Freshman Engineering Students' Insight on relevant and Effective Engineering Education- an overview

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Abstract—Introduction: Students are expected to gain knowledge, expertise and industry relevant skills from these specializations and are able to apply the skill thus gained in their professions. With the ever increasing aspirants of Engineering studies, the number of technical institutes have exploded across the country to meet the demand. Theseyoungsters really have to know what kind of work environment awaits them during the course of their education and training. The basic knowledge on the course and about the future career would enable them to take a reasoned and nuanced decision. The present study has focused not only their prior knowledge about the course, the nature of their course and the expectations from the course which they opted. Methodology: Across sectional study is conducted among the Freshman Engineering students of various colleges. A google form is prepared with 20 questions consisting of both open and close ended. After obtaining the filled forms the data is analysed by preparing pie charts and excel sheet. Results: The Composition of the respondent group was dominated by Females constituting a total of 310 Females out of the total respondent group of 464. An overwhelming number of respondents studied in Corporate Private Schools. A total of 429 respondents out of 464 preferred to have relevant mandatory Internship as part of the curriculum. A total of 322 respondents preferred to have a single common entrance test to determine the admissions to the Engineering course. Conclusion: This study may help them to plan various activities which were helpful to shape the future of engineering students.

INTRODUCTION

India today produces the largest number of Engineers in the world. Globalization continues to keep pace and gains momentum on a daily basis. This provides lots of opportunities as well as challenges to the Engineering students in terms of Job opportunities and professional growth. Because of the increase in the number of students and the varied requirements of a global corporates, there is intense competition amongst students to be selected, to be relevant and court success in their chosen field of professional endeavour. Science educators often characterize the degree to which tests measure different facets of college students' learning, such as knowing, applying, and problem solving [1]. The students opt for different domain streams like Information technology, computer science, Mechanical Engineering, Electrical Engineering, Electronics, Civil engineering etc., are expected to gain knowledge, expertise and industry relevant skills from these specializations in their due course and should be able to apply the skills gained in their course. After completion of the undergraduate Engineering Programme, the students should occupy a pivotal position in their entire structure of education. Students who have positive attitudes and decision-making ability towards the situation around them may be in a better position in their life careers [2].

With the ever increasing aspirants of Engineering studies, the number of technical institutes have exploded across the country to meet the demand. Engineering education has been expanded in India at a high rate of growth from the past few decades [3].

Engineering education is the best suited professional choice for students who like creativity, building, problem-solving, analytical thinking, developing and designing. Studies on the aspiring Engineers have indicated that students are not always aware of what are the prospects, requirements and pre-requisites of the various streams of Engineering that the time of joining the course [4]. However, students lack the necessary skills in solving word problems [5]. These young men and women really have to know what kind of work environment awaits them during the course of

their education and training. This will help them in taking an informed decision. Many factors and individuals influence and/or motivate the students' choice to opt for a particular engineering branch a basic knowledge on the course and about the future career would enable them to take a reasoned and nuanced decision.

Even though there are studies on engineering students on various parameters, there are very few studies on schooling, awareness on the course before joining, their attitude towards the course. The present study has focused not only their prior knowledge about the course, the nature of their course and the expectations from the course which they opted.

Objectives: 1. To know the attitude of engineering students towards their education. 2. Gender based attitude of the engineering students.

Methodology: Across sectional study is conducted among the Freshman Engineering students of various colleges located in the Kurnool region. A google form is prepared with 20 questions which consists of both open ended and close ended. It is shared to students and the importance of study is explained to them. Google form has been circulated to 1000 students, out of 1000 students 464 students were responded. After obtaining the filled forms the data is analysed by preparing excel sheet and tables.

Results and Discussion:

The Composition of the respondent group was dominated by Females constituting a total of 310 Females out of the total respondent group of 464. They constituted 66.81 % of the Respondents. The Male participants numbered a total of 154 constituting in percentage terms 33.18 Percent.

