Analysis of Research Attitudes of Engineering Students

Sakshi Sinha

Assistant Professor - Yeshwantrao Chavan College of Engineering, Wanadongri, Nagpur, India
sakshisinha@yahoo.com
9919@ycce.in

Abstract: *This study is undertaken to analyze Students Attitude towards Research especially of Engineering Students studying in various Institutes which are affiliated to RTM Nagpur University, Nagpur. Detail investigation of earlier research conducted on research attitude and various attributes of Research Attitude were compiled and Factor Analysis applied to extract the important responsible factors. Additionally descriptive statistics and inferential analysis were applied to have a clear picture and better understanding of Students Attitude towards research. All the responses were analysed by applying mean, Man Whitney U Test and Kruskal Wallis H Test. It is surprising to observe that the students have a negative attitude towards research. It has been observed in this study that Research Attitude has no correlation with Gender, however the research anxiety varies with males and females and as predicted those with a good CGPA displayed a high positive attitude towards research.*

Keywords: Students, Research, Research Attitude, factor analysis

1. Introduction

Research has the potential to look at the surrounding and situation with different perceptive and pave the way for future growth.

In this fast growing competitive world, it is necessary that research attitude should be there with all the people especially students who are pursuing the bachelor and other degree courses as it is going the change and mould the future according to the needs wants and demands of the society.

In this study an attempt has been made to analyse the Attitude of the students towards research so that suitable steps can be taken for their future betterment

2. Literature Review

In the Shafqat et al (2018) found that there exist positive attitude towards university research and incentives played a very important role in generating an interest towards research. They have also found that research anxiety did not hamper the intellectual activities of the faculty. In the shyambhavee Behera et al (2017) it is concluded that even with knowledge regarding the importance of research in the field of medicine, barriers outnumbered the motivations towards conducting thesis work. Overcoming these barriers in various forms will help students to pursue research. In the study of Paul Kakpa et al (2014) it is observed that Self Efficacy of the students are positively correlated with the Research Attitude.

In the Dr. C. Kartik et al (2014) it was fond that Research attitude of male students is higher than the female students. And there is significant difference between the scores of research attitude with regard to the type of college. There is significant difference between the scores of research attitude of college students based on locality. There is significant difference between the scores on research attitude of students with regard to the arts students based on type of college and gender. In the Saghir Ahmad et al (2021) It is

also concluded from the findings of the study that research is very important for the survival of prospective teachers in their life. There is a need to encourage the students to explore new things through research. It also concluded that research is useful for the career of teachers. Zeeshan Maqsood et al (2019) It is observed that Participants of PhD and MPhil were significantly better than participants of Masters and BS (hons) on factor 1 "positive attitude towards research", and factor 2 "research usefulness for profession". In Brien L. Bolin et al (2016) the study has pointed out that the meaningful research towards community and social service enhance the self empowerment and self efficacy. Daniel Gredig et al (2016) affirms faculty members perception that students have a certain apprehensive regarding engaging in research related course work and allows for the assumption that students enrolled in course BSW programmes in Switzerland do not differ from their peers enrolled in programmes in North America or Israel. In Prema et al (2017) study assesses the attitude towards research relating to research usefulness, its applications in real life and professional life, the students' interest in research and their fear, anxiety and difficulty. In the factor analysis the following parameters / factors were traced Love for research, Research usefulness, research fear, research difficulties, research importance and research benefits

3. Objectives of the study

This research was carried out with the following objectives:
1) To determine the student's attitude towards research.
2) To analyze the important factor responsible to evaluate research attitude
3) To study the attitude of students towards research in context to their gender.

Hypothesis of the study
In the present study we have assumed and considered framing of the following Hypothesis:

Ho1 - Null Hypothesis	There is no relationship between Gender of students on the Research Attitude
Ha1 - Alternate Hypothesis	There is positive relationship between Gender of students on the Research Attitude
Ho2 - Null Hypothesis	There is no relationship between CGPA score of Students and their Research Attitude
Ha2 - Alternate Hypothesis	There is positive relationship between CGPA score of Students and their Research Attitude

4. Material and Methods

The present study was conducted on students of RTM Nagpur University, Nagpur especially Engineering Branches. The sample size is 714. Frequencies tables and graphs were used to present frequency and percentages for the representation of the data. Factor analysis was applied to summarize the large number of variables i. e.32 variables into 3 factors and Man Whitney U Test, Kruskal Wallis Test and Pearson Product Moment correlation were applied to explore the student's attitude towards research.

