International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 03, 2020
ISSN: 1475-7192

Mechanical and Civil engineering graduates domain Knowledge and Life Skills for Employability

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Abstract:

Employability of Engineering Graduates has become a biggest concern for the Institutions, Industries and related government agencies. Year by year, the Intake reduction of engineeringinstitutesis becoming the problem of concern for the faculty's career as well.This research paper is the portion of the research work in understanding and analyzing the employable parameters of engineering graduates from Maharashtra (India).The research work is based on the feedback of Alumnus of these colleges. Thestatistical analysis of employability parametershelps in arriving the solution.

Keywords: *Employability skill, Mechanical and Civil Engineering graduates, Regression, Friedman's test*

I. Introduction and Literature Review

Employability is a much more daunting task than unemployment. The workforce needs tremendous expertise and quality enhancement in the view of business leaders. Problems such as education, quality degradation and low quality material do not add value to the labor-market requirements[1]. This study focuses on the role of higher education institutions in promoting employability skills to their graduates[4]. It aims to identify hard skills and soft skills in the current professional competitive era[3]. Dr. Samuel et al. have studied the recruitment process of the Campus and the studies have shown that 'Attitude' is an important parameter according to most industry experts[5]. Taking into account the perception of students and employers, policymakers discuss how best to build research and employer-friendliness policies. The study shows that Indian students are strongly sensitised to the skills required for employability on the global market[6][7][8]. An examined research in order to check students ' skills in employability involves MBA graduates, engineering graduates, sandwich graduated students and university bimolecular graduates and their employers.[10] The aims of the study are to explore the skills required for management graduates.[11]. PetiaPetrova carried out in 2001 a

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study at Luton University with students who graduated from the University of Luton with a view to assessing students ' abilities, expertise and personality characteristics, in order to provide them with a competitive edge in securing jobs in tourism[15]. However, he also suggested that the employer has a very close relationship in his mind between general values, competences and characteristics. The efficiency or the commitment of the employee is one of the key factors. The study carried out at colleges in Mumbai and Pune found that employability skills have been essential[1][16][18].The author has examined students with a large number of skills needed in the field of employability who are essential to the development of the country as well as employability of individuals[19]. The ability to present, communication , team attitudes and digital formats in the laboratory documents have an significant effect on soft skills in practising theoretical information[20]. Students in various India institutions are inadequate in their realistic implementation of this system. The ability to understand and solve problems in different regions of India is different and not unique in a given country. The practical application of theoretical knowledge will have a huge impact on student deterioration. The goal of reduced knowledge gaps in the application of theory to practise and thus increased employment rate for students of mechanical engineering is greatly impacted by soft skills, analytical knowledge, knowledge on efficiency, domain knowledge and faculty knowledge on practical applications[21]..

Objectives:

This paper aims at analyzing the employable parameters of engineering graduates in Maharashtra based on inputs from Alumni of various college.

The objectives of the proposed study are:

1) To study and understand the important variables of employability skills of Engineering students in Maharashtra

2) To suggest a comprehensive domain-specific model to address to the skill-set gap to enhance the quality standards of engineering colleges in Maharashtra.

II. Research Methodology

This study is intended to evaluate and evaluate the employment skills of Maharashtra engineering graduates, and to take form as graduates. Descriptive – correlational research design is used. Most of the literary studies limit samples to a particular region and did not consider the Maharashtra and in particular no investigation is carried out on the basis of the retroactive type Alumnus of engineering colleges. A set of questionnaires have been created to be tested by graduates of mechanical engineering and civil technology. Twenty-two common questions (such as soft skills, skills etc.) were asked including 15 domain-specific questions.

A 5-point style scale of Likert was used with the following answers:

. 1 : Agree

2 : Strongly Agree

3 : Neutral

4 : Disagree

5 : Strongly Disagree

The survey has been sent by e-mail to the alumni and the app with the Google Docs connexion. A sample size of 100 of the 129 respondents was defined as sufficient. The questionnaire had to be completed and the reply sent via Google Docs. Initially, the pilot analysis was conducted and the final questionnaire propagated. A total of 0.956 Cronbach alpha values were expected to suggest that the questionnaire was strongly correlated and reliable. This paper limits discussion of soft and technical skills and the relevant field.

Instatus of Survey

Structures in two components were the questionnaire for the study survey.

1) The questions concerned the skills of life, creativity, and technical qualifications.