Table 1: Composition of the respondent group

Gender	No. of Participants	Percentage
Male	154	33.18
Female	310	66.81
Total	464	100

The majority of the Male respondents originated from Urban back ground. They numbered 101 out of 154. In percentage terms amongst the total male respondents the urban males constituted 65.58 %. They constituted 21.76% of the total respondents.

Rural Males numbered 53 out of a total male respondent of 154. In percentage terms they constitute 34.42 % of the total Male respondents and 11.42 % of the total respondents. The regional breakup of the female respondents was more uniform with the Urban female respondents numbering 164 out of 310 Female respondents. In percentage term the urban female respondents constituted 35% of the Total respondents. They constituted 52.90 % of the total female respondents. The rural female respondents numbered 146 out of 310 female respondents. In percentage term the rural female respondents constituted 31.46 % of the Total respondents. They constituted 47.10 % of the total female respondents. The total urban respondents (male and female) numbered 265 out of 464 constituting 57.11 percent and the rural respondents numbered 199 out of 464 constituting 42.89 percent.

Table 2: Urban and Rural background of the respondents

Gender	Urban	Rural	Total
Male	101 (21.76%)	53(11.42%)	154(33.18%)
Female	164 (35.34%)	146(31.46%)	310 (66.81)
Total	265(57.11%)	199(42.88%)	464 (100%)

An overwhelming number of respondents studied in Corporate Private Schools. They numbered 357 out of the 464 respondents. In percentage terms respondents having Schooling in Corporate schools constituted 76.93 %. This indicates a predominance of Students getting schooled by Corporate private sector schools. 119 out of a total of 154 male respondents had their schooling in corporate schools. In percentage terms they constitute 77.27 of the total male respondents and 25.64 % of the total respondents.238 out of a total of 310 female respondents had their schooling in corporate schools. In percentage terms they constitute 76.77 of the total male respondents and 51.29 % of the total respondents.

The number of students who had their education in government schools was 70 out of 464. This indicates the low preference of the government schools amongst the Students. If the situation continues, the pursue of education in government schools and colleges will be questionable. Therefore, there is a strong need to strengthen government institutions by all means [6] .16 out of a total of 154 male respondents had their schooling in government schools. In percentage terms they constitute 10.39 % of the total male respondents and 3.45 % of the total respondents.54 out of a total of 310 female respondents had their schooling in corporate schools. In percentage terms they constitute 17.42 of the total female respondents and 11.64 % of the total respondents.

Table 3: Schooling Background of the respondents

Schooling/coaching	Male	Female	Total
Corporate school	119(77.27%)	238 (76.8%)	357 (76.9%)
Government school	16 (10.38%)	54 (17.4%)	70 (15.1%)
Mixed	19 (12.33%)	18 (5.8%)	37 (8.2%)
Not Taken coaching from High school onwards for IIT/JEE/EAPCET	108 (69.7%)	210 (67.7%)	318 (68.5%)
Taken coaching from High school onwards for IIT/JEE/EAPCET	47 (30.3%)	99 (31.9%)	146 (31.5%)

Table 4: Measures to Improve the professional skills in Engineering Course

	Male	Female	YES	NO
Compulsory Internship	144 (92.9%)	285 (91.9%)	429 (92.5%)	35 (7.5%)
Interaction with seniors	144 (92.9%)	286 (92.2%)	430 (92.7%)	34 (7.3%)
Uniform	57 (36.7%)	192 (61.9%)	249 (53.7%)	215 (46.3%)
Assessment	120 (77.4%)	243 (78.38%)	363 (78.2%)	101 (21.8%)
Sports & Games	146 (94.19%)	293 (94.5%)	439 (94.6%)	25 (5.4%)

The number of students who had Mixed education (part corporate schools and part government schools) was 37 out of 464. In percentage terms this section of the respondents constitute 1.5 % of the total respondents.19 out of a total of 154 male respondents had their schooling in government schools. In percentage terms they constitute 12.34 % of the total male respondents and 4.09 % of the total respondents.18 out of a total of 310 female respondents had their schooling in corporate schools. In percentage terms they constitute 5.81 of the total female respondents and 3.88 % of the total respondents.

