A Study on the Corporate Expectations from Engineering Graduates in India – Bangalore

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Abstract: *Entrepreneurship, Material, Methods, Money and Human resources are the five major resources of humans. Human resource stands out since it's a live entity; it's the unifying factor among all the resources since in its absence the others automatically seize to exist. In the world today Human resource has grown to unexpected levels, it has gone beyond planning, sustaining controlling, monitoring and developing since its now actively contributing to core of the organizations through Human resource audit. This shows that there is a paradigm shift in the way Human resource is perceived. Human resource professionals greatly influence determination of any organization's strategic planning through bringing new skill sets, accurate forecasting and filling the human resource needs. Their skills influence the organization mostly in developing, hiring and training, both the new and the experienced resources. In this study, the author focuses on the corporate expectations from engineering graduates in India.*

A methodical combination of an abstract structure and practical study is applied for the function. The abstract structure is through a decisive review of pertinent literature while the experimental part of the work is dependent on the decisive study and scrutiny of the responses given by the graduates to the structured questionnaire.

The primary output of the literature survey and the results of the experimental study articulately amalgamated would greatly assist in comprehending the corporate expectations of the engineering graduates.

I. Introduction

There are many expectations in the young minds of graduating engineers in India today. This can also be referred to as their perception of the scenario after college. What are the exact expectations of the engineering graduates from the corporate world in India? Is it influenced by the individual graduate or is it as a result of the education that they receive from the Universities? What is their opinion regarding the relevancy of the training attained in college in relation to their corporate expectations?

The main aim of university education today is molding and furnishing students to be ready to face the challenges and responsibilities in their future. This therefore requires the education be value based with the ability to synthesize the morals of the student individually. It has been very compelling to the education system to give high quality education which meets the international standards this is with regard to the global demands, technology and scenario on the inception of skills on the input side and the fast changing products and services on the output side. It's a very unfortunate case that Indian universities have not featured in the world top universities list with the main reasons being lack of advanced teaching and learning process, reduced investments, and missing out in research involvement.

Due to this ever growing demand for high quality education and the minimal resources being provided by the government the private sector has venture in this field in a mighty way in India today. In the world at large, the top universities are the major influencers of the results in the private sector, these are such as Stanford and Harvard.

The acquisition of employment in the competitive environment and sustaining the same demands a high degree of adaptability in today's fresh engineers. The quick and dynamic changes in the industry globally may be attributed to the workforce worldwide, dynamically changing specifications of products and services, heightened competition and changing technology. Employers today prefer to hire young and energetic engineers who have the potential of becoming future leaders and possess skills to motivate the team members to take sensibleresourcefulness.

Now that we have covered the demand side of this situation, when we come to the supply side, we encounter a multifaceted system of academics and the output. It is evident that the stress of education in universitieshas moved more towards training for jobs and trying to make graduates 'Job-fit' as a result of their program of study and laboratory/project practice at the learning centers from the commencement of the this century.

India produces a large number of engineers each year, but there are complaints from the industrial sector due to lack of the preferred quality of engineers. This is a concern since the success of the industries in India is dependent on the value and quality of the engineering education in the country.Most of the bright students in India nowadays opt to take engineering courses on completion of their pre-university education. This may be attributed to the increased number of people in the middle class and the upper class in conjunction with the predominant global market in the area of engineering equipment's, automobiles, software and others. This demand for engineering courses has resulted to increased creation of engineering institutions but due to the low quality of education they deliver, there has been the problem of unemployment of a substantial number of the fresh graduates.

This problematic issue is multiplied by the interest levels of the students that join this colleges and their quality as students. For instance there are institutes such as ITTs which gives an entrance test on their freshmen after they have passed in their pre university education; hence they produce high quality engineers. Others who don't do such a test to filter out their students end up producing a large number of engineers of which majority are of unexceptional quality if gauged in terms of critical thinking and their abilities in problem solving.

