of taking up employment are neither having innovative traits nor living in innovative environment. On mapping the 366 respondent scores on the Individual Innovation Matrix, our study revealed that only 0.8% of respondents were mapped as Performers, (*i.e.*, only 3 persons were Performers), 6.6% were mapped as Loungers (*i.e.*, 24 persons were Loungers), 4.9% were mapped as Challengers (*i.e.*, only 18 persons were Challengers) and a predominant percentage of respondents (87.7%, *i.e.*, 321persons) were mapped as Seekers - *individuals with neither sufficient traits nor the supporting environment for innovation*. The statistics of the results of the sample of 366 individuals showed that the mean I^3 value is 0.8, with a standard deviation of 0.188 and a standard error of 9.85×10^{-3}. The individual innovation matrix of the 366 respondents is presented in Figure 4. Our final survey results therefore corroborates the hypothesis postulated earlier that: *Most of the students in the current Indian education system neither have innovative traits nor live in environment supporting innovation, and therefore, their individual innovation index is low.*

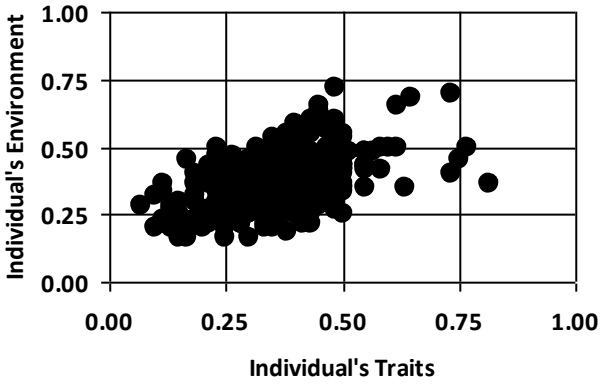


Figure 4: Individual Innovation Matrix of Mature Students

A. Validity and Reliability

The reliability of data collected was measured using Cronbach alpha coefficient to check for inter-item correlation in each of the variables in the questionnaire. The Cronbach alpha coefficient value obtained was 0.797.

B. Descriptive Statistics

Confidence Intervals- Sample of 366 individuals, the Mean of I^3 is 0.8, Standard Deviation is 0.188 and a Standard Error is $9.85 \times 10^{-3.}$ The standard variate (z) for 95% confidence is 1.96 (as per the normal curve area table). Thus 95% confidence interval for the mean I^3 is 0.8+ (1.96)*(.0188/SQRT (366)), 0.8- (1.96)*(.0188/SQRT (366)). i.e. 0.801926 and 0.7980744

T-Test (One-Sample Test) - The one sample t-test results (using SPSS software) show that results are significant.

Question #	t	df (Degrees of Freedom)	Significance. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
PART A						
1.	38.472	365	.000	2.557	2.43	2.69
2.	26.359	365	.000	1.997	1.85	2.15
3.	18.260	365	.000	1.016	.91	1.13
4.	15.318	365	.000	1.066	.93	1.20
5.	43.674	365	.000	2.697	2.58	2.82
6.	44.899	365	.000	2.637	2.52	2.75
7.	12.895	365	.000	.508	.43	.59
8.	10.606	365	.000	.710	.58	.84
9.	35.839	365	.000	2.169	2.05	2.29
10.	22.932	365	.000	1.798	1.64	1.95
11.	32.643	365	.000	2.030	1.91	2.15
12.	10.818	365	.000	.686	.56	.81
13.	8.518	365	.000	.303	.23	.37
14.	16.657	365	.000	1.240	1.09	1.39
15.	17.726	365	.000	1.732	1.54	1.92
PART B						
1.	27.865	365	.000	1.893	1.76	2.03
2.	42.292	365	.000	2.719	2.59	2.84
3.	37.542	365	.000	2.178	2.06	2.29
4.	25.475	365	.000	1.208	1.11	1.30
5.	28.208	365	.000	2.120	1.97	2.27
6.	17.231	365	.000	1.243	1.10	1.39
7.	11.240	365	.000	.631	.52	.74
8.	38.519	365	.000	2.645	2.51	2.78
9.	11.521	365	.000	.628	.52	.74
10.	33.457	365	.000	1.765	1.66	1.87
11.	15.505	365	.000	.910	.79	1.03
12.	31.362	365	.000	1.967	1.84	2.09
13.	8.922	365	.000	.366	.29	.45
14.	38.693	365	.000	1.702	1.62	1.79
15.	11.836	365	.000	.650	.54	.76

Table 3: Details of One-Sample Test – Assessment Questions

Factor Analysis: To explore further, we used SPSS to analyze the data and principal components factor analysis. The factor analysis yielded nine factors (Eigen values more than 1). The factors with Eigen values greater than one that accounts for 51% of the total variance and each factor accounted from 3.567% to 17.394 for the variance.

