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A Statistical Approach to Requirement of English Language Proficiency in the Realms of Engineering and Medicine in Andhra Pradesh

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Abstract

In a student's academic career of Andhra Pradesh, Intermediate is the turning point where his future gets decided. There is no doubt that majority of the students here are eager to join professional courses like Engineering and Medical stream. They are not given a chance to pursue the course for which they have flair or aptitude. Moreover, a student who is good at English in school tends to neglect English at the Intermediate level by over-emphasis on science subjects. In addition to it his parents too believe that only Engineering and Medicine courses would fetch him a good job. The present article, a part of a Major UGC Research Project entitled "**Emphasis on English Language at Intermediate Level in Andhra Pradesh**" (2013-2016) with a total grant of 4.7 lakhs, is on asserting the role of English language in a professional student's career and the need for English Language Proficiency in the domains of Engineering and Medicine in Andhra Pradesh with the help of a statistical analysis.

Introduction

Besides over-emphasizing on science subjects at the Intermediate level, there are a large number of other reasons for which students may neglect English at the Intermediate level. Furthermore, it is commonly found with many of the English teachers from their long experience that the students at Intermediate level have forgotten all the English learnt for 10 years in school. In-spite of this, some students are able to secure 90% in English at Intermediate level and others are effortlessly getting through it. At this point one needs to ponder on the point that 'should competence level of a student be decided on the basis of marks secured'? It could be one of the reasons that the students have developed an attitude of indifference and negligence towards English. So, they neither fare satisfactorily in examinations nor improve their oratory abilities.

When these students gain admission into an engineering program, it is found that many students face great difficulty in the four corner skills of English Language proficiency, namely, Listening, Speaking, Reading and Writing. They make little or no attempt to improve their skills in the language and as a result, they perform poorly during the time of campus recruitment. They finally regret their lack of the appropriate employable skills, but it is often too late to reverse the situation.

In the same way, usage of English language for the medical profession has gained a lot of prominence in the present era of globalization. For proper communication between a medico and a patient, language plays a vital role. Interaction between them very important especially in those cases where the diagnosis and the following treatment are based on the information obtained from such communication. Usually most of the interns or doctors prefer to speak in the native language which is common both to the patient and him. Sometimes they fail to connect well with the patients as they are unable to speak fluently in English. They are unable to make sure whether the patients understand what they are told and what they are supposed to do and why. Similarly, most of the patients feel comfortable with the interns or doctors when they use their native language for communication. They think that their problems can be better explained by talking in the native tongue. On the other hand, there are also some patients who flinch when an intern or a doctor doesn't speak fluent English.

Literature Survey

National Employability Report by Aspiring Minds states that "India has a sizeable engineering talent pool. It produces about five lakh Engineering graduates every year, but only less than one- fifth of the total number of them are fit to be employable, especially in IT service sector. It also says that the percentage of ready to be employed engineers for IT Jobs is dismally low at 2.68%". The report which covered over 55000 engineering students, who graduated in 2011, highlighted the fact that the zeal to increase the number of colleges has impacted on the quality drastically.

According to Purple Leap Survey conducted in the year 2012, only one out of ten students graduating from tier 2,3and 4 Engineering colleges can be readily employable. It also pointed out regarding the huge gap between education and employability of the so-called Engineering graduates. One third of these graduates who have done academically well by securing 60% marks are unfit for employment even after being given proper training. The pass percentage of final year of Engineering in Andhra Pradesh was 49% in 2006, 35 % in 2007, 29 % in 2008. According to Aspiring Minds National Employability Report, which is based on a study of more than 1,50,000 engineering students who graduated in 2015 from over 650 colleges, 80% of the them are unemployable and the situation continues to worsen over the years.

Scope of Research

Companies today want candidates possessing the three critical skills- Communication, Problem solving and Technical Skills, and ready to start working from day one, because nobody wants to spend and money on training. So, students will need to do all that they can do to work on their skills and be industry ready. Just going to college and finishing their studies is evidently not enough. Likewise, as most of the medical books are written in English and the entire syllabus is taught in English, it becomes a prerequisite for a medico to have a working knowledge in English. Besides, all the latest journals and magazines are written in English and it is the medium of communication for doctors or medicos at all the national and international conferences. In-spite of all the above reasons English has become a disconnect language for the medicos after their twelfth standard. Thus, some of the interns with their good subject knowledge fail to connect properly with

patients coming from different states due to poor grip on English language. They further miss better job prospects outside their respective state and country only due to poor hold on English Language.