Due to influences from family, peer pressure and lacking proper guidance from high school. Perusing an engineering degree has changed to a default cause of action in many situations instead of the student going through a thoughtful decision making process to come up with their right course for themselves. In high school today, the education system used does not encourage creative thinking among the students but only emphasizes on memorizing and cramming. This has a major negative impact on potential engineers in the system since creativity and original thinking are the major pillars in the life of practicing engineering. Hence they are critical qualities that an engineer should possess. With this kind of system is it really logical to expect quality engineers from such a system? Another issue is the fact the student who hail from the cities and have educated parents tend to have it easier when it comes to acquiring a job while those who come from the rural areas have a pretty hard time. This is not based on their skills in engineering but actually it just because they have better communication abilities. In the long run this will result to India being just but a mass producer of engineers.

It came as a surprise when a company started by MIT alumnus called Aspiring Minds, in 2008, carried out a study, in which gave results suggesting that a third of our engineers lack mathematical required in our daily life for doing simple counting, transactions & arranging, weak in using decimals, powers, operations, ratio, fractions and the ability to apply these concepts to real-world problems. In this paper, the discussion will be about the corporate expectations from young engineering graduates focusing on the skills that required by them to being employable. Hence, it is inevitable for the fresh engineers to know what they know and what they should be equipped with to attain and sustain a gainful employment in today's dynamically competitive world.

The consideration takes a tripod stand approach with regard to data collection from Industry (Demand side), Academic faculty (Means side) and the Students (Resource side), the major stakeholders. The structured questionnaire which has been used to collect the opinion of the students also seek their thoughtful feel or assessment on efforts from the institutions in gearing them up for employment, awareness of & sensitivity to the demands by the industry and suggestions as they think as solutions.

The questionnaire explores their apparentopinions by asking both closed-ended & open-ended questions. The major skill sets considered for the study are:
1. Attitude (Sincerity, Can-Do, Ownership/Motivation).
2. Business Ethics/Honesty.
3. Grooming/Confidence.
4. Communication Skills.
5. General Awareness.
6. Basic Managerial Skills (Leadership, Teamwork, Time Management, etc.).
7. Basic Sales and Customer Service (most entry level jobs require one of these).
8. Domain Knowledge.

II.   Literature Review
In the article 'The Entry-Level Engineer: Problems in the Transition from Student to Professional' by Susan M. Katz, she has covered the difficulties that the student go through during this transformation. The author points out that skills essential at the place of work such as team work, communication among peers and their supervisors are missing since they are not instilled in them while in college. Many employing institutions have now come up with programs so as to cope with this deficiencies. The author also suggest that academicians should come up with ways to best prepare the students for the corporate world and things that the students themselves should do so as they can ease the transition.

Due to the gap between theory and practice the graduates joining the industry require up to about two years gestation period for them to show their input in the company, in many situations they end up leaving the company without giving any input in the organization or company (Modi, 2009).

Despite the long-term decline in engineering manufacturing in our economy, there have been continued strong demand in the engineering skills especially in the telecommunications and electronics sectors. A considerable number of employers in the engineering sector experience challenges while employing engineers due to lack of personnel possessing relevant skills and experience. This gap is mostly evident in areas of practical and technical skills, the demand is also there for the generic and personal skills. This is according to the article 'An assessment of Skills Needs in Engineering' by Connor H, Dench S and Bates P.

Most of the universities have created meetings so as to have a platform that encourages linking of the academia and the industry. This is in the attempt to bridge the gap between the wants by the industry and the skills being taught in the institutions. The industry ends up being annoyed due to the institutions lack of focus on the essential practical skills and subjects while the academia's view the industry as narrow and shallow. With such results the meetings end up being unsuccessful. Researchers have now come up with a better model which is focused on shared learning repository by the collaboration between the academics and the industry. This is according to the article 'Forming a Dialogue with Academia, Industry Requirements Versus Academic Programs' by theTimothy D. Wells and ChristneSevilla.

In a study on competency needs analysis and quality factors for fresh recruits by M. Vijayakumar and Dr. S. Ramalingam. They focused on the method and process used by the companies including the strategies and the challenges that they face. They took into consideration what the employers expect and what the candidates offer as their key competencies. They tried to bring out the factors that are commonly considered in the interview and their order of preference (Vijayakumar, 2012).

