

Analysis of Factors Affecting the Stress Level of Engineering Students from Remote Areas*

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This paper presents an analysis, based on a questionnaire, of factors that affect the stress level of engineering students who come from remote areas. The questionnaire relates to the expectations that the students have gained from their native institutions as well as from their families. Randomly collected data from 200 students is analyzed. Six-sigma techniques of an Affinity diagram, Pareto analysis, SIPOC analysis, a Cause and Effect matrix and Scatter plots are used for the analysis. It is observed that the students' poor command of the English language, their lack of confidence and lack of knowledge about higher education are the most critical stress-causing factors.

Keywords: student stress; remote area students; Pakistan; Six-Sigma

1. Introduction

Stress is any situation that develops negative thoughts and feelings in students [1] and these stressful events can be appraised by them either as 'challenging' or 'threatening' [2]. When students see their education as a challenge, stress can bring them a sense of competence and an increased capacity to learn, but if education is seen as a threat, it can produce feelings of helplessness and a sense of loss. A critical issue concerning stress in students is its effect on learning; therefore, stress should be dealt with carefully and effectively [3]. The academic success of engineering students is related to the level of stress [4]. Stress in students can be caused by various existing problems, such as problems at school, financial problems, family problems and problems in their surroundings [5–7].

However, this can be more severe if the students simultaneously make the transition from a rural to an urban environment [8]. The students who come from remote areas in order to study have different problems from those from urban areas. For example, separation from home to get a degree and pressure to get good grades are permanent sources of stress [9]. In many cases for college freshman, this is generally their first time away from their home and parents, so they are starting to shift from a life that is dependent on others to a life that needs them to release the dependency and start carrying their own responsibilities [10–12]. Studies have shown that urban students experience less stress compared with rural students. This is due to differences in home stability, family background and parents–child relationship quality experienced by the students [10] from urban areas. On the other hand, a

low educational attainment of the parents [6], especially mothers, has a negative effect on student achievement in backward areas [13, 14]. Along with socioeconomic status, cultural differences also lead to stress in students [5, 7]. In addition to these external stress factors, stress is also self-generated and these internal factors include: uncertainty, pessimistic attitude, unrealistic expectations, lack of assertiveness and, in response to these stressors, students can develop physical and mental ailments. In an effort to become too competitive, students can develop a negative attitude, and have a feeling of inferiority, which is a root cause of stress for them. Teaching skills and communication with the teacher are also big stressors [15, 16]. Keeping in mind all these adverse consequences of this transition from rural to urban life, preparing students for this move becomes an important responsibility for educators [8]. This discussion reveals various factors that induce stress in students from remote and rural areas who come to university for education. In such a diverse and competitive environment they tend to be victims of stress and complexes that adversely affect their personality and academic performance. However, the above mentioned factors may not be universal, due to socio-cultural and political differences. So, in order to explore these factors in the context of a developing country such as Pakistan, this research was conducted to examine the main stress factors encountered in students from remote area.

2. Scope

The scope of the present study is limited to institutions located in Pakistan's largest province (in terms

of population and development), Punjab. Islamabad, the capital of Pakistan, is located in this province. Pakistan has fifteen major engineering universities with about 25,000 students of which 20,000 are from Punjab and study at ten engineering universities. These universities admit students from all provinces; however, a major share goes to the students of the home province. About forty percent of the students studying engineering in these universities come from remote areas.

Preliminary discussions were held with these students to ask about factors that could possibly affect their academic progress. The final outcomes of the students were arranged arbitrarily in the questionnaire. Data were collected randomly and analyzed with MINITAB 14 [15]. Pareto analysis was carried out to identify the vital factors. SIPOC analysis was used to reach the inputs and outputs of these factors. Subsequently, the tools of Cause and Effect matrix, Scatter plots and coefficient of correlation were used to further shortlist the most significant factors.

3. Student problems

A preliminary survey was conducted with these engineering students to inquire about factors that could hamper their performance in engineering education and subsequently producing stress. Brain storming sessions were held with the students to inquire about those factors. The responses of these students were listed in broader categories with

the help of an affinity diagram, which lead to the questionnaire.

