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Stress and Anxiety Among First Year and Final Year Engineering Students

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Abstract
Engineering education in India rooted during the British era. It started with the main focus on Civil Engineering and now expanded its branches in different specialized areas. The diversified braches of engineering provides wide opportunities of employment in various public and private organizations with handsome packages. This has resulted in popularity of engineering courses across the country. To meet the demand for engineering courses, India is increasing its sanctioned intake for engineering courses. In the last ten years 1997-2007 the sanctioned strength grew from 1.15 lakhs to 5.51 lakhs. The number of female students enrolling for engineering courses has also showed tremendous increase in last decade. Today, a large number of Indian engineers have left remarkable impact on the world internationally. To attain these positive outcomes, students have to face many problems and challenges during undergraduate engineering courses.
In the present paper, an attempt has been made to study the problems that lead to stress and anxiety among undergraduate engineering students. The major focus of the paper is on investigating the stress and anxiety level among first year and final year undergraduate engineering students. This paper also studies gender differences in stress and anxiety among undergraduate engineering students. The participants of study included 200 undergraduate engineering students studying in private engineering institute in Rashtrasant Tukdoji Maharaj Nagpur University, one of the esteemed universities in India. Data was collected by using 'Anxiety, Depression and Stress Scale (ADSS)' (Bhatnagar et.al, 2011). Data was analyzed by using SPSS-20.

Key word
Stress, Anxiety, Gender, Engineering students

I. Introduction

Engineering and Medical are considered as one of the most esteemed profession in India. When kids in India are asked what they want to be when they grow up – the first answer that that comes immediately in their mind is engineer or doctor. A majority of students wish to pursue education in engineering and medical after 10+2 level. This demand for engineering courses has resulted in mushrooming of many private engineering colleges across the country. Now it has become easier for students to get admission for engineering courses. But the road is still not smooth for the students. They have to face many challenges and problems during the four years of their graduation. The nature of problems that students face during undergraduate engineering course is different for different semesters and for gender. These problems and challenges are discussed in the next section of this research paper.

Previous studies have identified various stressors for college student. In the present study these stressors are studied again which are prevalent to socio-economic and cultural conditions of engineering students studying in RTMNU. First year and final year engineering students are introduced to various stressors which lead to stress and anxiety during four year undergraduate engineering programme. Researchers interviewed the participants and discussed about the major stressors. The information collected from students present a brief overview of major stressors to the students.

A. Stressors to first year engineering students

Choosing engineering as a career option presents many challenges to first year engineering students. Getting an admission for engineering course is easy for students as there are many engineering institutes across the country. But, the heavy fees of private engineering institutes are not affordable to all the engineering aspirants. To get the required sum of money, parents have to do so many adjustments, including taking education loans from financial institutions. In addition to this, college usually requires moving to a different town, city or state. This creates additional burden of money for travelling and boarding. The problem of homesickness also bothers many of the first year engineering students who stay away from home. Students find themselves in an unfamiliar environment, where they have to interact with new people, make new friends and adapt a new life style. Those who are staying away from home will need to adapt to living in a dorm room, to do all household work for oneself, to save money and deal with a daily commute. This will be the first true transition into adulthood, when student is in a position where he is no longer depending on parents, siblings and friends.

Another problem student encounter is the difficult curriculum of engineering courses. After completing the higher secondary education when student appears for first year engineering course, he is introduced with new technical and non technical subjects with a difficult study material. Also, students are introduced to the new examination pattern, i.e. semester pattern. This requires more involvement in studies throughout the year and students must address their academic priorities. Assignments, submission, frequent class tests creates additional burden of studies. Also, lack of time management makes it difficult for students to find the time to study. All these problems create stress and anxiety among first year students.

B. Stressors to final year engineering students

During the three years of studies, students accommodate themselves to the new environment, make new friends, get used to for examinations and other home works, understand the subjects, and prepare themselves for self study. When student enroll for final years, he is introduced with new stressors. After completing his graduation, students have to struggle to make their career in the field they have chosen four years back.

The first challenge for the students is to get good campus placement. Students have to train themselves well for the job market. This requires many additional certificates which make the resume more attractive and convincing for the employers, enhance communication skills, an up-to-date knowledge about new technology, the basic knowledge of the subject learned during four year engineering programme and get in touch with recruiters by various means. Here students face fewer burdens of studies but more burdens of mini and mega projects that they have to submit in final year. Preparing for various entrance examinations to get admission in good universities for higher studies and placements in public and private organizations is an additional academic burden on students during the final year.