In the article 'Engineering education in the context of labor market requirements and expectations - Polish experiences', AgataPradela has studied on the process of engineering education. The most important issues, challenges and problems connected with higher education are described, such as educational trends, the low quality of education at schools (in the opinion of academics), demographic gaps and the lack of monitoring of labor market requirements. he highlights system solutions of engineering education and activities that support engineering education such as career service, technology transfer, co-operation between employers and universities, and research on matters relating to students' and graduates' careers. The author has come up with the determinants and perspectives of engineering education (Agata, 2012).

In the paper 'An Empirical Study on Expectations of Industry from Academia', Prof. Neeraj K. Dubey, Dr. SaurabhGoyal, Prof. Ravindra Pathak, Dr.Uday Singh Rajput tried to explore gap between industry expectations and quality of recent college graduates. They tried to create an active interface between industry and academia. In the study they have considered 12 determinants of employability namely-soft skills, leadership qualities, suitability, analytical power, ethical component, dressing sense, language, appearance, manageability, training needs, industry's view and professional commitment. The results indicated the importance of soft skills and other criteria along with the basic theoretical knowledge.

The study done by FICCI on 'Industry – Academia Convergence "Bridging the Skill Gap", talks about the need for effective intervention to understand employer needs, variable sector specific skills, training requirements that improve business performance, articulation of business expectations in education institutions and engagement of industry leaders with higher education institutions. Given its mandate, FICCI through the platform of Industry – Academia Convergence, endeavors to bring together higher education institutions and employers to evolve modalities for collaboration with the aim to meet India's medium and long – term skills and business needs for the 21st century.

Need For The Study

Knowledge Commission of India recommends opening up of the field of Higher Education to meet with the growing economic needs of the country. Based on this and looking at the ever increasing demand for engineering seats, a large number of private engineering institutions offered engineering courses. As per TNN-Times News Network of 28th Feb 2012, India is now home to 3,393 engineering colleges that have 14.86 lakh seats. Five states of Andhra Pradesh, Karnataka, Maharashtra, Tamilnadu and Uttar Pradesh alone have about 70% of technical institutes. With such large supply on one end, leading industrialists and NASCOM on the other end state that only 15% to 25% of technical graduates are employable.

Why our corporate leaders and industrialists are not satisfied with today's graduates? Why In spite of so many technical institutions producing such large number of graduates, why our corporate leaders remain unsatisfied? Obviously, the indicator is surely towards the holistic quality and quantity is not an issue. Further, lakhs of seats lie vacant after the admissions are completed. (When admissions closed in the year 2011-12, AICTE estimated that nearly three lakh seats were unfilled).

With the literature survey referred and opinions of the students, who are the primary stake holders in terms of contributing to our nation's economy, studied, it is more clear now than earlier that specific skill sets what industry's seeks is lacking in the students aspiring to be the employees. Hence the need for this study is prompted to understand the very expectation of engineering graduates on the corporate world. This will enable comparison of these findings with the expectations of the corporate industries so as to bridge the gap in between.

Objectives
- To research on whether the engineering graduates know what they know with focus on the skills.
- To analyze and list the engineering graduates corporate expectations in India.

Primary and Secondary Data
The data used in this research will be solely collected through the use of a questionnaire containing both open ended and close ended questions. With regard to this, the data used will be mostly primary data. The secondary data referred to in this research will be from the cited areas in the literature review.

III. Research Methodology
Data collection Procedure
The survey was carried out on graduate engineering students from colleges in the Bangalore region. Most of the colleges were under the Visvesvaraya Technological University. The method used, as earlier mentioned, was a questionnaire (paper based) containing both open ended and close ended questions. The open ended questions are intended for unlimited and impulsive perspectives while the closed ended ones are to implore valid and easy to analyze responses. It was designed to focus on various aspects which are as listed:
- The skill sets that they in college
- Facilities available in their colleges in terms of infrastructure.
- The amount of practical exposure that they got during their time in college.
- The experience they gained in terms of projects and work.
- The preparations they had for placement.
- Opinion on the corporate expectations.
- Their view on their personal suitability to the industry.

The sample size consisted of a total of 990 graduates who had taken Electrical and Electronics engineering. On the analysis of the responses, they were grouped into clusters as per the ideas for effective representation of the ideas.