Proposed Methodology and Discussion

As a part of the main project, the present study has been conducted in some of the professional colleges of Visakhapatnam district by gathering information through questionnaires, personal interviews of the professionals. Students from 5 Engineering colleges and 4 medical colleges have been selected, thus making a total sample of around 200 engineering students and 200 medical students. After a gap of one month, collection of the filled-in questionnaires and personal interviews are carried out. To analyze the data, some statistical tools that bring out the best results have been used. The tools used are descriptive statistics with frequencies and factor analysis. The software used to carry out statistical analysis is SPSS (Statistical Package for The Social Sciences)

Questionnaire for 3rd Year Students of Professional Courses

1. Name of the student:
2. Name of the college:
3. Stream: Engineering/Medical/Dental
4. Do you think that having fluency in English is a boon for all Professional courses: Yes/No
5. Do you feel that a student with fluency in English has an edge over a student who is not so fluent in English: Yes/No
6. How do you feel when compared to your counterpart coming from Telugu Medium background:
   a) Subject understanding-poor/good/very good/excellent
   b) Subject expression------poor/good/very good/excellent
   c) Oral communication----poor/good/very good/excellent
   d) Written communication-poor/good/very good/excellent
7. Do your teachers insist on speaking on English in the class: Yes/No
8. In which language do you interact with your friends outside the classroom: English/others
9. Do you agree that a person with fluent English has higher confidence levels compared to his Academic peers: Yes/No
10. Don't you agree that all the latest developments in various professional fields can be accessed from journals/publications that are published in English: Yes/No
11. Do you agree with the view that "English is the window to the world": Yes/No
12. Do you agree with the view that a strong grip on English will bring about an all-round development of your personality including various soft-skills& emotional intelligence: Yes/No
13. Do you regret now that you have neglected English earlier, which has led to your inability to express properly: Yes/No
14. Do you wish to overcome the deficiency being created by neglecting English at the Intermediate level: Yes/No
15. Do you put in effort daily to improve your communication levels through LSRW skills: Yes/No

Experimental Results with Tables & Graphs

To analyze the data of professional students, a popular dimension reduction technique, Factor Analysis is used to study the correlation structure among variables. It partitions the manifest variables in to groups and each partition further signifies the effect of a latent variable called common factor. These new variables stand for constructs that cannot be directly measured. Such an analysis is vital in different fields of research such as marketing of various companies that spend huge amount of money towards advertisement of their products. This further facilitates to know whether it is worth spending money on an advertisement.

The objectives of the questionnaire:

- What are the factors that influence an engineer, a medico or a dental student in neglecting English language at their Intermediate level?
- Are the influencing factors same for the engineering students and the medicos?

The sampling units consist of 200 samples of engineering students and 200 medicos including dental, which further rate several variables on a 5 and 2-point semantic Likert-scale. The data obtained then is analyzed by using Factor procedure of SPSS package. In Data Screening after being given a set of variables, SPSS usually finds a factor solution to that particular set. The solution obtained does not have any real meaning in-case the variables analyzed turnout to be insensible. There are several techniques such as study correlation among the variables, Anti-Image Matrix, Kaiser-Meyer-Olkin Measure of Sampling Adequacy that can be used to know whether to proceed with factor analysis of the given data set.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy method is a popular diagnostic measure and provides a measure to assess the extent to which the indicators of a construct belong together. There are no statistical tests for the KMO measure and the following guidelines are suggested (by Kaiser and Rice):

KMO Measure	Recommendation
≥ 0.9	Marvelous
0.80+	Meritorious
0.70+	Middling
0.60+	Mediocre
0.50+	Miserable
Below 0.50	Unacceptable

This criterion is accurate when there are less than 30 variables and communalities after extraction are greater than 0.7. On the other hand, when the sample size exceeds 250 then the

average communality is greater than 0.6. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test values obtained for the data under analysis are given in the following table.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.806
Bartlett's Test of Sphericity	Approx. Chi-Square	256.027
	df	10
	Sig.	.000

Hence the KMO value, 0.806, suggests the appropriateness to proceed with factor analysis of the data on hand.