The questionnaire of our survey contains 45 question. In the demographic information we have sought 13 question and the remaining questional was related to the respondents attitude towards research. The questions were asked on Five point Likert Scale. The scale was comprised of both negative worded and positive worded items and a higher score represented higher level of attitude.

Pilot study was carried out to check the working context of the questionnaire before taking it to a large scale. A sample of 20 students was taken for this purpose. After the pilot study some changes were carried out and the scale of the questionnaire was changed from 7 - point Likert scale to 5 - point Likert scale as it was difficult for respondents to understand the 7 - point Likert scale. The questions were easily understood by the students as simple vocabulary was used.

5. Results and Discussion

a) Reliability Statistics
Testing the reliability of the present study, using Cronbach's α, it was found that the values of all variables were higher than 0.7 i. e.835, so the participants' answers were considered to be reliable.

Cronbach's Alpha	N of Items
.835	23

b) Demographic Features:

Attributes	Category	Frequency	(%)
Gender	Male	423	59.6
	Female	286	40.3
Resident	Rural	173	24.4
	Semi Urban	147	20.7
	Urban	386	54.4
Current CGPA	5.1 to 6.0	65	9.2
	6.1 to 7.0	344	48.5
	7.1 to 8.0	254	35.8
	8.1 to 9.0	39	5.5
Fathers Education	Intermediary	310	43.7
	Bachelor	260	36.6
	Masters	109	15.4

	Ph. D	11	1.5
Mothers Education	Intermediary	379	53.4
	Bachelor	203	28.6
	Masters	94	13.2
	M. Phil	4	.6
	Ph. D	7	1.0
Mothers Employment Status	House Maker	586	82.5
	Job Holder	92	13.0
	Business	19	2.7
Family Income	Below 20000	134	18.9
	21000 to 35000	114	16.1
	36000 to 50000	138	19.4
	51000 to 70000	109	15.4
	71000 to 99000	89	12.5
	1 Lakh and above	103	14.5
Previous Research Experience	Yes	194	27.3
	No	510	71.8

In this study it is observed that majority of the respondents were female (59.6%). Most of the respondent's age lies between 20 to 30 years. Majority of the participants belong to urban area i. e.54.4%. In this study it is also observed that 82.5 % of respondents mothers are home maker and most of the respondents parents have qualification upto intermediary.

Descriptive of respondent's demographic information depicts that the monthly family income of most of the respondents 32.5% was greater than 60, 000. In our research, most of the students 75.0% were those who have ever taken up research project/report/thesis and majority of the students (75.7%) said that they are interested in research work if they have a choice. It is surprising to observe that students have displayed negative attitude and majority of the respondents have stated that they are not interested in research activities and have shown positive attitude towards Research Difficulty. However, it is important to note that they have strong belief and faith in the relevance of Research in their respective field.

c) Factor Analysis
In this study Factor Analysis was done to reduce a large number of variables into fewer numbers of factors and to extract maximum common variance from all variables by putting them into a common score and the result and an index of all variable are used for further analysis

The below mentioned table shows two test that indicate the suitability of our data for structure detection. The Kaiser - Meyer - Olkin Measure of Sampling Adequacy is a statistic that is used to indicate the proportion of variance in our variables that might be caused by underlying factors.

KMO and Bartlett's Test

Kaiser - Meyer - Olkin Measure of Sampling Adequacy.		.934
Bartlett's Test of Sphericity	Approx. Chi - Square	13712.164
	df	253
	Sig.	.000

As seen from the Kaiser - Meyer - Olkin Test conducted we can conclude that as measure of Sampling Adequacy is.934 which is equal or greater than 0.60 we can proceed with exploratory factor Analysis. By analysing the data, the total

variance was explained through this data:

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	8.598	37.384	37.384	8.598	37.384	37.384	8.579	37.299	37.299
2	4.778	20.776	58.160	4.778	20.776	58.160	4.795	20.846	58.145
3	3.052	13.271	71.431	3.052	13.271	71.431	3.056	13.286	71.431
4	.893	3.881	75.312						
5	.689	2.994	78.307						
6	.560	2.436	80.742						
7	.483	2.098	82.841						
8	.442	1.922	84.763						
9	.421	1.831	86.594						
10	.377	1.641	88.235						
11	.357	1.550	89.785						
12	.331	1.441	91.227						
13	.284	1.235	92.461						
14	.252	1.095	93.556						
15	.234	1.018	94.574						
16	.220	.956	95.530						
17	.201	.876	96.406						
18	.173	.752	97.158						
19	.168	.732	97.890						
20	.148	.642	98.532						
21	.131	.570	99.102						
22	.106	.462	99.564						
23	.100	.436	100.000						
Extraction Method: Principal Component Analysis.									

The above table clearly shows the initial Eigevalues. And in this we have considered only those components that have total initial Eigenvalues greater than 1. In this case as only three components have total initial Eigenvalues greater than 1 which explains 71.43% of the variance, we can conclude that there are Three Factors.

The below mentioned table shows the factor weights. The first component covers the following questionnaire: (i) Research should be taught to all the Students (ii) Research Work is very interesting (iii) I like Research very much (iv) I use research in my daily life (v) Research is required in my field (vi) Most Students benefits from Research (vii) Research is Valuable (viii) The Skill acquired in research will be helpful to me in the future (ix) Knowledge from research is useful in my course work (x) I am inclined to study the details of research procedure carefully

The Second component covers the following questionnaire: (i) I find it difficult to understand the concept of research (ii) Research is Complex (iii) Research is Complicated (iv) Research makes me nervous (v) Research scares me (vi) I feel insecure concerning the analysis of Research Data (vii) I makes many mistakes (viii) i have trouble with arithmetic

The Third component covers the following questionnaire: (i) Research should be taught to all the Students (ii) I use research in my daily life (iii) Research is indispensable in my professional Training (iv) I am inclined to study the details of Research Procedure

Component Matrix^a

	Component				
	1	2	3	4	5
Research should be taught to all the Students	.856				
Research Work is very interesting	.907				
I like Research very much	.861				
I use research in my daily life	.659				
Research is required in my field	.872				
Most Students benefits from Research	.914				
Research is Valuable	.918				
The Skill acquired in research will be helpful to me in the future	.924				
Knowledge from research is useful in my course work	.921				
I am inclined to study the details of research procedure carefully	.898				
I find it difficult to understand the concept of research		.732			
Research is Complex		.801			
Research is Complicated		.819			
Research makes me nervous		.845			
Research scares me		.825			
I feel insecure concerning the analysis of Research Data		.784			
I makes many mistakes		.686			

i have trouble with arithmetic	.642		
Research should be taught to all the Students		.847	
I use research in my daily life		.857	
Research is indispensable in my professional Training		.878	
I am inclined to study the details of Research Procedure		.900	
Extraction Method: Principal Component Analysis.			
a.5 components extracted.			

It is observed from the factor analysis that there exist no strong correlation between each other factors which can be considered as good for analysis purpose

d) Testing of Hypothesis

To test our hypothesis whether the Research Attitude has

any correlation with the Gender of the students we have carried out the Mann - Whitney test. The findings of which is given hereunder:

The below given table shows the descriptive statistics

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Research Utility	713	2.28	1.075	0	5	1.40	2.00	3.00
Research Anxiety	713	2.20	1.138	0	5	1.33	2.00	3.00
Research Difficulty	885	3.09	.922	0	5	2.63	3.13	3.75
Gender	713	1.40	.491	1	2	1.00	1.00	2.00

The Ranks which contains number of observation in the group of male and female, mean rank and sum of ranks for the group of male and female is given hereunder. As seen in the below given table group with higher rank has the highest research attitude.

The third table shows test Statistics. We used Mann - Whitney U test statistics (53.000) and Asymp. Sig. (2 - tailed) to reject or fail to reject the null hypothesis.

If p > 0.05, we fail to reject the null hypothesis.
If p < 0.05, we must reject the null hypothesis.