IV. Analysis And Results

Kind of Industry that they would like to join					
	Electrical Company	**Telecommunications**	**Information Technology**	**Automobile**	**Others**
No. of Graduates	554	228	119	49	40
Percentage	55.96%	23.03%	12.02%	4.95%	4.04%

For the first question which was on the kind of industry the graduates would like to be part of, 78.99% opted either an Electric Company or a Telecommunications Company. Most of them stated that their reason was due to the growth and job security in the two sectors as compared to the Information Technology sector despite it paying better salaries. This is well illustrated in the table and the chart below:
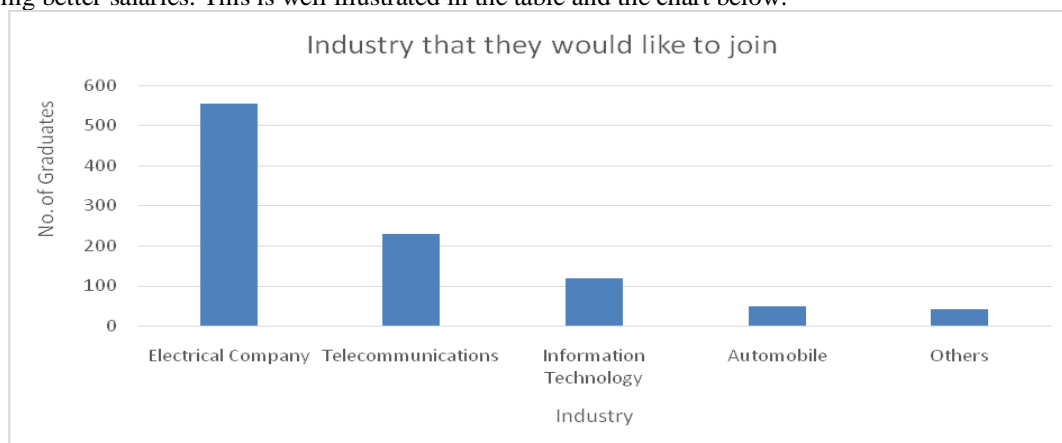
Regarding the kind of functions they were interested in, from the table below it is evident that design takes 33.94% and R&D 31.01% respectively. The rest share approximately 10% to 12% as illustrated in the chart.

| Kind of function interested in						
	Design	**Production**	**Testing**	**R & D**	**Marketing**	**Others**
No. of Students	336	99	119	307	99	30
Percentages	33.94%	10.00%	12.02%	31.01%	10.00%	3.03%
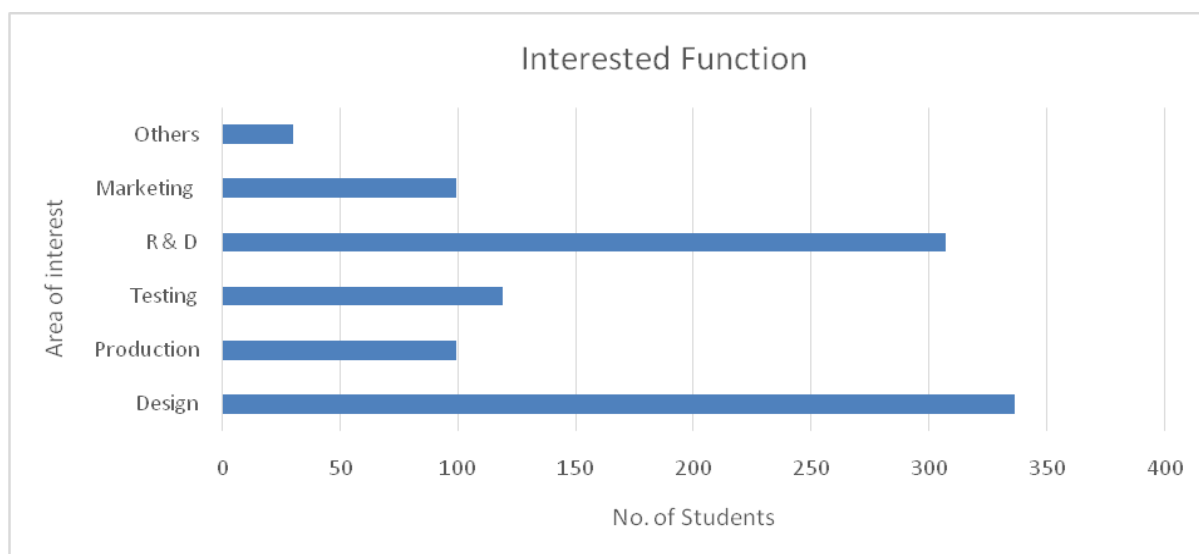
The graduates identified communication skills as the critical requirement for them under the category of soft skills. This may be observed in the pie chart and the details are in the table. Positive attitude is seen to closely follow communication skills.