Further Bartlett's Test of Sphericity tests the null hypothesis to find out whether the original correlation matrix is an identity matrix, which would indicate that, the variables are unrelated. For factor analysis there has to be some relationships between variables and if the correlation matrix is an identity matrix then all correlation coefficients would be zero. Therefore, the present test has to be significant as it gives the result of the test. As very small values (less than 0.5) indicate that there are probably significant relationships among the variables, a significant test tells that the correlation matrix is not an identity matrix. Finally, one can expect some relationships between the variables. Had the value been more than 0.10, then it would have indicated the unsuitability of the data for factor analysis. As the significance value is 0.000 for the problem under analysis, it can be said that the variables are not independent.

Further the Extraction of Factors consists of selecting the method of extracting the components, the number of components to be extracted, and the method of rotation for interpretation of the factors. At present, the Principal Component Method of extraction and the Varimax method of rotation are taken into consideration. The number of factors extracted is based on Eigen value more than one rule.

Usually Communalities table gives the proportion of variance explained by the underlying factors. After extraction, some of the factors are discarded and the amount of variance in each variable that can be explained by the retained factors is represented by the communalities table below. It shows that the factors included in the analysis have accounted for fairly good amounts of communalities among all the variables for both medical and engineering streams. Most of the communalities are above 0.4 and these values range from a minimum of 0.433 to a maximum of 0.799.

Communalities[a]

	Initial value	Extraction value for medical	Extraction value for engineers
1.Do you think that having fluency in English language is a boon at all professional courses:	1.000	.730	.441
2.Do you feel that a student with fluency in English has an edge over a student who is not so good at English:	1.000	.799	.583
3.Do the teachers insist on speaking in English in the class:	1.000	.602	.831
4.In which language do you interact with your friends outside the classroom:	1.000	.444	.438
5.Do you agree that a person with fluent English has higher confidence levels compared to his academic peers:	1.000	.705	.539
6.Don't you agree that all the latest developments in various professional fields can be accessed from journals/publications that are published in English:	1.000	.717	.663
7.Do you agree with the view that "English is the window to the world":	1.000	.433	.724
8.Don't you think as a student that fluency in English would make you stand in good stead:	1.000	.703	.765
9.Do you agree with the view that a strong grip on English will bring about an all-round development of your personality including various soft skills:	1.000	.683	.687
10.Do you regret now that you have neglect English, which has led to your inability to express yourself:	1.000	.613	.514
11.Do you wish to overcome the deficiency being created by neglecting English at intermediate level:	1.000	.741	.453

Extraction Method: Principal Component Analysis.

a. Only for the cases where stream = medical/engineering is used in the analysis phase.

Some of the popular criteria are Eigen value greater than one rule and Total variance explained. Further the Total Variance Explained table given below says that there are three Eigen values greater than one. The maximum Eigen value among all the values is 0.941and it is much below the unity. Further it can also be noted that the three factors that are larger than one and corresponding to these Eigen values, together account for 65.180% of total variance. Considering the kind of social survey, the amount of variance explained by the factor model is regarded to be fairly good.

Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.392	21.743	21.743	2.392	21.743	21.743	2.112	19.199	19.199
2	2.123	19.303	41.047	2.123	19.303	41.047	2.049	18.623	37.822
3	1.342	12.200	53.247	1.342	12.200	53.247	1.540	14.002	51.824
4	1.313	11.933	65.180	1.313	11.933	65.180	1.469	13.356	65.180
5	.941	8.556	73.736						
6	.824	7.490	81.226						
7	.702	6.379	87.605						
8	.473	4.296	91.901						
9	.397	3.605	95.506						
10	.328	2.979	98.485						
11	.167	1.515	100.000						

Extraction Method: Principal Component Analysis.

a. Only for the cases where stream = Medical is used in the analysis phase.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.116	19.233	19.233	2.116	19.233	19.233	2.073	18.848	18.848
2	1.739	15.808	35.041	1.739	15.808	35.041	1.663	15.123	33.970
3	1.542	14.018	49.060	1.542	14.018	49.060	1.605	14.595	48.565
4	1.243	11.298	60.358	1.243	11.298	60.358	1.297	11.792	60.358
5	.957	8.697	69.055						
6	.874	7.945	77.000						
7	.715	6.502	83.502						
8	.683	6.205	89.706						
9	.486	4.414	94.120						
10	.428	3.891	98.011						
11	.219	1.989	100.000						

Extraction Method: Principal Component Analysis.

a. Only for the cases where stream = Engineering is used in the analysis phase.

