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DEVELOPMENT OF A HOLISTIC APPROACH TOWARDS ENGINEERING EDUCATION FOR REDUCING HUMAN-CAPITAL WASTE

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Abstract
The objective of the study is to learn the state of affairs in the Engineering education in the private sector. The study reveals the aptitudes, technical skills, social and ethical concerns of the engineering students and also the factors responsible for poor employability skills of the such students. The study also identifies the areas in which improvement required in the educational systems. Through this article, an exploration is being made about the psychological impact on the Engineering students with reference to the poor job placements. A detailed study is made through personal interviews and conduct of questionnaires to understand the problems and a number of plausible solutions are also investigated. It is clearly understood through personal interactions with the randomly selected students that many of them are disillusioned about their future prospects and a special kind of frustration-related symptoms are getting prominent through their external behaviors and thought-patterns. Indirectly the standard of education, environment, support, infrastructure and motive of the institutions in the private sector also get revealed. A practical solution to the problems is being sought.

Introduction
The problems facing the Engineering students in the private sector in West Bengal are quite varied in nature depending upon infrastructural facilities available for preparing and grooming them for meeting industry requirements. The most prominent aspect is the confusion among the students' community regarding their future prospects. Poor job-placement is a serious matter requiring attention from the general public as well as the government. Poor employability skill and lack of aptitude among the students are the most cited reasons given by the industry experts and the academicians. Instead of debating about these aspects, we can investigate into the educational systems in terms of system inputs and outputs. Through a study conducted, a number of causal factors have been identified in the private engineering colleges.   The state of affairs in various engineering colleges need serious attention from top academicians and government administrators. It is now well known that we in India need technically skilled manpower that could compete with the best in the world, in terms of technical skills, research skills, social skills, managerial, and leadership skills. For such a thing to occur, we need to put concerted efforts towards improvement of the existing system in various dimensions such as revised curriculum, reduction of mental burden among the students, participation of the students in social and cultural activities, technical expertise in specialized domain, hardware-based skills, researching and project-execution skills. Revamping of the curriculum that fulfills the exact requirements of the Indian industries. Students in private engineering colleges possess a certain level intellect and abilities and hence a special focus should be placed on the special issues of the those students who may not be at par in merit with the students of the top-class universities and development activities that suit their needs, aspirations, as well match with industry requirements . Employable skills only should be sharpened and developed in a span of four years. Even we can think of 3-year B.Tech. Course to fulfill the employability requirements of the industries/entrepreneurship development and a 4-year B.Tech. Course for researches and higher education. Students in the private engineering colleges need a different kinds of training anA confused student then is unable to concentrate on studies and slowly reaches a point of frustration and consequent depression.

Questionnaire-based study, the analysis of the data collected and the conclusions
To make the study objective and unbiased, an elaborate questionnaire has been design to explore the thought-patterns and general behaviors of the students:

Questionnaire on the level of optimism among the students in the private Engineering Institutions (Depressive states to Optimistic states):

Evaluate each of the questions (QN1-QN24) with score lying between 1-10

1. You have admitted yourself in a B.Tech. Level course to gain knowledge about Engineering and Technology and to make a career in Engineering for living a better life. Assess the standard of existing education with reference to your expected level of academic excellence. (quality of education, academic ambience, educational infrastructure and facilities for grooming the future leaders and technocrats of the society)