Soft skills required for getting employed						
	Communication Skills	**Positive attitude**	**Team work**	**Leadership**	**Decision making**	**Others**
No. of Responses	3103	2069	1432	398	876	80
Percentage	38.99%	26.00%	17.99%	5.00%	11.01%	1.01%
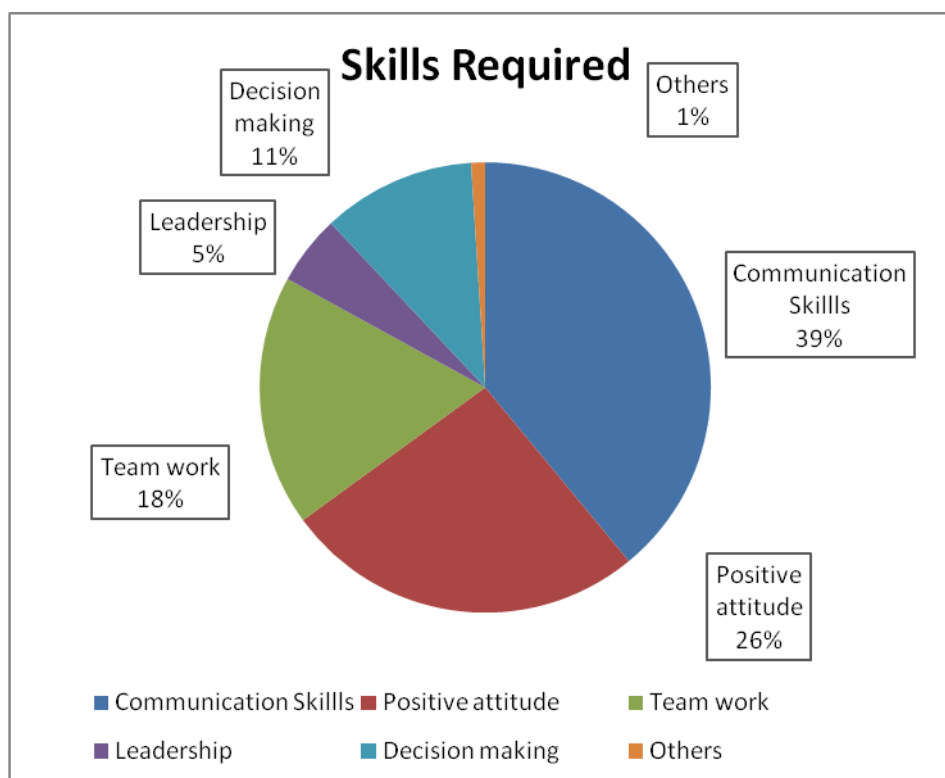
On the open ended question, the graduates gave a wide range of answers on the inputs of competency provided by their respective colleges. To make the analysis much simpler, the attributes were computed into 20 groups. The responses were then categorized into these groups as tabulated in the table below. This shows that the colleges mainly focus on the soft skills or interview skills followed by Personality development programs while laboratory and Industrial interaction take the trailing toll at seventeenth and Nineteenth position respectively. They are tabulated in descending order and thereafter illustrated in a chart.