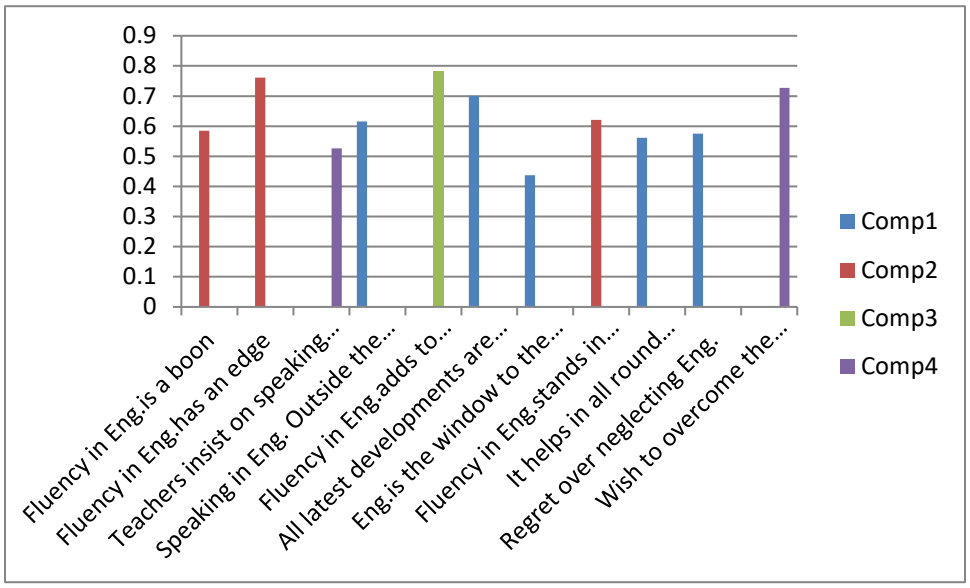
The component matrix gives the estimated factor loadings. The elements of this matrix describe the covariance or the correlations between the manifest variables and the latent common

factors depending on whether the covariance matrix or the correlation matrix is involved in the analysis. The sum of squares of the row elements of component matrix gives the communality of the corresponding variable. Using which we can estimate the specific variances of the manifest variables. Similarly, the sum of squares of the column elements of the component matrix gives the Eigen values of the covariance / correlation matrix. These values help in the computation of the proportion of variance explained by each factor. The method of estimation used to get the component matrix is the principle component method of estimation. This is referred to as un-rotated factor solution.

Further the elements of the loading matrix or the coefficients of the factor model are displayed in the Component Matrix Table below. Factor loadings of this order are usually neglected. From the table below, it is observed that there are some values that are loaded on more than one factor. Thus, this complicates the problem of identification of factors and necessitates rotation.