4. Data collection

Questions were distributed arbitrarily to minimize the effects of bias. Two hundred students were randomly selected from different public and private sector engineering universities. Two surveyors interviewed these students individually at their convenience in order to ensure the quality and credibility of the data. These surveyors themselves explained the concept of every question to avoid any discrepancy in understanding their meanings. Questionnaire comprised twenty one questions and respondents were offered answers on the five point Likert-type scale (ranging from 1 = not at all part of my life to 5 = very much part of my life) to indicate the persistency of a problem in their present student life. As a result, the average stress level of these engineering students was found to be 72.4 percent, crossing the healthy stress level of 34 percent [17].

5. Data analysis

Pareto analysis was used to separate factors responsible for 80% of the stress from those creating just 20%. A criterion of complaint was fixed at any of the two points in a five point scale indicating distinctly and very much part of life. In this manner, the total number of complaints against each question were numbered, arranged in descending order and then plotted as shown in Fig. 1. A cumulative line of these

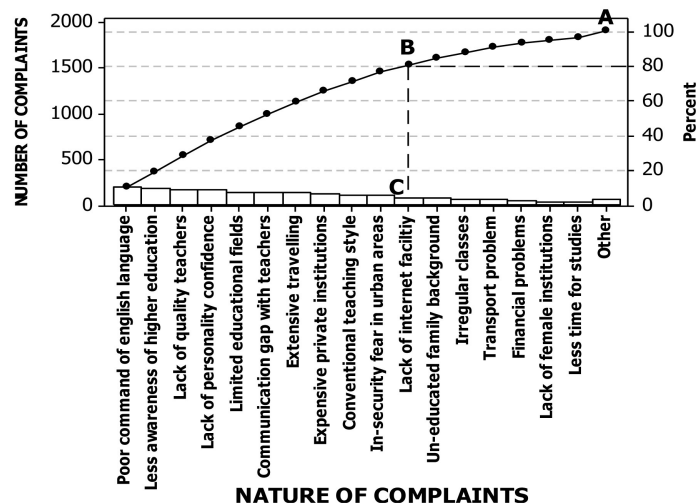


Fig. 1. Pareto analysis to show different types of complaints and their frequencies. The cumulative line of these complaints defines point A, indicating 100% on the vertical axis. The line starting from 80% intersects the cumulative curve at point B, from where a vertical line is drawn to cut the horizontal axis at point C.

Table 1. Eleven critical complaints as processes. The stake holders of these processes are suppliers and customers, who are responsible for creating inputs and receiving outputs respectively

S	I	P	O	C
Supplier	Input	Process	Output	Customer
Teacher	Non-interactive behavior	Lack of communication with teachers	Students' un-answered queries	Student
Government	Urdu medium schools	Poor command of English language	Students' weak expression	Student
HEC	Poor promotion of higher education schemes	Lack of awareness about higher education	Student's loss of opportunities	Student
Teacher	Conventional teaching methods	Traditional teaching style	Student's getting less knowledge	Student
Government	Poor location of schools	Extensive traveling	Students' loss of time	Student
Government	Less disciplines offered	Limited choice of career selection	Students' make compromised decisions	Student
Government	Poor pay package	Lack of quality teachers	Higher stress in students	Student
Parents	Less resources	Non-affordability of private institutions	Students' deprive of better education	Student
Administration	Misconceptions	Lack of internet facility	Students' no access to information	Student
Administration	Lack of extracurricular activities	Lack of personal confidence	Students' taking less initiative	Student
Government	Improper security	Fear of insecurity in urban areas	Parents' hesitation in sending students	Student

complaints was drawn to cut the right vertical axis at point A. The vertical distance between point A and the x-axis was divided into 100 equal parts. Then horizontal line was drawn from the point of 80% to cut the cumulative line at point B that defines point C at the x-axis. Figure 1 shows that eleven factors located on the left of point C that were responsible for 80% of the stress while the remaining ten resulted in only 20% of the stress.

An analysis of eleven complaints is summarized in the SIPOC diagram as shown in Table 1. Suppliers and customers are responsible for creating inputs and receiving outputs. Similarly these inputs and outputs are crucial in creating and observing any change in these complaints respectively.