No.	Attributes	Respondents
1	Soft skills, Interview and ethics	97
2	Personality Development Programs	54
3	Technical skills	38
4	Communication Skills	34
5	Placement training	27
6	Workshops	25
7	Self confidence and think out of the box	21
8	Seminars	17
9	Managerial skills	13
10	Projects	9
11	Aptitude, QT and reasoning	9
12	Motivation skill, Hard work	8
13	Programming skills	7
14	Teamwork	7
15	Design and application	6
16	Positive attitude	4
17	Practical labs	3
18	Assignment	2
19	Industry Interaction	2
20	Current Affairs	1
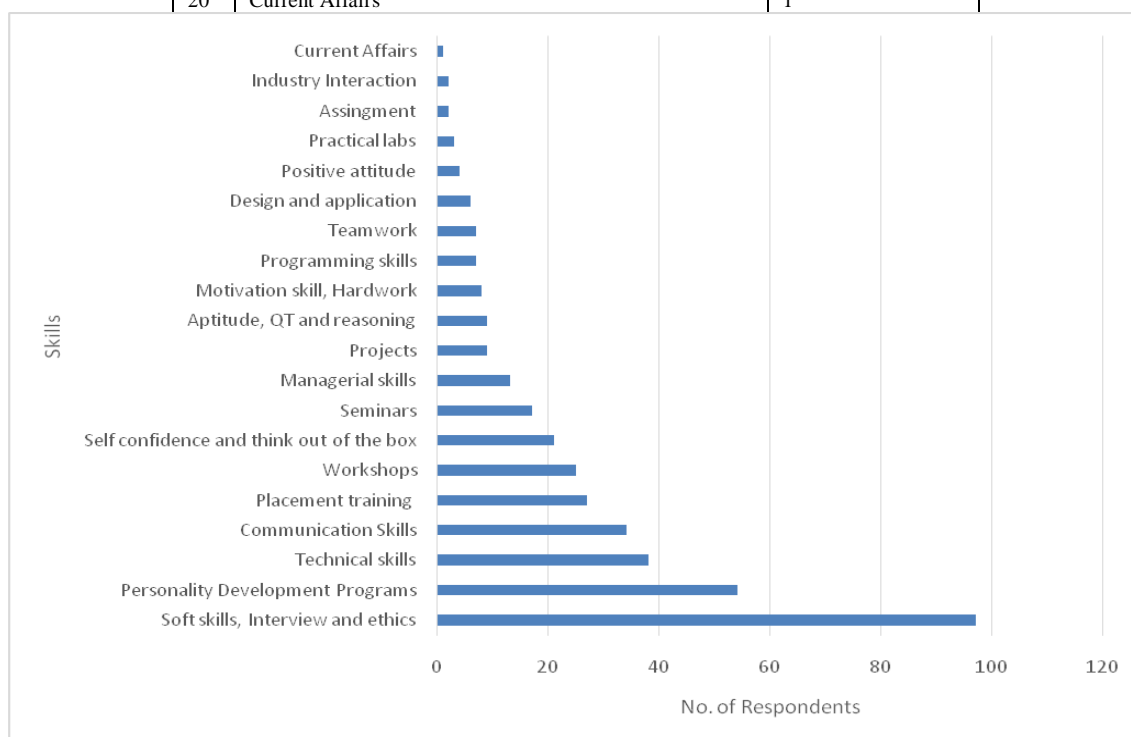
In the case of preparations for job placements, the graduate were of the opinion that the training attained while in college was not adequate enough since most of them were of the opinion that they would prefer exposure to mock interviews first and there after the interview itself. This means that they would have preferred rigorous training on employability skills such as interviews facing skills. This opinion is extracted from the tables summarizing the results below i.e. 70% of the graduates were of the opinion that they needed additional training for interviews.

| Require additional preparation for the interview		
Yes	**No**	
636	273	
Require assistance for interview		
Yes	**No**	
529	352	

Responding to the query on need for intervention for interviews, 60% of the graduates were responded with "Yes".

The responses from the question on the importance of positive attitude in getting and maintaining a job placement showed that the graduates were aware of the crucial importance of the right attitude. This is evidenced by a cumulative sum of approximately 98% voting as very important, important and average importance i.e. they voted that positive attitude was very crucial in an interview and more so in the corporate environment.