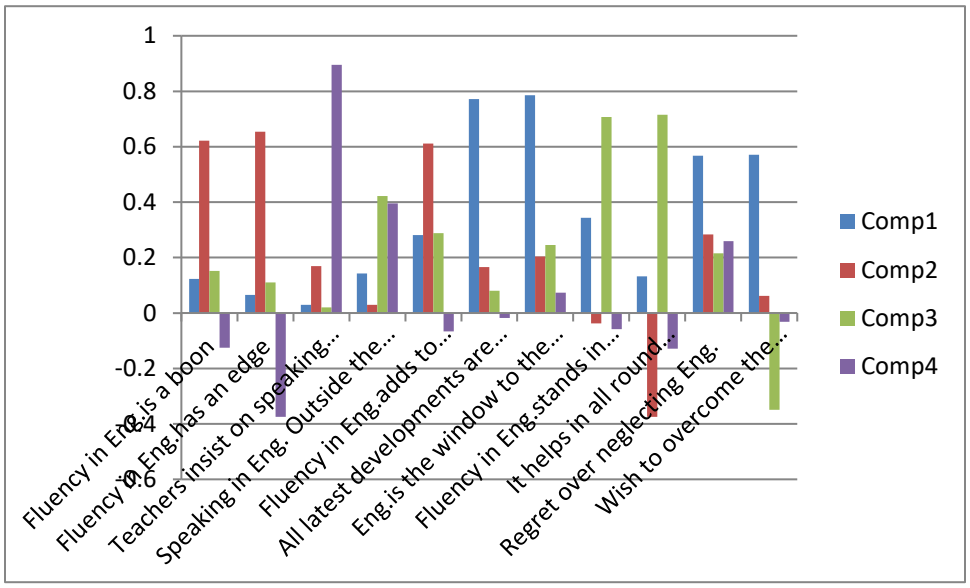
Component Matrix for Medical Students

Factors for Medical Students	Comp1	Comp2	Comp3	Comp4
1.Fluency in Eng.is a boon		0.585		
2.Fluency in Eng. has an edge		0.761		
3.Teachers insist on speaking in Eng.				0.526
4.Speaking in Eng. Outside the class	0.616			
5.Fluency in Eng. adds to confidence			0.78	
6.All latest developments are in Eng.	0.701			
7.Eng.is the window to the world	0.437			
8.Fluency in Eng. stands in good stead		0.621		
9.It helps in all round development	0.561			
10.Regret over neglecting Eng.	0.575			
11.Wish to overcome the deficiency				0.727



Component Matrix for Engineering Students

Factors for Engineering Students	Comp1	Comp2	Comp3	Comp4
1.Fluency in Eng. is a boon	0.123	0.622	0.152	-0.125
2.Fluency in Eng. has an edge	0.065	0.654	0.11	-0.374
3.Teachers insist on speaking in Eng.	0.029	0.169	0.02	0.895
4.Speaking in Eng. Outside the class	0.143	0.029	0.422	0.395
5.Fluency in Eng. adds to confidence	0.281	0.611	0.288	-0.066
6.All latest developments are in Eng.	0.772	0.166	0.08	-0.018
7.Eng.is the window to the world	0.786	0.204	0.245	0.073
8.Fluency in Eng. stands in good stead	0.343	-0.038	0.707	-0.058
9.It helps in all round development	0.132	-0.375	0.715	-0.129
10.Regret over neglecting Eng.	0.567	0.283	0.215	0.259
11.Wish to overcome the deficiency	0.571	0.062	-0.349	-0.032