VII. PROPOSED INNOVATION INCUBATION LIFECYCLE AND RECOMMENDATIONS

How can one transform the individuals from Seekers into Performers in a timely and efficient manner? We tried to address this rather complex and difficult question by asking whether the '*Seekers*' can be incubated as '*Pioneers*' who can in turn metamorphose into '*Performers*'? Based on the survey statistics

and the responses obtained, we propose here an innovation incubation life cycle, in order to inspire individuals to innovate. We hope that this endeavour would help individuals in improving their Individual Innovation Index, I^{3}. We term our endeavor as - *Mission: Inspire to Innovate*.

A. Innovation Incubation Lifecycle: Mission Inspire to Innovate

We present here, an innovation incubation lifecycle which we feel can improve the Individual Innovation Index in a structured, timely ad efficient manner. The innovation incubation lifecycle is related to the well known butterfly lifecycle, to drive home the point that, like the metamorphosis of an egg, into a crawling caterpillar and further into a beautiful butterfly which can fly, ideas and passions can be transformed into products of added value to society at large. Figure 5 shows a schematic of the proposed innovation incubation lifecycle vis-à-vis Butterfly cycle, for inspiring individuals to innovate and also metamorphose from Seekers to Performers by becoming Pioneers. Table 4 below details each of these phases

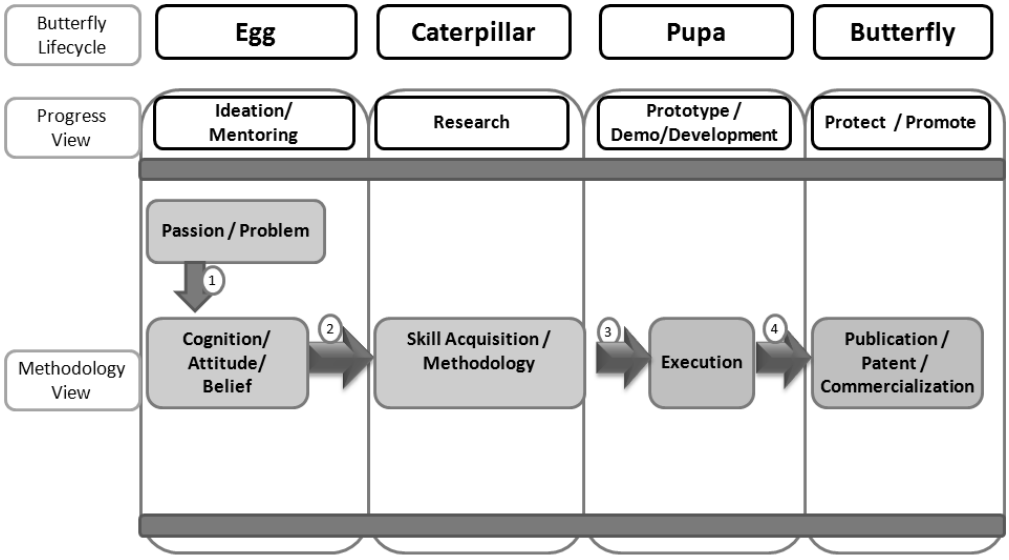


Figure 5: Schematic of the proposed innovation incubation lifecycle in comparison to the Butterfly lifecycle.

Butterfly lifecycle	Innovation Incubation Lifecycle	Remarks
Egg	*Ideation / Mentoring*	Ideas are germinated out of passion or problem. Mentoring is required during this phase. System should provide a lot of inspiration and motivation so that the individual can apply better cognition and right attitude to strengthen the innovative ideas.
Caterpillar	*Research / Methodology*	During this phase, individual belief and knowledge should be strengthened and necessary ecosystem needs to be built.
Pupa	*Prototype Demonstration / Development*	Like a cocoon, from an individual perspective, this is a very crucial phase of the entire process. Individual needs to struggle with minimum support from ecosystem so that individual innovation skills are strengthened.
Butterfly	*Protection and Promotion*	Innovation ecosystem plays a major role during this phase. Individual ideas are to be protected and promoted for commercialization with due credit to individual. This makes innovation process viable and sustainable.