Role of right attitude in job				
Very High	**High**	**Average**	**Poor**	**Nil**
349	364	84	12	1

On the question regarding the changes the graduates would suggest for the institutions so that they could make future graduates more equipped for the corporate industry, they rated the interaction between the industry and the institutes highest. This was closely followed by additional laboratory exposure and hands on experience.

| Additional inputs from institution to make students employable						
Change in Curriculum	**Industry-Institute**	**More Lab &Hands on exposure**	**Guest Lecturers**	**Seminars and conferences**	**All the above**	**Others**
3.15	4.74	3.48	2.04	1.70	1.07	0.30
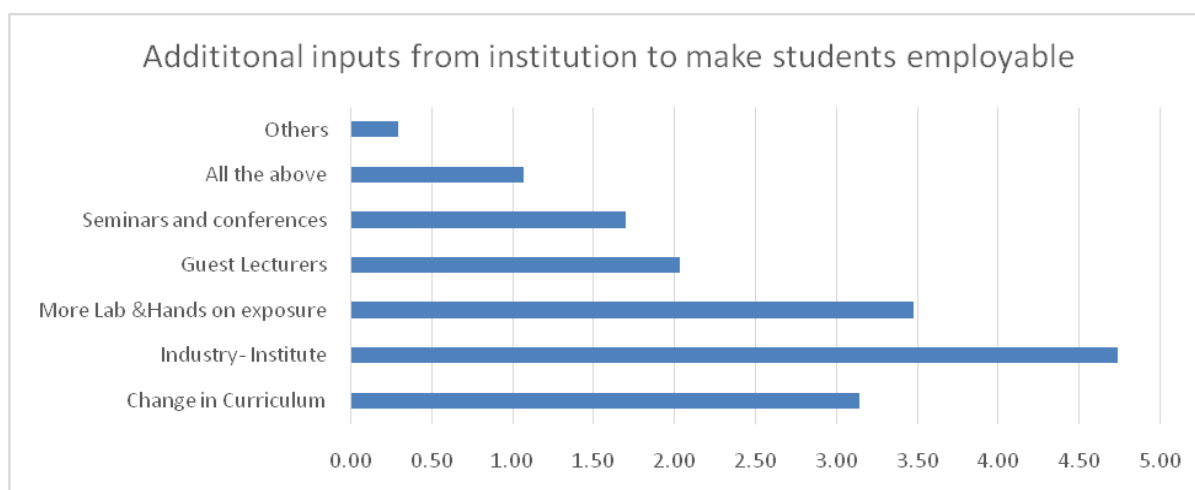
Under the others section on the questionnaire, the graduates also suggested that the institutions should extra training on the following to make them more equipped for the corporate world:
- Exposure to skills that grow the ability to build a good rapport, work efficiently and interact with others effectively.
- Skills that expand their ability to expand thinking skills such as analysis and evaluation of discussions.
- Training to improve recognition and respect for others' beliefs behavior and attitude.
- Exposure so as to improve the ability to identify and analyze difficult problems under pressure and make reliable evaluation.

On the question regarding the corporate expectations of the graduates in terms of skills from the corporate industry, they gave approximately 40 skills which were grouped in to 20 distinct classes so that the analysis would be simplified. Domain Knowledge got the highest votes which was almost 50% of all the responses i.e. 359 out of 779. Its came as a surprise that the soft skills got less than 2% despite it being a point of focus by the corporate industries today.