Students who had not taken any form of specialised coaching for entrance examinations like JEE, EAPCET were in majority of the respondents. They numbered 318 out of 464 respondents. In percentage terms they constituted 68.53 %.108 out of a total of 154 male respondents had not availed specialised coaching for entrance examinations. In percentage terms they constitute 70.13 % of the total male respondents and 23.28 % of the total respondents.210 out of a total of 310 female respondents had not availed specialised coaching for entrance examinations. In percentage terms they constitute 67.74 of the total female respondents and 45.26 % of the total respondents. Students who had taken specialised coaching for entrance examinations like JEE, EAPCET were in minority amongst the respondents. They numbered 146 out of 464 respondents. In percentage terms they constituted 31.46 %.47 out of a total of 154 male respondents had availed specialised coaching for entrance examinations. In percentage terms they constitute 30.52 % of the total male respondents and 10.13 % of the total respondents.99 out of a total of 310 female respondents had availed specialised coaching for entrance examinations. In percentage terms they constitute 31.94 of the total female respondents and 21.34 % of the total respondents.

Table 4: Measures to Improve the professional skills in Engineering Course

Uniform :

A majority of the respondents felt that the Uniform allows the student to have a self of identification, pride and belonging to the course. Amongst the respondents 249 respondents out of 464 preferred to have Uniform for the College. However, this preference was marked amongst the female respondents with 61.9 % of female respondents expressing in favour of respondents (192/310) and 38.1% not inclined to have a uniform. The preference changes dramatically amongst the male respondents with 37 % in favour of a uniform (57/154) and 63 % not in favour of the respondents.

Mandatory Internship to complement and Improve Professional Skills:

An overwhelming majority of the respondents said that they would like to have compulsory Internship to provide real life industrial experience which will enable them to appreciate the requirements of the industry in which they would be working after graduation. A total of 429 respondents out of 464 preferred to have relevant mandatory Internship as part of the curriculum for the Engineering Graduation course. In percentage terms they constitute 92.45 % of

the respondents. Only 35 respondents felt that Mandatory was not needed for the course. This preference was found to be uniform amongst the Male and Female respondents. 93.50 % of the male respondents and 91.9% of female respondents preferred to have Internship for Engineering education. In numerical terms 285 female respondents out of 310 expresses their preference for Internship and 144 male respondents out of 154 expressed their preference for Internship.

Mentorship with Seniors:

An overwhelming majority of the respondents said that they would prefer having an arrangement wherein Seniors would be guides and Mentors and help them in Skill upgradation and in acquire industry relevant skills. They also said that such mentorship would allow to build contacts and networks in Industry which would professionally very helpful. A total of 430 respondents out of 464 preferred Mentorship with seniors. In percentage terms they constitute 92.67 % of the respondents. Only 34 respondents felt that Mentorship was not required. This preference was found to be uniform amongst the Male and Female respondents. 93.50 % of the male respondents and 92.2% of female respondents preferred Mentorship. In numerical terms 286 female respondents out of 310 and 144 male respondents out of 154 expressed their preference for Mentorship.

Assessment and Evaluation:

Three fourths of the respondents are satisfied with the present method of Evaluation and assessment of the student competency in Engineering education. A total of 363 respondents out of 464 expresses their satisfaction with the present method of evaluation. In percentage terms they constitute 78.23 % of the respondents. Around 101 respondents (21.77%) were not satisfied with the present methodology adopted evaluations and wanted improvements in the same. This preference was found to be fairly uniform amongst the Male and Female respondents. 77.92 % of the male respondents and 78.38 % of female respondents were satisfied with the current method of evaluation. In numerical terms 243 female respondents out of 310 and 120 male respondents out of 154 expressed their satisfaction with the current method of assessment and evaluation.