Table 4: Proposed innovation incubation lifecycle phases and details of the phases.

During early stages of this process, mentoring is necessary to inspire individuals to take up the innovation path; and should also cover latest knowledge updates on Science and Technology / Research / Social / Economic / Cultural / Political / Legal / Ecological trends. It is also imperative to encourage and cull out ideas, allow open debate, conduct group discussions and innovation / business case competitions. Finally, it is essential to baseline I^3 (Individual Innovation Index).

For a successful incubation and implementation of innovation lifecycle, we propose an effort distribution where in weightage for each of the lifecycle phases shall be arrived at individually, based on the responses of the individual to the structured instrument. The responses to the instrument were broadly re-grouped into each of the life cycle phases covering 'Ideation / Mentoring', 'Research', 'Prototype Demonstration and Development', and 'Promotion and Protection'. That is, the responses to the 15 questions pertaining to Innovation Traits and the 15 questions pertaining to Innovation Environment were grouped further in terms of the innovation incubation life cycle phases which resulted in responses to 7 questions falling under Ideation / Mentoring category, responses to 11 questions falling under Research category, responses to 6 questions falling under Prototype Demonstration and Development category and responses to 6 questions falling under the Protect and Promote category. Based on the classification of responses, the total score of responses under each of the four categories is computed, normalized and the weights for effort distribution under the innovation incubation lifecycle are derived as follows:

$$\alpha = \left(1 - \frac{\sum a_I}{\sum i_I}\right); \qquad \beta = \left(1 - \frac{\sum a_R}{\sum i_R}\right); \qquad \gamma = \left(1 - \frac{\sum a_D}{\sum i_D}\right); \qquad \delta = \left(1 - \frac{\sum a_P}{\sum i_P}\right);$$

where, $\alpha, \beta, \gamma, and\ \delta$ are the unique weights determined for each individual allotted for incubation efforts in Ideation, Research, Prototype Demonstration/Development and Promotion/Protection respectively); derived for each individual for the innovation incubation lifecycle efforts necessary for transforming the individual 'Seeker' into a 'Performer', based on the individual's responses to the structured instrument. Subscripts I, R, D and P denote the categories pertaining to Ideation, Research, Demonstration / Development and Promote / Protect, respectively.

a and *i* denote the score related to the answer/ response by individual, and the score related to the ideal response respectively.
The ideal score for a response was chosen as 4 and the normalization factors are taken as:

$$\sum i_I = 28;\ \sum i_R = 44,\ \sum i_D = 24;\ \sum i_P = 24;$$

based on the categorization of responses into different lifecycle phases of Ideation (7 responses), Research (11 responses), Prototype Demonstration/ Development (6 responses), and Protection / Promotion (6 responses).

Figure 6 shows a typical effort distribution for transforming a 'Seeker' to a 'Performer'.

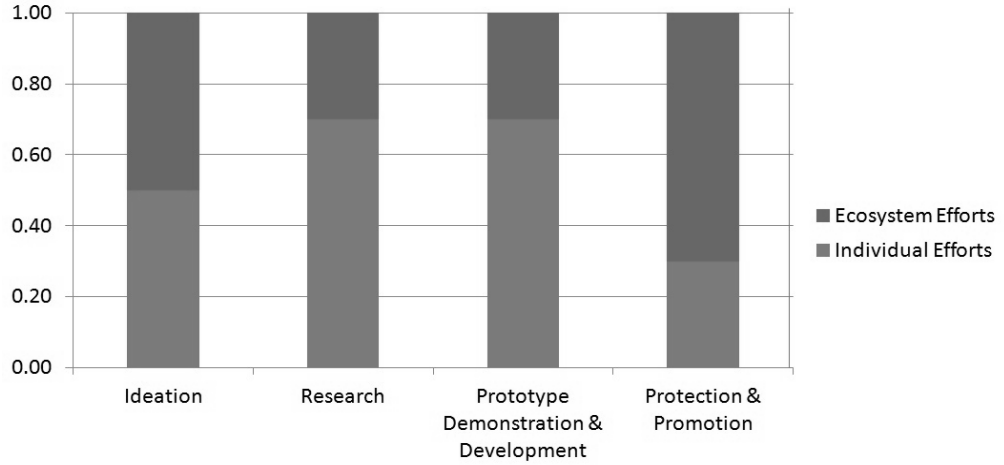


Figure 6: Typical effort distribution in innovation incubation lifecycle of an individual.