A Cause and Effect (C&E) matrix, as shown in Table 2, uses the inputs and outputs of the SIPOC

Table 2. Cause and effect matrix as tailored in the present work. It shows the inputs and outputs of processes in the second row and second column respectively. The summation of the assumed correlation values in rows 3–11 are listed in the last row and last column

		Process outputs											
		Un-answered questions	Students weak expression	Students' loss of opportunity	Students' less knowledge	Students' waste of time	Students' making compromised decisions	Students' higher stress	Students' deprived of better education	Students' have no access to information	Students' taking less initiative	Parents' hesitation in sending students	Total
Process inputs	Lack of communication with teachers	9	3	3	9	1	1	9	9	0	3	3	50
	Poor command of English language	3	9	9	9	9	3	9	9	9	9	3	81
	Lack of awareness about higher education	3	1	9	9	9	9	9	9	3	9	9	79
	Traditional teaching style	9	1	1	9	9	3	9	9	3	3	3	59
	Extensive traveling	1	1	9	3	9	1	9	3	1	1	9	47
	Limited choice of career selection	1	0	9	1	3	9	9	1	0	1	0	34
	Lack of quality teachers	9	1	1	9	3	3	9	9	3	1	9	57
	Non-affordability pf private institutions	0	9	1	3	3	3	3	9	9	3	3	46
	Lack of internet facility	9	1	3	3	3	0	3	3	9	3	3	40
	Lack of personal confidence	3	9	9	9	3	9	9	9	3	9	9	81
	Fear of insecurity in urban areas	0	1	9	3	3	9	9	9	1	1	9	54
Total	47	36	63	67	55	50	87	79	41	43	60		

diagram that are outlined in the second row and second column respectively. A ranking scale is assumed to correlate inputs and outputs as follows:

No correlation	Strong effect
1	0
Remote effect	Moderate effect
3	9

Appropriate correlation values are shown in Table 2. These values are summed up in the last row and last column. Results indicate that higher stress among students with 87 points is the best indicator for any noticeable change in the inputs because of its strongest link with them, while the three inputs of poor command of English language, lack of personal confidence and un-awareness about higher education, with their respective totals of 81, 81 and 79, are responsible for creating maximum changes in the outputs.

Scatter plots in Figs 2(a–c) are used to witness the relationships between three inputs and an output, in which the student stress level from the whole questionnaire is plotted on the y-axis and the corresponding stress levels from the three individual questions are shown on the x-axis. A straight line is drawn to show mean values. Positive relationships between student stress and the three factors highlight that any change in these parameters is capable of producing a reciprocal change in student stress level. However, further analysis to see the strength of relationship between student stress and three factors is done with the help of Pearson correlation coefficient:

Poor command of English language	0.81
Lack of personal confidence	0.81
Un-awareness about higher education	0.79

The results show that a poor command of the English language, lack of personal confidence and lack of awareness about higher education are the most stress-contributing factors for the students from remote area.

6. Discussion

The principal purpose of this study was to investigate factors that affect the stress level of remote area students. The literature and previous work supports the argument that remote area students do face certain level of stress while getting educated in urban areas. However, in order to look into this matter in a specific context, i.e. Pakistan, research was conducted focusing on the engineering universities of a typical developing country, because the socio-cultural and political conditions are hugely different in developed and developing countries.