2) Sector specific problems divided into professional and strategic expertise We usage.

In previous studies, most areas were skipped. The survey helped to define the real difference in the variables. As shown in Table 1, the dependent and independent variables are grouped into 4 variables as shown in Table 2.

Table 1: Dependent and Independent Parameters

Independent variable	Dependent Variable
The ability to demonstrate Leadership	Lifeskills were developed by concerned department in college.
Training in Verbal Communication	
Training in Written Communication	
Problem solving skill	
Critical Thinking skill	
Organizing & managing Symposiums, Events	
To acquire international certification.	
Write different competitive exams such as GRE, GMAT, and CAT.	

Table 2: Questionnaires and the Grouping

Group Number	Nomenclature	Group name	No. of Questions in the group for Civil Engg.	No. of Questions in the group for Mechanical Engg
Group 1	TS	Technical skill	11	10

Group 2	MTT	Modern tools and technique	03	06
Group 3	SS	Soft skill & professional skill	10	10
Group 4	TLP & OTHERS	Teachinglearningprocess,R&D, Innovation & other skill	09	09

Research Hypothesis:-

A. H01: Technical Skill, Modern tools and techniques, Teaching Learning and soft skills of Civil Engineering graduates have same probability distribution.

H11: At least 2 of Technical Skill, Modern tools and techniques, Teaching Learning and soft skillsof Civil engineering graduates differ from each other.

B. H02: Technical Skill, Modern tools and techniques, Teaching Learning and soft skillsMechanicalEngineering graduates have same probabilitydistribution.

H12: At least 2 of Technical Skill, Modern tools and techniques, Teaching Learning and soft skillsof Mechanical engineering graduate's differ from each other.

C. H04: The eight defined variables i.e. "To write different competitive exams, Leadership ability, Verbal Communication, Problem solving skill, Organizing managing Symposiums, Critical Thinking skill, Written Communication, international certification" does not have impact on soft skills of Civil engineering graduates.

H14: The eight variables i.e. "To write different competitive exams, Leadership ability, Verbal Communication, Problem solving skill, Organizing managing Symposiums, Critical Thinking skill, Written Communication, international certification "does have impact on soft skills of Civil engineering graduates.

D. H04: The eight defined variables i.e. "To write different competitive exams, Leadership ability, Verbal Communication, Problem solving skill, Organizing managing Symposiums, Critical Thinking skill, Written Communication, international certification" does not have impact on soft skills of Mechanical engineering graduates.

H14: The eight variables i.e. "To write different competitive exams, Leadership ability, Verbal Communication, Problem solving skill, Organizing managing Symposiums, Critical Thinking skill, Written Communication, international certification "does have impact on soft skills of Mechanical engineering graduates.

III. Research Findings:

The data collected from the alumnus are used to find the gap in employability variables. Data analysis was carried out by using a statistical tool SPSS i.e.statistical process for social sciences version 20.

Anova and Regression Analysis

The hypothesis were tested for the statistical significance for importance of individual factors, regression analysis and Anova have been performed.

Analysis of Civil Engineering data:-

H01: Technical Skill, Modern tools and techniques, Teaching Learning and soft skills of Civil Engineering graduates have same probability distribution.

H11: At least 2 of Technical Skill, Modern tools and techniques, Teaching Learning and soft skills of Civil engineering graduates differ from each other.

Descriptive Statistics					
	N	Mean	Std. Deviation	Minimum	Maximum
Avg of TS	44	2.249854	.8244046	1.0000	4.7692
Avg of MTT	44	2.856061	1.1755426	1.0000	5.0000
Avg of SS	44	2.443182	.9231890	1.1000	5.0000
Avg of TLP:	44	2.525568	.9824487	1.0000	5.0000

Friedman Test

Ranks	
	Mean Rank
Avg of TS	2.06
Avg of MTT	2.90
Avg of SS	2.42
Avg of TLP:	2.63

Test Statistics[a]	
N	44
Chi-Square	10.390
Df	3

Asymp. Sig.	.016
a. Friedman Test	

P value is less than 0.05 so null hypothesis is rejected. So we can conclude that at least 2 skills sets differ from each other for civil engineering studentsacrossMaharashtra.

Post hoc

As P value is less than 0.0083, the Bon Ferroni corrected Alpha,This is the only statisticallysignificant variable technical skill and Modern usage tool.