VIII. CASE STUDIES FOR INNOVATION INCUBATION LIFECYCLE – VALIDATION

A. Case Study 1- Herbal Green Brush Development

Innovation is not just a matter of luck, eureka moments or alchemy. Nor is it the exclusive province of brilliant individuals. It is strongly believed that innovation can be managed, supported and nurtured, and anyone if they want can become part of it. (Robin Murray et al. 2010).

We therefore used the proposed Innovation Incubation Lifecycle for evaluating and testing our proposal that a structured intervention can transform individuals who were earlier mapped on to the Seekers quadrant of the Individual Innovation Index Matrix, can be transformed into individuals falling under the Performers quadrant by facilitating them through the innovation incubation lifecycle. The structured intervention process is believed to aid in improving both innovation traits as well as arranging right environment.

As a Case Study, we have considered to incubate a team of five individuals (Undergraduate Chemical Engineering students from different backgrounds from a local engineering college) who were mapped on to the Seekers quadrant in the initial I^3 assessment.

The team which initially had a number of wild ideas was advised to focus on specifics and eventually were mentored and facilitated to develop an Herbal Green Tooth Brush as an alternative to the plastic tooth brushes commonly used. During the research and prototype phase, the mentoring role was dramatically reduced. During this phase they got tremendous confidence and finally developed a prototype, which is now being evaluated for commercial production by a local company. We have reassessed the individuals of the team after their success (in nine months time) and observed that their assessment index is now falling in the Performers quadrant. Figure 7 shows the I^3 values of the team in the pre and post intervention periods (separated by a time period of nine months). We therefore conclude that the individuals with the help of the structured intervention facilitated by the innovation incubation life cycle have followed the path of Pioneers and metamorphosed into Performers in a matter of nine months time, thus validating the proposed innovation incubation lifecycle for effectively enhancing the individual innovation index levels.

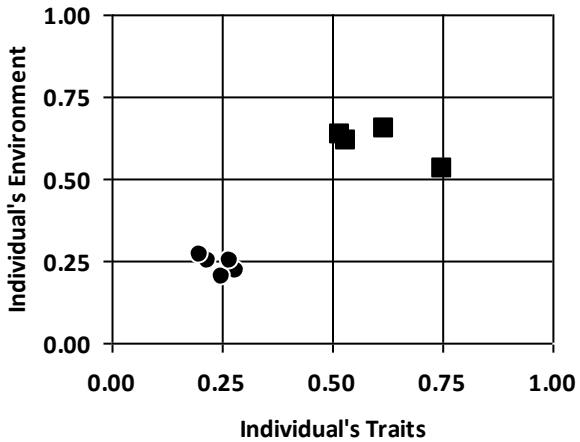


Figure 7: Individual Innovation Index of the study team during pre- and post-intervention phase (*i.e.*, before (●) and after (■) the innovation incubation life cycle implementation). Note that two of the individuals have the same post-intervention scores.

B. Case Study 2- Innovation Traits Training Resulting In Publication of Technical Journal

We have identified 240 students from all the engineering branches of one of the premium engineering colleges of Andhra Pradesh, India for basic innovation traits orientation workshop. These students constitute top 10% of the college from an academic performance perspective. By suggesting that the pre-requisites for innovation are analytical thinking and basic empathy towards societal issues, we exhorted

the students to analyze some of the social problems, come up with engineering solutions and then communicate the same in the form of a cogent manuscript in order to collate into a technical journal which can be peer reviewed and published. We have divided the 240 students into teams of 30 each and conducted 2-day workshops over a period of time. As part of the workshop, students were given orientation on various societal problems, grassroots innovations exhibited across the world and then students were encouraged to solve some of the problems on a run time basis to develop simple, sustainable innovative product designs for the bottom of the pyramid market. The students were then asked to present them using non-chalk and board model (e.g. role play, skit, advertisement, live marketing etc). These presentations were video recorded so that students felt situated on a live platform. Total number of hours spent on these workshop modules were around 8750 man hours over a period of 2 months. At the end of the workshops, we asked students to form teams and write a manuscript on any of the social problem they worked on during the workshop. We asked them to analyze on PESTEL methodology (Political, Economical, Social & Cultural, Technological, Environmental, and Legal). We advised them to take IEEE Journal format for publication. At the end of 2 months period, we had 179 (74.5%) students contributing for articles which were peer reviewed and published as a technical journal, named SPHURTHI- Societal Problems Highlighted Understood Researched To Herald Innovation, which had 58 peer reviewed articles. This publication has enhanced student's confidence and we found some students are now working towards prototypes. In fact the feedback we received from all the students is that the workshops have really helped in developing key traits for innovative thinking.