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2. Are you really focused on studies related to your chosen field of Engineering? (aptitude for learning specialized Engineering subjects)
3. How do you assess the job-prospect for yourself? (awareness about job-market and self-confidence for grabbing the opportunities)
4. In the context of present job-market scenario, how much prepared are you to grab a job for yourself? (quality of education received through the existing system of education)
5. How much self-confident are you regarding your chance of making a stable career in Engineering? (vision, self-confidence and preparedness of the candidates)
6. Do you suffer from any kind of frustration regarding your future prospects? (measure of optimism)
7. How much are you geared up higher education after B.Tech?? (aptitude for attaining higher education)
8. Will you opt for R&D after completing B.Tech./M.Tech? (research-interest and motivation based on quality of education)
9. Do you have sufficient level of mental concentration for learning the subjects taught in the college? (real interest in the subject-matter of study)
10. Are you optimistic about your future financial and social securities? (clear vision of the future)
11. How much a positive thinker are you regarding securing a bright future for yourself? (optimism)
12. Are you able to spend your leisure time creatively so that you can derive enormous mental pleasure and satisfaction? (clear vision and philosophy of life)
13. Are you physically fit to face hard times in a job in the highly competitive working environment? (health and fitness)
14. Do you take physical exercise regularly to keep your fit and energetic?(lifestyle pattern as part of holistic education)
15. Do you take part in sports and games regularly? (character-building exercise and healthy competition)
16. Do you have enough sense of humor in your daily life?   (enjoyment of life in variety of dimensions to withstand stress
17. Do you have enough friends who can guide you in need? (friendly environment)
18. Do you feel helpless and depressed while facing life in general? (level of positive thinking, will power and self-improvement philosophy)
19. In case you do not get a suitable job, do you have some alternative means of building a career? (level of entrepreneurial skills obtained from the educational systems)
20. Did you think of various alternative options for yourself, in the event of not getting a job/admission into an M.Tech? Course? (level of creativity, innovation and entrepreneurship)
21. Do you receive enough guidance/mentoring in your hard times ?(Institutional support, guidance and counseling division)
22. Do you have an attitude of helping others facing bad times? (quality of human and ethical environment)
23. Do you have an attitude of serving the needy and distressed when you would be established in life? (understanding of the ethical aspects of life during student-days)
24. Do you enjoy enough sleep and relaxation after day's work? (educational stress and balance in lifestyle)

ANALYSIS OF DATA(mean values of score against each question for 150 respondents is tabulated below)

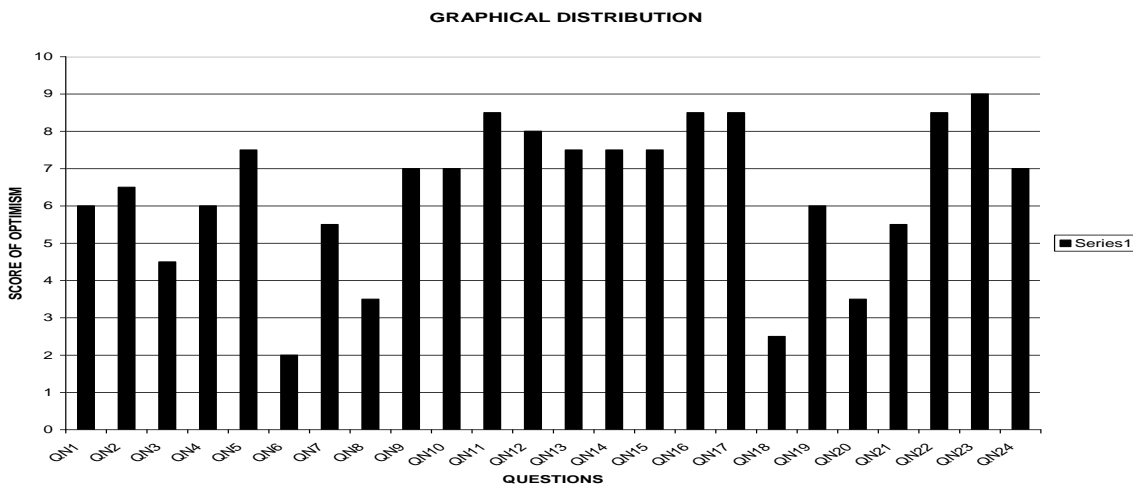|	
QN1	6
QN2	6.5
QN3	4.5
QN4	6
QN5	7.5
QN6	2
QN7	5.5
QN8	3.5
QN9	7
QN10	7
QN11	8.5
QN12	8

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QN13	7.5
QN14	7.5
QN15	7.5
QN16	8.5
QN17	8.5
QN18	2.5
QN19	6
QN20	3.5
QN21	5.5
QN22	8.5
QN23	9
QN24	7
AVG.=	**6.5**

STANDARD DEVIATION=0.707

RESULTS FROM RANDOMLY SELECTED 150 STUDENTS FROM 3 ENGINEERING COLLEGES

Lower average scores have been found for the following questions: Core areas of deficiencies

Lack of public awareness regarding Engineering career
QN1: You have admitted yourself in a B.Tech. Level course to gain knowledge about Engineering and Technology and to make a career in Engineering for living a better life.