This is the time when students are involved in close friendship, personal or romantic relationships. There is always fear of separating from partner and losing a relationship. In addition to these, expectations from parents, responsibilities towards family also create stress and anxiety among final year students.

C. Stressors to female engineering students

These stressors discussed above are common to both male and female students. But still female students encounters with some additional problems. Even though the number of female students appearing for engineering has increased since last decade, but still male dominance has not changed. Female students are aware that they are entering is a filed which is classically dominated by males. This creates emotional problems which affects female engineers. The gender bias is even severe in Mechanical and Civil Engineering fields, where more than 90% of the class population is dominated by male. Most of the professors are male and the delivery of material is tailored towards men. The minority in most classes' makes women feel like that they need to prove themselves to their professors, male counterparts and industry leaders. Also, there is a lack of female companionship and there are high levels of competitiveness within the women in classes, which contributes to feelings of isolation and loneliness.

By studying these stressors it can be concluded that stress is an inevitable part of engineering student's life. Male or female, first year or final year students, everyone reports lesser or higher degree of stress and anxiety. However, the major focus of the present paper is to help these students to formulate proper coping strategy.

Stress is a part and parcel of everyone's life. However, the term "stress" is interpreted negatively by most of the people. For those people who interpret stress negatively, stress is something that is negative and unpleasant. Without proper knowledge about their stress level, people use stress and anxiety interchangeably. For adapting proper stress management strategies, it becomes extremely important to understand one's level of stress and anxiety. In the present study an attempt has made to examine the stress and anxiety level of students. This will be a primary step for formulating proper counseling and stress management strategy.

Background

There has been extensive research on college students' stress and anxiety so far. The major focus of these studies was indentifying the stressors for college students and how it affects the physical and mental well being and finally the academic achievement of the students. A number of studies have been conducted on engineering students so far. Lindsay E. D, Rogers H. (2010) in their study presented data gathered from first-year engineering students regarding their perceptions of their levels of stress and workload throughout a semester of study. Stress is investigated both as an absolute measure, and also as a measure relative to the students' perception of 'normal'. Fedler R, Fedler G. N, Hamrin C. E, Dietz E. J. (1995) examined gender differences in chemical engineering students' academic performance. Zhang G, Anderson T. J, Ohland M. W, Thorndyke B. R. (2004) work is useful for improving understanding of factors that influence retention of engineering students. this study provide help in suggesting approaches to improving student success in engineering, and also aid for counseling and advising of students seeking an engineering degree. Behare S, Yadav R, Behare P (2011) in an interesting study identified the quality and quantity of stress in medical, engineering, and nursing students. B. Elamurugan (2013) investigated the sources of stress among engineering college students in villupuram district, Tamilnadu. Kumar S, Bhukar J. P, (2013) investigated the stress levels and coping strategies of professional students belonging to Physical Education and Engineering professions. Raghavendran, J Gajendra Naidu, (2014) study aimed at measuring academic stress for engineering students. Rizwan A., Farooq S, Alvi M.S.I. & Nawaz S. (2012) analyzed the factors that affect the stress level of female engineering students. In a recent study Pyari, D (2015) compared the anxiety and depression of engineering and medical students. Results revealed significant difference in anxiety level of engineering and medical students, whereas no significant difference was found in depression level of both the students.