Sports as part of Curriculum.

Sports has to be mandatorily part of the Engineering education as it allows the students to develop fitness. It helps them understand virtues like perseverance, time management, Team management and patience. These virtues are very important to become a successful Professional. An overwhelming majority (439 respondents out of 464) expressed that Sports should be made compulsory in Engineering education. In percentage terms they constitute 94.61 % of the respondents. Around 25 respondents (5.39%) were not in favour of spot being part of the curriculum. This preference was found to be fairly uniform amongst the Male and Female respondents. 94.80 % of the male respondents and 94.51 % of female respondents were satisfied with the current method of evaluation. In numerical terms 293 female respondents out of 310 and 146 male respondents out of 154 were in favour of sports being a compulsory part of the curriculum.

Table 5: Profession

Profession	No. of participants
Rethink of Profession	109 (23.49%)
Civil Services	25 (5.38%)
Fashion Designer/Interior Designer	23(4.95%)
Arts(Singing/dance/film making)	20(4.31%)
Sports person	9(1.93%)
Teacher	7(1.50%)
Banking/Railways	6(1.29%)
Doctor	4(0.86%)
Army	3(0.64%)
Others	12(2.58%)

Out of 464 participants 109 (23.49%) participants were like to rethink of their profession if chance is given to them. Very few participants 25(5.38%) want to become civil servant. 25 participants (4.95%) want to become Fashion designer and Interior designer, 20 participants (4.31%) were like to choose their profession towards fine arts. The details were shown in table 5. The above result shows that most of the students they want to continue in the same profession. The aspirants of civil services are very less.

Table 6: Nature of Employment

Nature of Employment	No. of participants
Corporate Companies	207(44.61%)
Government Sector	170(36.63%)
Entrepreneur	87(18.75%)

There was varied response when it came to nature of employment preferred by the respondents.44.61 % of the participants preferred Employment with Corporates and constitute the major chunk of the respondents. In numerical terms they were 207

respondents out of a total of 464 respondents. The next preferred employer was the Government sector with 36.63 % of the respondents preferring it. (170/464).18.75% (87/464) of the respondents preferred to be self-employed and entrepreneurs.

A large chunk of the respondents (109 /464) constituting 23.49 % would like to shift their profession and present area of specialization if an opportunity is provided. This indicates dissatisfaction with the prospects and opportunities in their chosen field. A few respondents (25/464) constituting 5.39 % would prefer civil services as their vocation and would strive to attain the same.23 respondents would prefer the vocation of fashion designers constituting 4.35 %. 4.31% of the respondents were inclined towards fine arts and would pursue that as their vocation.

Research shows that self-efficacy is important for both men and women in Engineering. However, differences in engineering self-efficacy by gender are inconsistent across various studies. Some studies indicate that men had higher engineering self-efficacy than women but not the other; yet both groups saw a decrease in self-efficacy over time [7].

Entrance:

Majority of the respondents were not satisfied with the multitude of entrance exams for admission to the Engineering Courses. A total of 322 respondents preferred to have a single common entrance test to determine the admissions to the Engineering course. In percentage terms they constitute 69.39% of the respondents.

Table :7

	Yes	No
One Common Entrance Test	322(69.39%)	142(30.60%)
Scope of Research	276(59.48%)	188(40.52)
Job	367(79.09%)	97(20.90%)
Higher Studies	97(20.90%)	367(79.09%)

Research:

276 respondents expressed that there is a possibility of research in their chosen field of Education constituting 59.49% of the total respondents. 188 respondents said that they would prefer to be employed and would not be interest in any research activities.

Job and Higher Studies :

On the other hand, if given a choice either a job or pursuit of higher studies an overwhelming majority opted for Job. 79 .1 % of the respondents opted for a Job (367 /464). 97 respondents preferred to pursue higher education in their chosen field of specialization constituting 20.9 %.