Assess the standard of existing education with reference to your expected level of academic excellence. (Score of 6 indicates that majority of the students have little knowledge and interest about Engineering or Technology career and their choice is driven more by new circumstances of rise in number of engineering colleges than their aptitude and interest towards science and engineering career)

Lack of personality development training programs for the students
QN3: How do you assess the job-prospect for yourself? : 4.5(showing lower self-confidence for oneself)

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QN6: Do you suffer from any kind of frustration regarding your future prospects: 2(as most of the students are from economically sound background and many of them do not have a clear vision of the future competitive world in a globalized society. The frustration arises of not being able to cope up with financial difficulties and such a situation occurs only for remaining employed after passing out, for a longer period of time. The young students have least experience of financial difficulty and displays least kind of frustration during their studentships at the colleges)

Insufficient Mentoring Scheme
Do you receive enough guidance/mentoring in your hard times? QN21 (mean value of 3.5) (showing lack of will and initiative among the management of the institutes to nurture the talents with the prime object of national development in the form of providing skilled man-power). Hence, mentoring should be strengthened to keep the students motivated and focused on their skills-development process. Regular interaction and morale boost-up process need highly skilled resource persons and faculty members in the institutes. For implementing such schemes, systematic and planned Faculty Development Programs should be organized on a periodical basis.

Quality of educationQN8 (mean value of 3.5)
Will you opt for R&D after completing B.Tech./M.Tech? 3.5(students do not have top-level intellectual ability, according to the JEE ranks of the students admitted, that could stimulate research ideas, and they receive least mentoring for developing creativity and innovation. Researches in any field require in depth Understanding of the fundamentals of various interdisciplinary subjects and in a semester type educational systems for and he average students, it cannot be expected that students gain sufficient knowledge and skills for conducting research in an Engineering domain. The burden of syllabi and extensive variations in the subject-matter are two main causes behind failure of the students in grasping the subjects at research-level)

Lack of entrepreneurship skills
In case you do not get a suitable job, do you have some alternative means of building a career? QN19: mean value of 2.5(competition in the job market being stiff and employability skills being moderate, entrepreneurship skills development etc, has taken a back seat, as there is little efforts by the educators/governmental agencies) in training up/supporting future entrepreneurs.)

Specialized Counseling and Training Inputs
QN18 (mean value being 2.5): Do you feel helpless and depressed while facing life in general?

The poor score shows lack of care and counseling on the part of management of the institutes. If the mission and vision of the institutes, as usually given in writing, are not followed in practice, there is bound to be a situation where frustration among the learners will become more and more prominent. The cause behind the depression is that the students feel neglected in their respective temples of learning. Profit-motive should slowly be removed from all kinds of educational system.)

Analysis of the Questionnaire-based study
The level of optimism being 6.5 on an average out of highest value of 10 shows that we need to improve the environment so that the students attain a greater level of energy, enthusiasm, optimism, employability skills, entrepreneurial inspiration and motivation, focus on both technical and social skills. Such a situation will require revamping the educational infrastructure that would be able to address the core issues of providing technically skilled manpower for a more powerful India in the future times. Curriculum development should be based on real-life industry requirements and as well as researches for development of indigenous technologies. Instead of providing wide ranges of theoretical subjects, we should make it more and more practice-oriented, project-based, research-based, and design-oriented on specializations at the very B.Tech. Level courses. It is possibly a sheer waste of human capital that remain focused on primarily on theory, diagrams and mathematical modeling. Industry-level practical problems should be made a part and parcel of the curriculum.