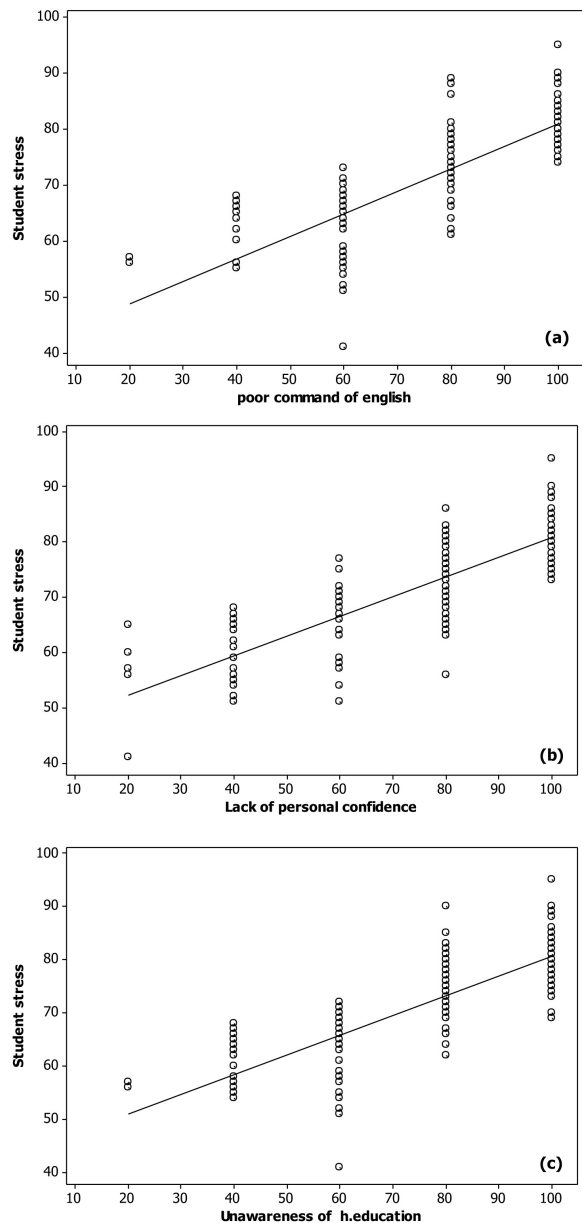


Fig. 2. Relationship charts between student’s stress and three complaints; (a) Poor command of English language, (b) Lack of personal confidence and (c) Lack of awareness of higher education – with straight lines showing their mean values.

Thus, the impetus is a diversified socio-cultural milieu and therefore the problems faced by students of remote areas in developed countries are certain to be different from those in developing countries. The findings of this research reveal that a poor command of English language, lack of personal confidence and lack of awareness of higher education, further compound their problems. The geographic and economic disparities in Pakistan lead to a discrepancy in educational standards in the different regions and these marginalized rural areas lack quality education. This is the reason that these findings are applicable for remote area students

only. These deprivations lower their self-confidence and they become victims of stress and an inferiority complex, which adversely affects their personality and performance. Owing to the above factors, only a few of the whole cohort of engineering students spend their quality time in engineering education without becoming stressed. Due to their lack of awareness about higher education and diversified disciplines, they are incapable of choosing the most suitable academic career for themselves, as the knowledge of different fields of higher education in rural areas is mostly limited to engineering and medical professions. Another major reason for stress in these students is that they lack confidence in their ability to compete successfully in engineering education. Factors such as family, surroundings and lifestyle add a lot of stress to these students. Their differences from urban area students are clear, such as family surrounding, home stability, parents' behavior and their economic condition. Their educational and occupational ambitions tend to be comparatively lower than urban youth because they have had less exposure to information about job market trends and career opportunities. They feel that they are incapable of competing with other students in the university. Teachers and university authorities should take appropriate measures to help the students from remote area to reduce these stress-creating factors and relieve them of these worries. Although, these findings are context specific and look to be more applicable to the environment from which they are extracted, countries that share common cultural and social traditions can also benefit from them. Teachers, educational leadership and government can get help from the findings of this research to formulate their strategies to counter these problems. This study provides us with an opportunity to reflect upon this crucial issue.

7. Conclusions

This research reveals that students of remote areas in Pakistan who come to cities for engineering education face many problems, which in turn cause them stress. Through this study, it is observed that a poor command of the English language, lack of personal confidence and a lack of knowledge about higher education are the most stress-contributing factors.

The limitation of the present study is the random collection of data from students belonging to dif-

ferent academic semesters. It is thus difficult to see the variation of stress levels between a first semester student and a final semester student. However, this limitation can be overcome in future studies by collecting data from students of separate semesters to see disparities in their stress levels.