IX. CONCLUSIONS

In the next decade, nation's strength as well as individual strength is determined by innovations. Innovation deficiency can severely cripple the nation, so the need of the hour is to promote 'Higher Order Thinking', in education system and create a platform for an individual to develop innovation skills. In this day of age, when the country is thinking of setting up innovation universities, it is opined that the seeds for the innovative spirit can be planted into the individual's psyche at a much younger age. We have stressed on the importance of individual innovation and introduced a mechanism to assess and enhance the individual innovation skills. We advocate that the Mission: *Inspire to Innovate* proposed (*and sufficiently demonstrated with case studies*) can be taken across the nation to elevate the future student's empowerment by inculcation of innovation.The proposed I^3 for assessment and enhancement model can be adopted by academic institutions as well as industry with little customization. We therefore opine that, if I^3 can become a standard and used extensively, it can lead to innovative culture over a period of time.

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APPENDIX

INDIVIDUAL INNOVATION INDEX ASSESSMENT QUESTIONNAIRE

Please indicate your personal background details:

- Male/Female
- Class//Year
- Branch/Specialization
- Year of Birth
- Current living place (Urban/Rural/Semi Urban)
- Last 5 years average academic performance (>=80% / >=60% / >= 40% / < 40%)
- I want to settle as (in long term)
  a. Employee or Intrapreneur
  b. Innovator or Inventor
  c. Entrepreneur
  d. Not decided
- Father's and (or) Mother's Occupation
- Brother(s) or Sister(s)'s background
- My key strengths (List top 3)
  -
  -
  -
- My weaknesses (List top 3)
  -
  -
  -
- My future goals
  - 3 years goal
  - 5 years goal
  - 10 years goal
- Which area/domain you would like to work as part of "profession"?
- Which area/domain you would like to pursue as part of "interest / passion"?
- Describe your awareness about innovation? If possible, explain using examples or your own innovation(s).

Part A (Individual Innovation Traits / Propensity)

1. Do you have the desire and openness to do something different and out of box in areas related to any of the following: Science and Technology, Economy, Environment, Politics, Society, Culture, Law?
(A) *Weak desire* (B) *Moderate desire*
(C) *Strong desire* (D) *No desire*

2. Do you have clarity in terms of specific areas of interest or specific innovative ideas to work on?
(A) *Not yet decided* (B) *Clear idea*
(C) *Poor idea* (D) *Moderate idea*

3. Outside your academics, have you been working on innovative idea(s) in any of the following areas: Science and Technology, Economy, Environment, Politics, Society, Culture, Law?
(A) *Just started thinking* (B) *Work in progress*
(C) *Received results (Positive or Negative)*
(D) *Not applicable*

4. How long have you been pursuing your idea(s)?
(A) *More than 1 year* (B) *6 months-1 year*
(C) *3 months- 6 months* (D) *Not applicable*

5. Are you optimistic and believe that failures are stepping stones to success?
(A) A*gree* (B) *Strongly Agree*
(C) *Undecided* (D) *Disagree*

6. What are your motivational levels? Rate yourself in terms of sincerity, curiosity, questioning, hard work and tendency to obtain concrete results?
(A) *Poor* (B) *Moderate* (C) *Bad* (D) Strong

7. Did you collaborate with any other 'innovator' or 'organization' to prove your innovative idea?
(A) *Not yet planned* (B) *Collaborated but failed*
(C) Successfully collaborated (D) *Not applicable*

8. I have not succeeded but I am still working on the innovative idea (s)?
(A) *Initial failures have been converted into learning outcome*
(B) *Initial failures are being analyzed*
(C) *Yet to experience any result* (D) *Not Applicable*