The numerical answers will indicate the level of personality disorders of the students, and the average value, to be calculated with various credit points, hence will represent the overall psychological state(ranging from depressed to normal) of the students. Through this study we can learn about the educational and supportive environment offered by the private sector institutions for budding engineers who are supposed to lead the society in the future. We can identify the factors causing such disorders and frustration among the Engineering students. Broadly speaking, there are economic, social, political, cultural, and global and various other psychological factors which can cause damage to the mental and behavioral states among the young minds. But in this observational study involving the Engineering students, the focus will be to identify the intensities of various factors responsible for poor employability skills and lack of positive attitudes among the students.

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Other than the conduct of questionnaire, many other ways of interaction with students' affairs give a clear picture about the stress-related personality disorders among most of the students. The attendance level in the class shows the deterioration of motivation towards learning. This problem has grown multifold in the last few years. Students are more interested in getting a job by any means. They are least interested in learning through class-room lectures. A new trend has already developed in education in engineering colleges in West Bengal. The students are seeking the path of least work for obtaining a University degree. Recent phenomenon of economic recession and poor job openings developed some sort of fear, uncertainty and frustration among the students' community. Many students are now thinking about grabbing government jobs for a more secure life. There is firm conviction among the students that private sector jobs involves excessive pressure and have less job-security. It has been observed that the number of candidates appearing in M.Tech. Entrance examination (GATE) has grown many times in recent years. But the number of seats has not been increased much. Many of the students feel that they would be joining almost any kind of jobs after completing their degrees. The percentage of students who could secure jobs for themselves is in the range of 10 to 40.

In addition to the above, there is parental pressure on the students to achieve greatest things of life in the shortest possible time. The achievement-driven life also has a negative impact on the minds of the weaker students. At the same time, there is lack of competent faculties who can mentor the students.

Under such circumstances, the students with middle-class economic background are the worst sufferers of mental disillusionment, frustration, negative thinking and depression. These characteristics are getting more and more prominent, as observed during class-room interaction. The behavioral characteristics have changed drastically. Majority of the students prefer not to attend class and spend times in different kinds of addiction. Due to such attitudes there is a growing number of violence within or in and around the campus. It indirectly depicts the level of frustration among the students.

Plausible Solutions to the problems

In West Bengal, the setting up of an Engineering college has almost become a fashion for a section of the wealthy. In a span of 5-7 years more than 60 colleges have been set up without much concern for the quality of education to be imparted. For Engineering education, a minimum level of merit of the candidates is essentially required, whereas the JEE rank goes as high as 100,000 and more. Some of these candidates are allowed to study some of the toughest subjects in Engineering and Technology. The infrastructure of the college including Faculty and Laboratories, Space, Canteen, Playground, Common Room etc can be termed as insufficient. The students cannot be trained and developed intellectually in most of these colleges.

Focus should be on development of:

- Hard-core, specialized technical skills
- Social, interpersonal, communication and soft-skills
- Managerial and leadership skills

The most important task inb this regard is to devise the curricula in such a manner that would consider all the above-mentioned aspects in a balanced manner. The focus should on providing technically skilled manpower for improving productivity as well as developing indigenous, eco-friendly technologies for nation building.

To find a solution for problems of such magnitude, the government and AICTE should sit together and discuss about the measures to be taken so that the individual institutes take swift measures in enhancing the process of development of infrastructure for grooming the students. The student intake capacity can also be reduced in specific cases so as to ensure higher quality of education.

Conclusions

AICTE and the concerned University are doing nothing to ensure good quality of education to the students. Political masters of the country are to be blamed for such a state of affairs. There should be more awareness among the general masses regarding the quality of technical education. The students should consider various other options after completion of their degree programs. Many of them may opt for entrepreneurship. The personality disorders of the negative thinkers can also be corrected through a combination of counseling and training. The students should be exposed to variety of options before them and the college authority should take the responsibility for grooming them on flexibility, dynamism, soft skills, leadership, venturing into business, going in for higher studies etc.

Scope for Further Studies

There is enough scope for further studies on the subject. Behavioral patterns of the students can be studied in more detail. Disorders may be studied in detail under the scope of Human Psychology and Organizational Psychology.

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