References

1. N. A. Whitman, *Student Stress: Effects and Solutions*, ERIC Digest 85-1, 1985.
2. R. Schwarzer, Stress and coping resources: Theory and review, *Advances in Health Psychology Research*, Freie Universität Berlin, Berlin [CD-ROM publication ISBN 3-00-002776-9], 1998.
3. E. Goodman, How to handle the stress of being a student, *Imprint*, **40**(2), 1993, pp. 43.
4. A. J. Swart, The impact of stress on student tardiness and subsequent throughput rate of engineering students: A case study, *International Journal of Engineering Education*, **24**(4), 2008, pp. 794–801.
5. J. A. Banks and C. A. M. G. Banks, *Multicultural Education: Issues and Perspectives*, Wiley, 2009.
6. E. Chenoweth and R. Galliher, Factors influencing college aspirations of rural West Virginia high school students, *Journal of Research in Rural Education*, **19**(2), 2004, pp. 19–2.
7. M. V. Redmond and J. M. Bunyi, The relationship of intercultural communication competence with stress and the handling of stress as reported by international students, *International Journal of Intercultural Relations*, **17**(2), 1993, pp. 235–254.
8. D. Swift, Preparing rural students for an urban environment, *ERIC Digest*, 1988.
9. J. K. Hirsch and J. B. Ellis, Differences in life stress and reasons for living among college suicide ideators and non-ideators, *College Student Journal*, 1996.
10. T. Sulaiman, A. Hassan, V. M. Sapian *et al.*, The level of stress among students in urban and rural secondary schools in Malaysia, *European Journal of Social Sciences*, **10**(2), 2009, pp. 179–184.
11. T. J. D'Zurilla and C. F. Sheedy, Relation between social problem-solving ability and subsequent level of psychological stress in college students, *Journal of Personality and Social Psychology*, **61**(5), 1991, pp. 841.
12. L. C. Towbes and L. H. Cohen, Chronic stress in the lives of college students: Scale development and prospective prediction of distress, *Journal of Youth and Adolescence*, **25**(2), 1996, pp. 199–217.
13. N. Khattri, K. W. Riley and M. B. Kane, Students at risk in poor, rural areas: A review of the research, *Journal of Research in Rural Education*, **13**, 1997, pp. 79–100.
14. Y. K. Hoh, Presenting female role models in civil engineering: An outreach activity to help teachers overcome their misperceptions of engineers, *International Journal of Engineering Education*, **24**(4), 2008, pp. 817–824.
15. A. Rizwan, M. Alvi, and M. Hammouda, Analysis of factors affecting the satisfaction level of engineering students, *International Journal of Engineering Education*, **24**(4), 2008, pp. 811–816.
16. A. Rizwan, M.S.I. Alvi and M.-u.-D. Saeed, Analysis of factors affecting the stress level of engineering students, *International Journal of Engineering Education*, **26**(3), 2010, pp. 681–686.
17. APA. Stress and Generations, <http://www.apa.org/news/press/releases/stress/stress-generations.aspx>, accessed 10 February, 2013.

Appendix A

Questionnaire

Serial no.	Parameters	Not at all part of my life	Only slightly part of my life	Normally part of my life	Distinctly part of my life	Very much part of my life
1	Uneducated family background	1	2	3	4	5
2	Lack of communication with teachers	1	2	3	4	5
3	Poor English due to Urdu medium institutions	1	2	3	4	5
4	Lack of education awareness of remote area teachers	1	2	3	4	5
5	Improper guidance of accessing higher education	1	2	3	4	5
6	Traditional teaching style of remote area teachers	1	2	3	4	5
7	Financial problems	1	2	3	4	5
8	Exhaustion due to school/colleges situated far from villages	1	2	3	4	5
9	Traditional pressure to prevent higher education for females	1	2	3	4	5
10	No institution for females in remote areas	1	2	3	4	5
11	Lack of information about government schemes for students' financial aid	1	2	3	4	5
12	Lack of interest in admission due to institutions at greater distance (transport problem)	1	2	3	4	5
13	Limited choice of career selection	1	2	3	4	5
14	Homesickness	1	2	3	4	5
15	Non-availability of quality teachers in remote areas	1	2	3	4	5
16	Non-affordability of private institutes in remote areas	1	2	3	4	5
17	Lack of Internet facility	1	2	3	4	5
18	Irregular classes in remote areas	1	2	3	4	5
19	Less time due to extra home responsibilities	1	2	3	4	5
20	Unpolished personality due to no extracurricular activities	1	2	3	4	5
21	Parents fear of insecurity in urban area institutions	1	2	3	4	5

In order to maintain the confidentiality of the respondent, you are not required to give your name. Further, it is assured that all the information provided by you will be used solely for research purposes.

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