9. Can you work in uncertain environment regardless of guidance? Specify your capacity?
(A) *Moderate capacity* (B) *Low capacity*
(C) Strong *capacity* (D) *No capacity*

10. Can you guide, inspire and motivate teams? Categorize your team management strength
(A) *No opportunity to prove* (B) *Poor*
(C) *Moderate* (D) Strong

11. During my free time, I work on technical and non technical issues which do not fail in the preview of my regular curriculum or workload?
(A) *Not true* (B) *Sometimes true*
(C) Sometimes false (D) *True*

12. I have been working on my innovative idea (s) in the following environment
(A) *Challenging Environment* (B) *Conducive Environment*
(C) Neither challenging nor conductive *Environment*
(D) *Not Applicable*

13. Have any of your innovations been proved in terms of filing/receiving patents/ making a mark in the society? Classify your success as:
(A) *Strongly proved* (B) *Moderately proved*
(C) *Weak* (D) *Not applicable*

14. My experience as a successful team member or team lead in research/ technology / charitable / cultural projects is a result of my involvement in
(A) *A single project* (B) *Multiple projects*
(C) *Ongoing project(s)* (D) *Not applicable*

15. What is your true inspiration in pursuing your idea/ innovation?
(A) *Money and Recognition* (B) *Self satisfaction*
(C) *External influence* (D) *Not applicable*

<u>Part B</u> (Individual Environment)

1. Rate your flexibility (in terms of time and resources) at home/work place to work on your passion and dreams?
(A) *Low flexibility* (B) *Moderate flexibility*
(C) *High flexibility* (D) *Don't know*

2. Do your family/friends (peers) support your passion and dreams?
(A) *Moderately supportive* (B) *Highly supportive*
(C) *Poorly supportive* (D) *Discourage*

3. Does your work place or educational institution support innovative ideas and higher order thinking?
(A) *Highly supportive* (B) *Moderately supportive*
(C) *Poorly supportive* (D) *Discourage*

4. Do you have access to R&D resources and people who work on innovative ideas?
(A) Not explored (B) *Moderate*
(C) *Low* (D) *Highly accessible*

5. Quantify the degree of peer pressure on you, for securing high marks in your examinations?
(A) *No pressure* (B) *Low pressure*
(C) *Moderate pressure* (D) *High pressure*

6. Are you accepted and supported by your peers when you take one of the following professions?
(A) *Become Entrepreneur with your idea*
(B) *Become a fulltime innovator or inventor or researcher*
(C) *Work for an organization but be a part time innovator*
(D) *Employee without any additional responsibilities*

7. Share your experience of collaboration with any other innovator or organization while pursuing your idea/innovation?
(A) *Moderately supportive* (B) *Poorly supportive*
(C) *Highly supportive* (D) *Not applicable*

8. Which one of the following situation describes you?
(A) *I have financial/social constraints but still want to pursue my goals at any cost*
(B) *I don't have financial/social constraints and want to pursue my goals*
(C) *I have financial/social constraints, but I will pursue my goals later*
(D) *I don't have financial/social constraints, but don't want to pursue any goals*

9. Share your working experience with your innovation team (if any) while pursuing your idea/innovation?
(A) *Not applicable* (B) *Poorly supportive*
(C) *Highly supportive* (D) M*oderately supportive*

10. How do you describe your current living location social environment?
(A) *Ambitious and positively charged for social good*
(B) *Pleasant and neutral environment*
(C) *Disturbed and negatively charged*
(D) *No opinion*

11. Can you rate the availability of competent people for forming a full-fledged team in order to purse your innovation?
(A) *Moderately available* (B) *Not available*
(C) *Highly available* (D) *Not applicable*

12. Do you have mentor(s) to guide your idea/innovation?
(A) *Yes and accessible at all times*
(B) *Yes, but have limited access*
(C) *No*
(D) *I don't believe in mentors*

13. Share your working experience with the government and public policies while pursuing your idea/innovation?
(A) *Moderately supportive* (B) *Poorly supportive*
(C) *Highly supportive* (D) *Not applicable*

14. Do you have access to investment for implementation of your idea(s)?
(A) *Yes and immediate access*
(B) *Yes, but not immediate*
(C) *No*
(D) *I will never invest*

15. Do you have healthy market environment to scale your innovation?
(A) *Not applicable* (B) *Poorly supportive*
(C) *Highly supportive* (D) *Moderately Supportive*