Wilcoxon Signed Ranks Test

Ranks				
		N	Mean Rank	Sum of Ranks
Avg of MTT - Avg of TS	Negative Ranks	9[a]	15.50	139.50
	Positive Ranks	33[b]	23.14	763.50
	Ties	2[c]		
	Total	44		
a. Avg of MTT <Avg of TS				
b. Avg of MTT >Avg of TS				
c. Avg of MTT = Avg of TS				

Test Statistics	
	Avg of MTT - Avg of TS
Z	-3.902[b]
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test b. Based on negative ranks.	

Regression Analysis:

H04: The eight defined variablesi.e. “To write different competitive exams,Leadershipability, Verbal Communication, Problem solving skill, Organizing managing Symposiums,Critical Thinking skill, Written Communication, international certification” does not have impact on soft skills of Civil engineering graduates.

H14: The eight variables i.e. “To write different competitive exams,Leadershipability, Verbal Communication, Problem solving skill, Organizing managing Symposiums,Critical Thinking skill, Written Communication, international certification“does have impact on soft skills of Civil engineering graduates.

a. Dependent Variable: Life skills (time Management, Prioritization)/Interpersonal Skills were developed by concerned dept. in college

b. Predictors: (Constant), College encouraged and guided you to write different competitive exams such as GRE, GMAT, and CAT etc., The ability to demonstrate Leadership was developed by college, Training in Verbal Communication was developed as required by industry, Problem solving skill was developed as required by industry, Organizing & managing Symposiums, Events and other activities were assigned by college to you., Critical Thinking skill was developed as required by industry, Training in Written Communication was developed as required by industry, College encouraged you to acquire international certification.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.050	.338		.148	.883
	The ability to demonstrate Leadership was developed by college	.161	.130	.153	1.233	.226
	Training in Verbal Communication was developed as required by industry	.168	.171	.180	.986	.331
	Training in Written Communication was developed as required by industry	.508	.182	.579	2.792	.008

	Problem solving skill was developed as required by industry	-.016	.207	-.019	-.077	.939
	Critical Thinking skill was developed as required by industry	-.078	.187	-.097	-.418	.678
	Organizing and managing Symposiums, Events and other activities were assigned by college to you.	.136	.128	.191	1.057	.298
	College encouraged you to acquire international certification.	-.162	.151	-.278	-1.075	.290
	College encouraged and guided you to write different competitive exams such as GRE, GMAT, and CAT etc.	.137	.138	.240	.993	.327
a. Dependent Variable: Life skills (time Management, Prioritization)/Interpersonal Skills were developed by concerned dept. in college						

The coefficients table provides us with the necessary information to predict the model.

The regression equation is

$$\mathbf{Y=0.050+0.161A1+0.168A2+0.508A3+0.016A4-0.078A5+0.136A6-0.162A7+0.137A8+\mu}$$

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.807[a]	.651	.573	.917

The R value represents the simple correlation and is .807 which indicates a high degree of correlation .The R Square value indicates how much total variation in the dependent variable can be explained by the independent variable which is 0.651 in this case i.e. 65 % can be explained.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	56.496	8	7.062	8.389	.000[b]
	Residual	30.304	36	.842		
	Total	86.800	44			

a. Dependent Variable: SS Life skills (time Management, Prioritization)/Interpersonal Skills were developed by concerned dept. in college

This table indicates the regression model predicts the dependent variable significantly well. The P is 0.00 which is less than 0.05 and indicates that overall, the regression model statistically significantly predicts the outcome variable. It is a good fit for the data.

Mechanical Engineering graduates.

Hypothesis:-

H02: Technical Skill, Modern tools and techniques, Teaching Learning and soft skills Mechanical Engineering graduates have same probability distribution.

H12: At least 2 of Technical Skill, Modern tools and techniques, Teaching Learning and soft skills of Mechanical engineering graduate's differ from each other.

Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Avg of TS	56	2.892378	4.8563986	.9091	38.0000
Avg of MTT	56	3.347619	4.9572632	1.0000	39.0000
Avg. of SS	56	3.055605	5.1108299	1.0000	40.0000
Avg of TLP	56	3.150794	5.2345836	1.0000	41.0000

Ranks	
	Mean Rank
Avg of TS	1.93
Avg of MTT	3.29
Avg. of SS	2.26
Avg of TLP	2.53

Test Statistics[a]	
N	56
Chi-Square	34.056
Df	3
Asymp. Sig.	.000
a. Friedman Test	

P value is less than 0.5 so null hypothesis is rejected. So we can conclude that at least 2 skills sets differ from each other for Mechanical engineering students across Maharashtra.