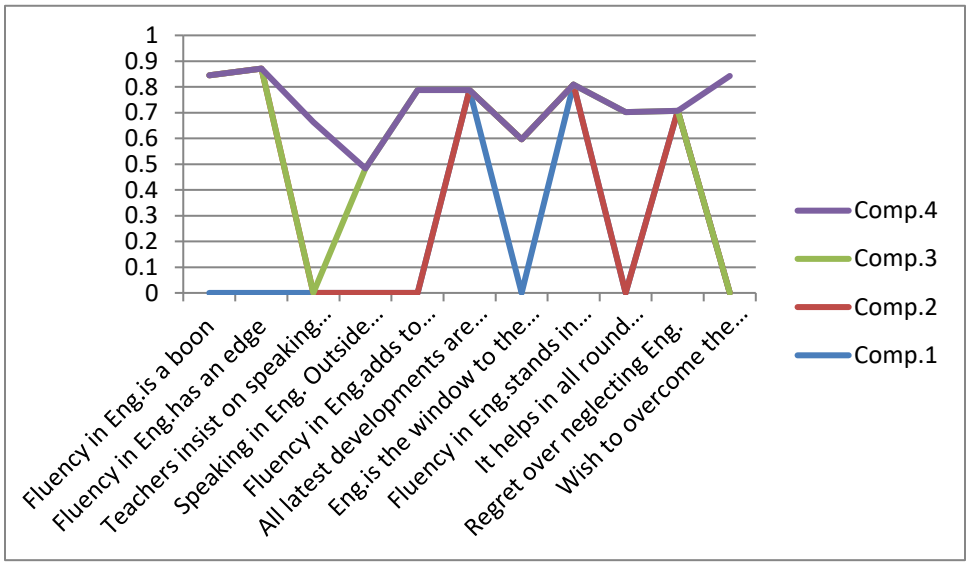


From the above two matrixes one observes that most of the variables are loaded on to the first factor. A subset of the variables are loaded both on to the first and second factors and further another subset of the variables loaded both on to the first and second factor. One also observes that only one variable on the second factor has its loading value more than that of their counterparts on the first. However commonsense says that they do not belong to a single category. This makes interpretation of the factors difficult. To facilitate the interpretation of the factors, the varimax rotation is considered. In Rotated component matrix all the variables have got partitioned into three mutually exclusive groups and are clearly interpretable. This explains how the rotation of initial factor solution is useful in the interpretation of factors. The factor solution obtained below clearly shows all the three mutually exclusive groups in the total set of variables. It can be further noted that the relative order of the factors are the same as in the case of the total sample.

Rotated Component Matrix for Medical Students

Factors for Medical Students	Comp.1	Comp.2	Comp.3	Comp.4
1.Fluency in Eng.is a boon		0.845		
2.Fluency in Eng. has an edge		0.871		
3.Teachers insist on speaking in Eng.				0.664
4.Speaking in Eng. Outside the class			0.483	
5.Fluency in Eng. adds to confidence			0.788	
6.All latest developments are in Eng.	0.788			
7.Eng.is the window to the world		0.596		

8.Fluency in Eng. stands in good stead	0.809			
9.It helps in all round development			0.702	
10.Regret over neglecting Eng.	0.707			
11.Wish to overcome the deficiency				0.842

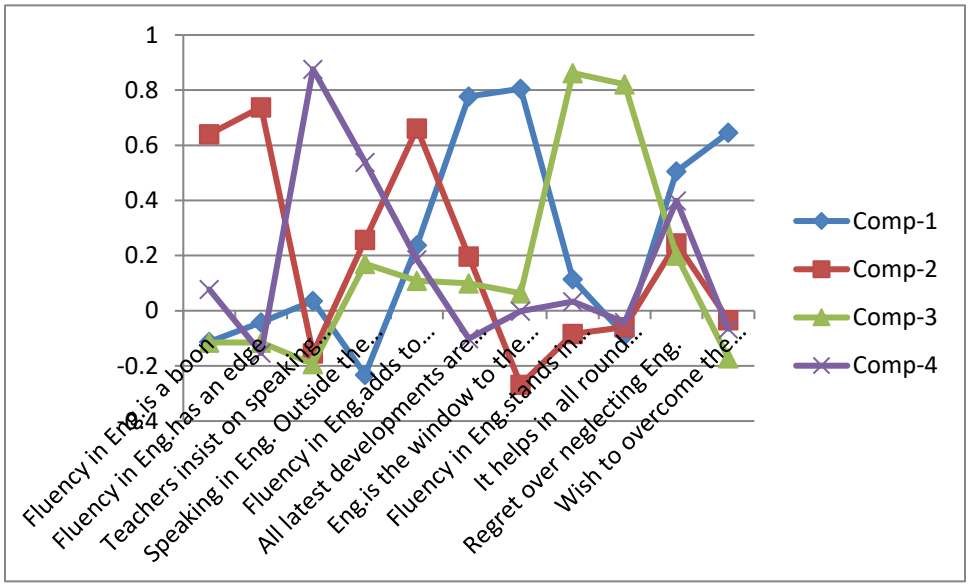


Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.
b. Only for the cases where stream = Medical is used in the analysis phase.

Rotated Component Matrix for Engineering Students:

Factors For Engineering Students	Comp-1	Comp-2	Comp-3	Comp-4
1.Fluency in Eng.is a boon	-0.113	0.64	-0.115	0.077
2.Fluency in Eng. has an edge	-0.042	0.738	-0.115	-0.153
3.Teachers insist on speaking in Eng.	0.036	-0.155	-0.193	0.876
4.Speaking in Eng. Outside the class	-0.232	0.257	0.17	0.538
5.Fluency in Eng. adds to confidence	0.237	0.661	0.109	0.185
6.All latest developments are in Eng.	0.777	0.197	0.1	-0.101

7.Eng.is the window to the world	0.805	-0.268	0.063	-0.001
8.Fluency in Eng. stands in good stead	0.115	-0.084	0.862	0.033
9.It helps in all round development	-0.088	-0.059	0.821	-0.042
10.Regret over neglecting Eng.	0.506	0.244	0.2	0.399
11.Wish to overcome the deficiency	0.646	-0.034	-0.172	-0.065



Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.
b. Only for the cases where stream = Engineering is used in the analysis phase.

