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RELATIONSHIP BETWEEN CREATIVE PROBLEM SOLVING ABILITY AND APTITUDE OF ENGINEERING COLLEGE STUDENTS

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ABSTRACT The present study is an attempt to examine the relationship between creative problem solving ability and aptitude of engineering college students. Sample for the study includes 302 engineering college students in Ernakulam District. In selecting the sample, due representing was given to gender, locality and type of management. Normative survey method was used to collect the data. Two tools were used for collecting the data. Creative problem solving ability test, developed and standardised by B.K. Passi and Usha Kumar (1996) and Engineering Aptitude Test Battery, standardised by Dr. Swarn Pratap (1998). The data collected were analysed by suing Pearson's product - moment coefficient of correlation, t-test and regression analysis. The study revealed significant relationship between creative problem solving ability and aptitude of engineering college students. Findings also showed a significant difference in the aptitude of engineering college students based on different levels of creative problem solving ability.

KEYWORDS : Creative Problem Solving Ability, Aptitude, Engineering College Students

INTRODUCTION

In the second half of the twentieth century, creativity and its development was the main focus of the curriculum planners, educators and researchers. Indian mathematicians like Ramanujan, Bhaskaracharya, Aryabhatta, Brahmagupta etc. used creative problem solving approach to solve difficult problems of mathematics.

There has been an increasing emphasis on the group interaction and assume that brain storming techniques exerts a positive effect on creativity. Creative problem solving always involves creativity. However, creativity often does not involve creative problem solving, especially in fields such as music, poetry and art. Creativity requires newness or novelty as a characteristics of what is created, but creativity does not necessarily imply that what is created has value or is appreciated by other people. To qualify as creative problem solving, the solution must either have value, clearly solved the stated problem, or be appreciated by someone for whom the situation improves. Creative problem solving is a special form of problem solving in which the solution is independently created rather than learned with assistance.

The term aptitude has been traditionally been defined as the ability to profit from a particular education or training in a designated field. Aptitude tests are devised to assess potential achievement or to predict future performance in some endeavour. People who enjoy engineering and are successful in it tend to share common traits. Most important of these trait is their creative problem solving ability. Other dominant engineering aptitude is structural visualization - the ability to visualize 3D object in mind. Analytical reasoning, mathematical ability and to lesser extent memory for design are the other aptitudes for design are the other aptitudes that correlate with satisfaction and success in engineering.

NEED AND SIGNIFICANCE

According to Bartlett (1958), creativity is an adventurous thinking or getting away from the main track, breaking out of the mould, being open to experience and permitting one thing to lead another. The most important developments in civilization have come about through the creative process. So it is high time that schools should find ways and means to foster creativity in children. Research and developments on creativity support that all people can potentially be creatively productive (Davis, 2004) and that with training they can move closer to fulfilling that potential. A number of studies and surveys have categorized engineering aptitude as the ability to try new approaches, ability to create a number of solutions to the same problem, ability to make new combinations etc. These inputs can be combined under the area of creative thinking. Gestalt Psychologists believe that the problem solving process consists of transformation undergone by the initial problematic situation which ultimately leads to a solution. The field of engineering appears interesting to many students who are trying to decide on a course of study in college. Engineering as a career it may be the best way to make the biggest contribution to society. Engineers work to improve the quality of life and to make life more efficient or comfortable. They strive for constant improvement by applying scientific principles to solve everyday or specialised problems in practical ways. As it is presumed that creative problem solving ability and engineering aptitude is correlated, a study to test these hypotheses will be highly beneficial for the higher secondary school students in deciding to select their careers.

OBJECTIVES

1. To assess the relationship between creative problem solving ability and aptitude of engineering college students.
2. To compare the aptitude of engineering college students on different levels of creative problem solving ability.

HYPOTHESES

1. There is significant relationship between creative problem solving ability and aptitude of engineering college students.
2. There is significant difference in the aptitude of engineering college students based on different levels of creative problem solving ability.

METHODOLOGY

Normative survey method was used to collect data for the study. A sample of three hundred and two engineering students including male and female from aided and unaided colleges situated in urban and rural areas were selected for the study.. The investigators used Creative Problem Solving Ability Test, (PUTCPS) developed by B.K. Passi and Usha Kumar (1996) and Engineering Aptitude Test Battery (EATB) by Dr. Swarn Pratap (1981). The data were analysed using statistical procedures like Pearson's product moment coefficient of correlation and 't' test.

DATA ANALYSIS AND RESULTS

1. Correlation between creative problem solving ability and aptitude for the engineering college students - Analysis using Pearson's Product moment coefficient of correlation. The details are shows in Table 1.

Table 1

Sl. No.	Variables -creative problem solving ability and aptitude		r	Significance
1.		Total Sample	0.20	.000***
2.	Gender	Male	0.19	.010*
		Female	0.23	.011*
3.	Locale	Urban	0.33	.000**
		Rural	0.09	.222(NS)
4.	Type of Management	Aided	0.39	.001**
		Unaided	0.13	.052(NS)

**Significant at .01 levelNS - Not Significant
* Significant at .05 level

The 'r' value (0.20) between the variables creative problem solving ability and aptitude for the whole sample is significant at .01 level. The 'r' value between the variables for male sample is 0.19 and that for female sample is 0.23. Both values of the correlation coefficient is significant at .05 level. The correlation coefficient for urban sample is .33 (p<.01) and that of rural sample is .09 (p>.05),. In the case of type of management of the institution, 'r' value between the variables for aided school students is .39 (p< .01) which is significant at .01 level. Whereas the 'r' value for unaided school students is .13 (p>.05). It is not significant at .05 level.