Ranks

	Gender	N	Mean Rank	Sum of Ranks
Research Utility	Male	425	372.51	158316.50
	Female	288	334.11	96224.50
	Total	713		
Research Anxiety	Male	425	368.72	156706.00
	Female	288	339.70	97835.00
	Total	713		
Research Difficulty	Male	425	355.59	151127.00
	Female	288	359.08	103414.00
	Total	713		

Test Statistics^a

	Research Utility	Research Anxiety	Research Difficulty
Mann - Whitney U	54608.500	56219.000	60602.000
Wilcoxon W	96224.500	97835.000	151127.000
Z	- 2.449	- 1.852	- .222
Asymp. Sig. (2 - tailed)	.014	.064	.824
a. Grouping Variable: Gender			

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The medians of Research Utility are the same across categories of Gender.	Independent-Samples Median Test	.005	Reject the null hypothesis.
2	The medians of Research Anxiety are the same across categories of Gender.	Independent-Samples Median Test	.062	Retain the null hypothesis.
3	The medians of Research Difficulty are the same across categories of Gender.	Independent-Samples Median Test	.711	Retain the null hypothesis.

Since in our example, p = 0.005 with respect to Research Utility. Hence, we reject the null hypothesis. In two other factors like Research Anxiety where P value is .062 > 0.05, and Research Difficulty where P Value is .711>0.05 we fail to reject the null hypothesis and conclude that there is no difference in the Research Attitude with respect to understanding the utility of Research but there is significant difference between males and females with respect to

Research Anxiety and Research Difficulty.

(i) To test our hypothesis whether the Research Attitude has any correlation with the CGPA of the Students and the Research Attitude we have carried out the **Mann - Whitney** test. The findings of which is given hereunder:

The below given table shows the descriptive statistics

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Research Utility	713	2.28	1.075	0	5	1.40	2.00	3.00
Research Anxiety	713	2.20	1.138	0	5	1.33	2.00	3.00
Research Difficulty	885	3.09	.922	0	5	2.63	3.13	3.75
CGPA	701	2.38	.730	1	4	2.00	2.00	3.00

The Ranks which contains number of observation in the group of CGPA 5.1 to 6.0 and 6.1 to 7.0, mean rank and sum of ranks for the group is given hereunder. As seen in the below given table group with higher rank has the highest research attitude.

The third table shows test Statistics. We used Mann - Whitney U test statistics (53.000) and Asymp. Sig. (2 - tailed) to reject or fail to reject the null hypothesis.
If p > 0.05, we fail to reject the null hypothesis.
If p < 0.05, we must reject the null hypothesis.

Ranks

	CGPA	N	Mean Rank	Sum of Ranks
Research Utility	5.1 to 6.0	65	195.41	12701.50
	6.1 to 7.0	343	206.22	70734.50
	Total	408		
Research Anxiety	5.1 to 6.0	65	197.25	12821.50
	6.1 to 7.0	343	205.87	70614.50
	Total	408		
Research Difficulty	5.1 to 6.0	65	205.05	13328.00
	6.1 to 7.0	343	204.40	70108.00
	Total	408		

Test Statistics[a]

	Research Utility	Research Anxiety	Research Difficulty
Mann - Whitney U	10556.500	10676.500	11112.000
Wilcoxon W	12701.500	12821.500	70108.000
Z	- .680	- .542	- .041
Asymp. Sig. (2 - tailed)	.497	.588	.967
a. Grouping Variable: CGPA			

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The medians of Research Utility are the same across categories of CGPA.	Independent-Samples Median Test	.700	Retain the null hypothesis.
2	The medians of Research Anxiety are the same across categories of CGPA.	Independent-Samples Median Test	.858	Retain the null hypothesis.
3	The medians of Research Difficulty are the same across categories of CGPA.	Independent-Samples Median Test	.150	Retain the null hypothesis.

Since in our example, p value is >0.05 we fail to reject the null hypothesis and conclude that there is difference in the Research Attitude of Students on the basis of CGPA Scores they have.

6. Conclusion

This study explored the effects of demographic variables on

the student's attitude towards research. It was observed that students like and enjoy involving in research activity which indicates positive attitude of students towards research.

Another finding of this study is that the research attitude has no correlation with gender, however the research anxiety varies with males and females. It is also observed that there is strong correlation with CGPA score of the person with

Research attitude. This study has also examined the relationships that existed between the three factors that were produced in this study. This also shows that students perceived research usefulness in their lives. Results also showed that participants with good CGPA score were significantly better than participants with low CGPA Score on Factor - 1 "positive attitude towards research", and factor 2 "Research Utility and usefulness for profession".