Conclusion

From the factor analysis it is observed that the professional students have realized that fluency in English plays a vital role in their lives. They further wish to overcome the deficiency created by neglecting English at Intermediate level in A.P. The students feel that a student with fluency in English has an edge over a student not all that confident in English. They agree that fluency in English is a boon for the professional student as it is the only language of instruction at the undergraduate level. They feel the importance of interacting with teachers and friends in English both in the classroom and outside. They also agree on the point that fluency in English would boost one's confidence levels and help in all round development of one's personality. They realize that English is the window to the world and all the latest developments in various professional fields can be accessed from journals/publications in English. Furthermore, students who are not confident in English regret over their negligence. They also agree that this negligence has further led to the

inability to express effectively in future. They all wish to bridge the gap which is being created due to various reasons at the Intermediate level.

After considering the statistical report, a bridge course is suggested to improve Listening, Speaking, Reading and Writing skills of the students who are not fluent at English. It is an attempt made both through literature and language to improve LSRW skills at the first year of their professional courses. It will try to fill in the gap and help them to come on par with the students that are fluent at English. It can be further suggested that a test of proficiency in English for the students already admitted into professional courses by the respective Institutions will certainly segregate the weaker students from the ones with fluency in English. The suggested bridge is meant for "not so confident in English" students to take up the course and fill in the gap in order to come on par with the regular batch of students. They will follow the course for 35 to 40 hrs. in the first semester of their respective professional course for 3-4 credits. This bridge course has to run for only segregated weaker students in order to bridge the gap between students, not so fluent at English with the ones who are fluent at English and following the regular course in English prescribed by the respective Institutions. As medical students don't have English Language in their curriculum, the suggested list of reading given below will definitely be helpful to them who are not so fluent in English and wish to go out of state on a better career prospective. It will certainly prove to be helpful in meeting their requirements at the time of recruitment and later at various work places. It will contribute competency, efficiency, values and necessary life skills to the professional students and bring in a holistic development in them.

Suggested-Reading

A selection of fictional and non-fictional prose pieces from English and Indian Literature are chosen to introduce the students to different writings and induce the importance of values in life. The list includes different forms like short stories, novels, plays and autobiographies. The suggested writers are:

17th Century-18th Century—
i. Charles Dickens-Great Expectations,
ii. Thomas Hardy-The Mayor of Caster bridge,
iii. Lewis Carroll-Alice's Adventures in Wonderland,
iv. Arthur Conan Doyle-The Hound of The Baskervilles,
v. Rudyard Kipling-The Jungle Book,

19th Century-20th Century—
i. O Henry-Short Stories like Girl, Dream, After Twenty Years,
ii. H.H. Munro-- Short Stories like The Story Teller, Tea, The Threat
iii. Mark Twain—The Adventures of Tom Sawyer,
iv. Somerset Maugham-- Short Stories like Luncheon, The Rain, The Colonel's Lady
iv. G.B. Shaw—Play -Pygmalion,

20th century-- Present-
i. R.K. Narayan- Swamy and Friends,

ii. R.K. Laxman—The Distorted Mirror,
iii. A.P.J. Abdul Kalam—Wings of Fire,
iv. Khushwant Singh—The Mark of Vishnu and other Stories,
v. Anita Desai-The Artist Of Disappearance,

Besides the above suggested reading, daily reading of the news paper will be certainly helpful to the students.

II. Writing - Paragraph, Essay, Précis, Reading Comprehension, Letter Writing, Resume writing, emails, notices and minutes of the meeting.

III. Speaking and Listening- Students need to practice by listening to the news daily and speaking to others in English and participating in Just a Minute, Group Discussion and Debate.
IV. English Practice - Above all, grammar plays a key role both in the written and spoken communication of English. This umbrella term "grammar" includes many smaller components such as tenses, subject verb agreement, prepositions, articles, conjunctions and S+V+O (subject+verb+object) pattern. Thorough practice on all the above components will certainly make the students confident in their expression in English.

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