Regression Analysis:

H04: The eight defined variables i.e. “To write different competitive exams, Leadership ability, Verbal Communication, Problem solving skill, Organizing managing Symposiums, Critical Thinking skill, Written Communication, international certification” does not have impact on soft skills of Mechanical engineering graduates.

H14: The eight variables i.e. “To write different competitive exams, Leadership ability, Verbal Communication, Problem solving skill, Organizing managing Symposiums, Critical Thinking skill, Written Communication, international certification “does have impact on soft skills of Mechanical engineering graduates.

a. Dependent Variable: Life skills (time Management, Prioritization)/Interpersonal Skills were developed by concerned dept in college

b. Predictors: (Constant), College encouraged and guided you to write different competitive exams such as GRE, GMAT, and CAT etc., The ability to demonstrate Leadership was developed by college, Training in Verbal Communication was developed as required by industry, Problem solving skill was developed as required by industry, Organizing & managing Symposiums, Events and other activities were assigned by college to you., Critical Thinking skill was developed as required by industry, Training in Written Communication was developed as required by industry, College encouraged you to acquire international certification.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.145	.324		.446	.657
	The ability to demonstrate Leadership was developed by college	.709	.161	.598	4.390	.000
	Training in Verbal Communication was developed as required by industry	.346	.175	.349	1.973	.055
	Training in Written Communication was developed as required by industry	-.040	.182	-.040	-.218	.828
	Problem solving skill was developed as required by industry	.274	.122	.301	2.244	.030
	Critical Thinking skill was developed as required by industry	-.297	.152	-.325	-1.960	.056
	Organizing & managing Symposiums, Events and other activities were assigned by college to you.	-.202	.122	-.248	-1.653	.105
	College encouraged you to acquire international certification.	.065	.161	.093	.404	.688

	College encouraged and guided you to write different competitive exams such as GRE, GMAT, and CAT etc.	.114	.138	.180	.830	.411
a. Dependent Variable: SS Life skills (time Management, Prioritization)/Interpersonal Skills were developed by concerned dept in college						

The coefficients table provides us with the necessary information to predict the model.

The regression equation is

Y=.145+0.709A1+0.346A2-0.40A3+0.274A4-0.297A5-0.202A6+0.065A7+0.114A8+μ

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.800[a]	.640	.576	1.001

The R value represents the simple correlation and is .800 which indicates a high degree of correlation .The R Square value indicates how much total variation in the dependent variable can be explained by the independent variable which is 0.640 in this case ie 64 % can be explained .

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	79.974	8	9.997	9.983	.000[b]
	Residual	45.063	45	1.001		
	Total	125.037	53			
a. Dependent Variable: SS Life skills (time Management, Prioritization)/Interpersonal Skills were developed by concerned dept. in college						

This table shows that the model of regression substantially well forecasts the dependent variable. The P is 0,00 and less than 0,05. In general, the regression model statistically forecasts the result variable substantially. It fits the data well.

IV. Result and outcome:

The study shows improvements in student employability in different areas of education. The study shows that students have good skills in one field and that they do not ensure their ability in another. If the present situation is taken into account, an individual who is able to do several tasks will obtain jobs and retain them very well in the professional setting.

The statistical significance notes that all four of these null hypothetic variables are rejected. This means the utility of civil and mechanical engineering deputy graduates in Maharashtra are significantly affected by variables such as leadership, oral and written communication, problems resolution skills , and critical thinking skills etc.

• Four competences, including technological experience, latest technologies and techniques. For graduates of civil engineering and of mechanical engineering, soft skills and learning processes are distinct from each other.

• The Maharashtra Engineering College will follow the established regression model.

• The Bon-Ferroni corrected Alpha because the value of P is less than 0.0083, it is the only statistically important differ, e.g. technical expertise and a modern method for use. This shows that Maharashtra 's students stressed their techniques and new techniques in the schools.

• The Colleges of Engineering must focus on and educate on use of digital technologies such as 3D Printing, New Product Creation Tools, MEMS, Hypermesh analysis software, and Nastran, L.S. Dyna. The study demonstrated that graduates of civil engineering need exposure to modern instruments such as Rhino PSC, Prima-Vera and ETABS.

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