References

[1] Adams, N. A., & Holcomb, W. R. (1986). Analysis of the relationship between anxiety about mathematics and performance. *Psychological Reports, 59* (2, Pt 2), 943–948. https: //doi. org/10.2466/pr0.1986.59.2.943

[2] Butt, I. H. & Shams, J. A. (2013). Master in Education Student Attitudes towards Research: A comparison between two public sector universities in Punjab, South Asian Studies, 28 (1), 97 - 105.

[3] Deepa, C. K., (2014). Attitude among college students towards research in Coimbatore city. International reference research journal.5 (5).37 - 42.

[4] Elmore, P. B., & Lewis, E. L. (1991). Statistics and computer attitudes and achievement of students enrolled in applied statistics: Effect of computer laboratory. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

[5] Fraser, H. (2009). Trying to complete socially just, politically sensitive social work research. Journal of Social Work, 9 (1), 87– 98.

[6] German, P. J. (1988). Development of the attitude toward science in school assessment and its use to investigate the relationships between science achievement and attitude toward science in school. Journal of Research in Science Teaching.25 (8).689 - 703.

[7] Keeves, J. P., & Morgenstern, C. (1970). Attitudes towards science: Measures and effects. The IEA Study of Science III: Changes in science education and achievement, 1984, 122 - 140.

[8] Kirk, S., & Rosenblatt, A. (1981). Research knowledge and orientation among social work students. Research utilization in social work education, 29 - 39.

[9] Oguan Jr, F. E., Bernal, M. M., & Pinca, M. C. D. (2014). Attitude and Anxiety towards Research, Its Influence on the Students' Achievement in the Course. Asian Journal of Management Sciences & Education, 3 (4), 165 - 172

[10] Papanastasiou, E. C. (2005). Factor structure of the attitudes toward research scale. Statistics education research journal, 4 (1), 16 - 26.

[11] Patak, A. A, Naim, H. A. (2012). ESL/EFL Students Attitude toward Research Report Writing in Higher Education: A Literature Review, Management Educator: Courses, Cases & Teaching Journal, 5 (65).

[12] Rubin, A., & Babbie, E. (2011). Research methods for social work (7th ed). Pacific Grove, CA: Brooks/Cole. Sabzwari, S., Kauser, S., & Khuwaja, A. K. (2009). Experiences, attitudes and barriers towards research amongst junior faculty of Pakistani medical universities. BMC medical education, 9 (1).

[13] Secret, M., Ford, J., & Rompf, E. L. (2003). Undergraduate research courses: A closer look reveals complex social work student attitudes. Journal of Social Work Education, 39 (3), 411 - 422.

[14] Shaukat, S., Siddiquah, A., Abiodullah, M. &Akbar, R. A. (2014), Postgraduate students attitude towards research. Bulletin of education and research.36 (1).111 - 122.

[15] Shkedi, A. (1998). Teachers' attitudes towards research: A challenge for qualitative researchers, International Journal of Qualitative Studies in Education, 11 (4), 559 - 577.

[16] Siemens, D. R., Punnen, S., Wong, J., & Kanji, N. (2010). A survey on the attitudes towards research in medical school. BMC medical education, 10 (1).

[17] Swindoll, C. R. (2012). Quotable quotes. Retrieved from http: //www.goodreads. com / quotes/267482 - the - longer - i - live - the - more - i - realize - theimpact, retrieved on 02 - 05 - 2017.

[18] Wainstock, S. L. (1994). Swimming against the current: Teaching research methodology to reluctant social work students. Journal of Teaching in Social Work, 9 (1 - 2), 3 - 16.

[19] Wells, M. (2006). Making statistics "real" for social work students. Journal Education for Social Work, 42 (2), 397–404.

[20] Zan, R., & Martino, P. (2007). Attitude toward Mathematics: Overcoming the Positive. Negative Dichotomy. The Montana Mathematics Enthusiast, 157 - 168.

[21] Zeidner, M. (1991). Statistics and mathematics anxiety in social science students: Some interesting parallels. British Journal of Educational Psychology, 61 (3), 319 - 328.