Some other studies focused on college students' stress level gave valuable contribution in this context. Abdullah N. A. C, Dan M. S. (2011) examined the stress level among part-time students and its relationships to their psychological well-being status. Barrows J, Dunn S, Lloyd C. A. (2013) investigated how test anxiety and level of self-efficacy directly preceding an exam affects the exam scores. Brausch B. (2011) studied the role of academic stress and academic efficacy in students' academic achievement. Dwyer A. L, Cummings A. L, (2001) examined the relationship of self-efficacy, social support, and coping strategies with stress levels of university students. Hong Ji, Lei Zhang (2011) in an interesting research investigated the mental stresses of college students. He identified four sources of stresses, namely employment situations, study conditions, personal factors, and economic conditions. N. Kumaraswamy. (2013) briefly described the research carried out in the last 3 decades especially regarding stress, anxiety & depression. It focuses stress among college students, nature of psychiatric morbidity, emotional problems and adjustment, psychological problems of college students. Lan, L.Y. & Gill, D.L. (1984) examined the influence of self-efficacy on physiological arousal and self-reported anxiety. McKnight J, M. A. McKnight, (2012) studied gender differences in anxiety in face-to-face and video conferencing instructions. The research was useful as difference in gender as it relates to education is an important focus of research. M. Meenakshisundaram, P.T. Saleendran, N. Panachanathan 2010 identifed the level of stress and the factors that influenced to the stress among Business school students. The factors that were considered in the this study were Academic Factors, Physical factors Social factors and Emotional factors. In a recent studied Naveen S, Swapna M, Jayanthkumar K, Shashikala Manjunatha,(2015) studied gender differences in stress anxiety and depression in selected medical and engineering colleges. Priya, Bisen V, (2012) examined the symptoms of stress & effect that are likely to be felt by the management students in higher institution. Zajacova A., Lynch S. M., Espenshade T. J. (2005) investigates the joint effects of academic self-efficacy and stress on

the academic performance of nontraditional, largely immigrant and minority, college freshmen at a large urban commuter institution. Armstrong, Kerry A. and Khawaja, Nigar G. (2002) determined whether any observable gender difference existed in the expression of symptoms, cognitions, and sensitivity towards anxiety for a nonclinical sample.

The major focus of previous studies was on identifying the factors that create stress and anxiety among students. With the changing socio-cultural environment, these factors also vary in nature. During the four year undergraduate engineering course, many transformations take place in students. The diffident adolescent make over into a confident youngster. In the present paper, researcher discussed over the major stressors of first year, final year and female students separately. But do the educational level and gender have any significant impact on stress and anxiety level of engineering students? Here, researchers made an attempt to find the answer of this tickling question.

II. Methodology

A. Participants

The current study was conducted at a Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur. The sample consisted of 200 undergraduate engineering students. These students are selected randomly and studying in various private engineering institutions in first year and final year at different branches of engineering. The age of the students ranges between 18-23 years. These students belong to different socio-economical background. The details of the sample are presented in table 1.

Table 1: Description of sample size

Education Level	Gender	N	Total
First Year	Male	42	100
	Female	58	
Final Year	Male	65	100
	Female	35	

B. Measures

Pallavi Bhatnagar, et al. Anxiety, Depression and Stress Scale (ADSS) was administered to measure the stress and anxiety level of students. ADSS consist of total 48 items divided in three subscales which are:

1. Anxiety subscale – it comprise of 19 items covering various symptoms that are manifestation of anxiety.
2. Depression scale – it consists of 15 items representing the different symptoms of depression.
3. Stress subscale – it is a scale having 14 items and they are covering the symptoms that people experience in the state of stress.

Responses of the items are terms of 'Yes' or 'No'. Each item is scored 1 if endorsed "Yes" and 0 if endorsed "No".

III. Results

After obtaining the scores of each of the subject on stress and anxiety, the data was analyzed using SPSS 20 (Statistical Package for the Social Sciences). Two Way ANOVA was used to compare the means of the groups of students. The mean and standard deviation for stress scores are presented in table 2.

Table 2: Mean and SD for stress scores

Edu_level	Gender	Mean	Std. Deviation	N
First Yr	Female	5.3103	3.29916	58
	Male	6.7143	3.96500	42
	Total	5.9000	3.64179	100
Final Year	Female	4.9143	2.87352	35
	Male	4.9077	3.63887	65
	Total	4.9100	3.37578	100
Total	Female	5.1613	3.13567	93
	Male	5.6168	3.85503	107
	Total	5.4050	3.53745	200

The results of the table shows that the first year students have obtained the mean score of 5.90 indicating their high stress score than the final year students who obtained the mean score of 4.91. For gender, the obtained mean scores are female (M = 5.1613) and male (M = 5.6168) shows that male students reported more stress than female students. To find whether there is any statistical significant difference in mean of stress level, a two way analysis of variance was applied. The results of Two Way ANOVA are discussed below:

Table 3: Table showing results on Two Way ANOVA for stress scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	97.021[a]	3	32.340	2.649	.050
Intercept	5614.533	1	5614.533	459.828	.000
Edu_level	57.074	1	57.074	4.674	.032
Gender	22.970	1	22.970	1.881	.172
Edu_level * Gender	23.405	1	23.405	1.917	.168
Error	2393.174	196	12.210		
Total	8333.000	200			
Corrected Total	2490.195	199			
a. R Squared = .039 (Adjusted R Squared = .024)					

The Two Way ANOVA showed no significant main effect of gender on stress level of students, $F = 1.881$, $p > .05$. The main effect of education level was significant, $F = 4.674$, $p < .05$. Hence first year students experienced more stress than final year students. Also, the interaction between gender and education level was not significant, $F = 1.917$, $p > .05$. The effect of gender on stress was the same for each age group.