Good communication skills are of utmost importance in the education of engineering students. It is necessary to promote not only their education, but also to prepare them for the demanding and competitive job market [8]. Along with technical skills good communication skills are highly required for the students either to pursue higher studies or for job.

Table 8: Inspiration to Join Engineering

Inspiration to join in the course	No. of participants
Family &Relatives	252(54.31%)
Friends & seniors	76(16.38%)
Teachers	27(5.82%)
Self-motivated	99(21.33%)
Eminent Personalities	10(2.15%)

The major source of inspiration to join Engineering studies was the influence of the Family and relatives. A total of 252 respondents said that they were inspired someone in their family and relatives to join Engineering. This segment constitutes 54.31 % of the total respondents. Around 99 respondents constituting 21.34 %of the respondents, said it was their own decision to join Engineering and that decision was not influenced by other factors or others influence. The next source of inspiration was friends and seniors in School. 76 respondents said they were encouraged and inspired to join Engineering by their Friends and Seniors. They constitute 16.38 % of the respondents. Around 27 respondents constituting 5.8% of the respondents were inspired by their Teachers to join Engineering studies and 2.15 % of the respondents were inspired by Famous persons and eminent personalities to take up Engineering.

Table 9: Enrichment of curriculum

	Yes	No
Additions to the curriculum	250(53.88%)	214(46.12%)
Coding	88(18.96%)	
Extra and co-curricular Activities	52(11.20%)	
Industrial tours	32(6.89%)	
Innovation	26(5.60%)	
Foreign language	24(5.17%)	
Business related Activities	16(3.45%)	
Yoga and meditation	12(2.58%)	

A majority of the respondents felt the need to improve the present curriculum to improve the quality of engineering education.250 respondents averred that the curriculum should be increased and improved and

they constituted 58.5 % of the total respondents. 214 respondents felt that the current curriculum was adequate and needs no further changes these segment constitutes 41.5% of the respondents.88 respondents constituting 18.97% of the total respondents felt that they require enhanced coding skills for better professional opportunities and coding should form a significant portion of the curriculum.52 respondents felt that a holistic curriculum was possible by inclusion of Extra and co-curricular activities and these would play a great role in improving the soft skills and communication , which will have great bearing on their prospects in the corporate arena.24 respondents felt that learning a foreign language and having the same as part of engineering curriculum would enrich their learning experience as well as improve their prospects Around 26 respondents felt the need to include research and innovation activities as part of the Engineering curriculum to encourage students to pursue Research activities.32 respondents felt that Study and Industrial tours allowed the students to experience corporates and observe their activities and would play a role in inspiring the students to join the corporates . Hence they should be part of the curriculum. A small portion of the respondents also felt that business practices and Financial knowledge should be imparted as hat would be helpful for students. Some respondents also felt that Yoga and meditation should be part of the curriculum as it would promote healthy life style and would be useful for the student to navigate the stress they may face in the corporate world.

As technology continues to change and as students continue to become more technologically advanced, administrators and instructors must recognize student limitations to different types of technology expertise and address those deficiencies in college curriculum [9].

CONCLUSION

The purpose of this study was to know the attitude of Freshman Engineering students towards their education. Findings are showing that most of the students have positive attitude towards Engineering education and their attitudes are more affected by their family members and teachers. They feel that Mentoring plays a key role in shaping their future. Majority of the respondents felt the need to improve the present curriculum to improve the quality of engineering education.

This study may help other researchers, faculty members and administrators for better understanding of Freshman Engineering student's attitude. This may help them to plan various activities which will be helpful to shape the future of Engineering students.

Limitations:

1. Small Sample size
2. Findings are confined to Kurnool Engineering colleges

Conflicts of Interest: Nil

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2022 batch students of Freshman Engineering in Kurnool.

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