No.	Graduates expectations on skills required by Corporate Industries	No. of students
Graduates expectations on skills required by Corporate Industries		
1	Domain Knowledge	359
2	Programming Languages	147
3	Technical skills, Aptitude	95
4	Practical application	43
5	Soft skills, Communication skills, learning skills, time management	15
6	Problems solving, analytical skills	14
7	VLSI	14
8	Conceptual understanding of theory and basic Understanding of application	14
9	Logical thinking	14
10	Design	10
11	Application of concepts	9
12	Coding	9
13	Embedded systems	7
14	innovative skills	7
15	Networks	4
16	Basic operating systems	4
17	Digital Communication	4
18	Internships in Good companies	4
19	Basic in analogue and digital systems	3
20	Simulation language	3
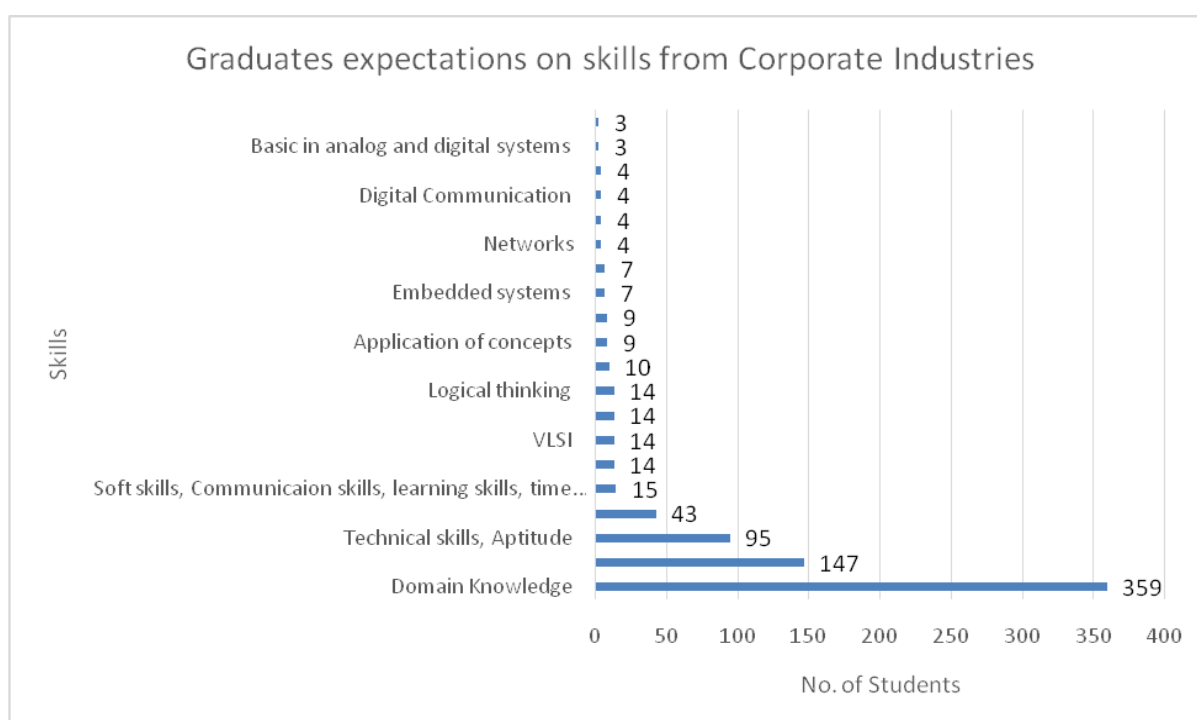
V. Conclusion

From the study and the responses got from the questionnaire it can be established that contrary to the 20th century when the corporate industries used to hire fresh graduate engineers based on their academic qualification shown through their marks and technical skills, now there is need for the graduate engineer to have other skills which may be categorized as soft-skills. This is due to the rapid growth in technology, the dynamic world economy, the increased influence of information technology, the ever rising competition and globalization. From the research it is also evident that despite there being thousands of engineers being released into the market by our engineering institutions in India, the corporate industry experts strongly feel that only at most 25% of them are employable. Using the results from the survey, the following conclusions can be inferred based on the analysis of the data collected.

Regarding the kind of functions they were interested in, from the table below it is evident that design takes 33.94% and R&D 31.01% respectively. The rest share approximately 10% to 12%. The graduates identified communication skills as the critical requirement for them under the category of soft skills followed by positive attitude.

It's is also evident that the engineering institutes have now started focusing on the soft skills, with interviews leading followed by Personality Development. It is also been noticed that the practical exposure and laboratory work trail in this category.

The graduates are of the opinion that skills they gained from training in college were not sufficient since they did not include exposure to interviews and other employability skills such as assistance and guidance in interview preparation. Approximately 98% of the graduates are aware that positive attitude plays a major role in acquiring and maintaining a job placement.

The graduates strongly believe that the increase exposure on hands on experiences and the interaction between the industries and the institute would enhance their employability in the corporate world today.

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