2. Comparison of aptitude of engineering college students based on different levels of creative problem solving ability.

Based on the values of problem solving abilities, engineering college students were classified into three groups - low, average and high. Those who have the value greater than 6.69 is considered as high group and less than 2.49 is the low group. Between the values 2.49 and 6.69 comes the average group.

The details are shows in table 2

Table : 2 Classification of the level of creative problem solving abilities for the whole sample

Level	Frequency	Percentage
Low	48	15.9
Average	198	65.6
High	56	18.5
Total	302	100.00

Table : 3 Group Statistics

Variable	Creative problem Solving ability	N	Mean
Engineering Aptitude	Low	48	23.65
	Average	198	26.36

Table : 4 Independent Sample Test

Variable		Levene's Test for Equality of variance		t- test for equality of Means					
		F	Sig	t	df	Sig (2-tailed)	Mean diff.	95% C.I. of the difference	
								Lower	Upper
Engineering aptitude	Equal variance assumed	.509	.47	-2.19	244	.030	-2.72	-5.17	-2.69
	Equal variance not assumed			-2.13	69.51	.04	-2.72	-5.26	-.175

Hence the p-value is greater than .05. So we consider equal variance assumed. Then P-value of t-test is less than .05. Hence low and average levels of creative problem solving ability have significant influence on aptitude of engineering students.

Comparison of aptitude of engineering college students on low and high levels of creative problem solving ability is shown below.

Table : 5 Group statistics

Variable	Creative problem Solving ability	N	Mean	S.D.
Engineering Aptitude	Low	48	23.65	7.99
	High	56	29.13	7.38

Table : 6 Independent Sample Test

Variable		Levene's Test for Equality of variance	t- test for equality of Means							
		F	Sig	t	df	sig	Mean difference	S. Error Diff.	95% C.I. of the difference	
									Lower	Upper
Engineering aptitude	Equal variance assumed	.016	.89	-2.39	252	.017	-2.76	1.15	-5.03	-.49

Here the p- value is greater than .05. So we consider equal variable assumed. Then p-value of t-test is less than .05. This shows that low and high levels of creative problem solving ability have significant influence on aptitude of engineering college students.

Comparison of the aptitude of engineering college students on average high levels of creative problem solving ability is shown in the following tables.

Table :7 Group Statistics

Variable	Creative problem Solving ability	N	Mean	S.D.	S. Errors Mean
Engineering Aptitude	Average	198	26.36	7.66	.54
	High	56	29.13	7.38	.98

Table : 8 Independent Sample Test

Variable		Levene's Test for Equality of variance	t- test for equality of Means							
		F	Sig	t	df	sig	Mean difference	S. Error Diff.	95% C.I. of the difference	
									Lower	Upper
Engineering aptitude	Equal variance assumed	.016	.89	-2.39	252	.017	-2.76	1.15	-5.03	-.49
	Equal variances not assumed			-2.45	91.25	.016	-2.76	1.13	-5.00	-.52

Here the p- value is greater than .05. So we consider equal variance assumed. Here p- value for the t-test is less than .05. Hence average

and high levels of creative problem solving ability have significance influence on aptitude of engineering students.

TENABILITY OF HYPOTHESES

The coefficient of correlation between creative problem solving ability and aptitude is significant for the whole sample and sub sample based on gender. In the case of sub-sample based on locality of the institution, the 'r' value is significant for urban college students. Whereas the correlation is not significant for rural college students. Similarly in the case of sub-sample based on type of management of the institution, the 'r' value is significant for aided college students and not for un-aided college students. Therefore the first hypothesis is fully substantiated for the whole sample. But for the sub-samples, it is partially substantiated.

Analysis of the result shows that , there is significant difference in the aptitude of engineering college students based on different levels of creative problem solving ability. Hence the second hypothesis is fully substantiated.

CONCLUSION AND SUGGESTIONS

The present study revealed a positive and significant correlation between creative problem solving ability and aptitude for the whole sample and sub-samples except rural and un-aided college students.

Mumaw, R.J., et al., (1982) investigated individual difference in complex spatial problem solving aptitude and strategy effects. The results of the study are in tune with the present problem. Chen, Lin, Barufaldi & Chang (2007) found a significant positive correlation between problem solving ability and reasoning skills. The present study also reported significant difference in the aptitude of engineering students at different levels of creative problem solving ability. In order to gain and apply knowledge from multiple fields simultaneously, it is necessary to increase the ability to solve problems in a creative manner. Teachers should encourage lateral thinking among students. Students should be provided with puzzles and complex problems. Then only they will think in a divergent manner.

Educators, in turn, must transform their teaching methods to reflect and support students' growth from learners to leaders.

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