Similarly, the mean and standard deviation of all the groups on anxiety scale are presented in table 4.

Table 4: Mean and SD for anxiety scores

Edu_level	Gender	Mean	Std. Deviation	N
First Yr	Female	6.9655	3.16209	58
	Male	7.2143	3.08842	42
	Total	7.0700	3.11806	100
Final Yr	Female	6.0857	3.14709	35
	Male	5.6000	3.18591	65
	Total	5.7700	3.16501	100
Total	Female	6.6344	3.16841	93
	Male	6.2336	3.23186	107
	Total	6.4200	3.20075	200

From table 4, first year students mean score on anxiety is M = 7.07, and final year students mean score on anxiety M = 5.77. This shows that first year students reported more anxiety than final year students. Also mean anxiety score of male student (M = 6.23), female student (M = 6.63) show that female students reported more anxiety than male students. A two way ANOVA was carried out to find the statistical significance difference in mean anxiety scores. The results are presented in Table 5.

A two way ANOVA revealed significant difference between anxiety level of first year and final year students (F = 7.365, p <.05). However, the result revealed no significant effect of gender on anxiety level of students (F = 0.066, p>.05). Also, the interaction between gender and education are not significant (F=0.639, p>.05).

Table 5: Table showing results of Two Way ANOVA on anxiety scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	91.375a	3	30.458	3.066	.029
Intercept	7870.239	1	7870.239	792.138	.000
Edu_level	73.176	1	73.176	7.365	.007
Gender	.660	1	.660	.066	.797
Edu_level * Gender	6.346	1	6.346	.639	.425
Error	1947.345	196	9.935		
Total	10282.000	200			
Corrected Total	2038.720	199			
a. R Squared = .045 (Adjusted R Squared = .030)					

IV. Discussion

From the obtained mean scores it is clear than first year students (M = 5.90) reported more stress than final year students (M = 4.91). Moving to gender, male engineering students (M = 5.6168) reported more stress than female engineering students (M = 5.1613). Male engineering students have additional burden of scoring good marks and get good placements. This burden of good academic score and placement is less on female students. Probably, it may be the reason why male engineering students experience more stress than female engineering students.

Also, first year students (M = 7.07) reported more anxiety than final year students (M = 5.77). However, female engineering students (M = 6.6344) reported more anxiety than male engineering students (M = 6.2336). It is well documented that females are more emotional than males and more likely to develop anxiety disorders than males. The findings of the current study support this notion and contribute to studies related to anxiety and gender differences which support this notion.

The results of two way ANOVA shows that there is significant difference in stress level of first year and final year engineering students (F = 4.674, p<0.05). Also, first year and final year students differs significantly on anxiety scores (F = 7.365, p<0.05). The four year engineering undergraduate program contributes for overall personality development of the students. Students show tremendous changes in personality and level of understanding during these four years. They not only develop self confidence but also raise their level of understanding about the technical subjects and prepare themselves for self study. They learn to face challenges and undertaking difficult assignments. They develop new skills and handle the obstacles and challenges with courage. This results in improving mental health and abilities of students. Hence, the final year students can manage their stress and anxiety in a better way than first year students.

V. Conclusion

From the above results and discussion it is clear that first year students reports more stress and anxiety than final year students. Hence, the institutes must undertake the stress management programme for the new entrants so that they will be able to manage their stress and anxiety level and concentrate more on studies. However, the study showed less impact of gender on stress and anxiety level of students.

This study also concludes that in order to improve physical and mental health of the engineering students, institutes should plan proper counseling strategy periodically. These counseling sessions will be helpful for students to express their problems freely to the counselor. This will help students in many aspects. Students can enhance optimism, boost confidence in students and enable them to cope up with stress and anxiety. It will be beneficial for improving overall mental health of students.

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