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Assessment of Creative Potential of Students Pursuing Higher Education in Agriculture

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ABSTRACT

The main purpose of the study was to assess the creative potential of students pursuing higher education in agriculture subject. Hence, the researcher developed a creative potential assessment test for students. Four state agricultural universities (SAUs) and two deemed universities (DUs) were selected for the study. Simple random sampling was used for the selection of respondents. Total sample size of the student respondents was 240. Findings of the study showed that majority of the agricultural students had low level of creativity score. The overall picture of different dimensions of creativity showed that majority of the students had medium levels of fluency, flexibility, originality and problem sensitivity. Results also showed that there is significant difference between Deemed and Low Performing Universities. We also found that there is significant difference between High and Low Performing Universities. In contrast, it was observed that there is no significant difference between Deemed and High Performing Universities which indicate that both the categories were at par as far as creativity score of the students were concerned.

Key Words: Assessment, agriculture and creativity, higher education.

INTRODUCTION

Creativity can be considered as an important requisite by today's competitive world and it plays a significant role in student's success in classroom and the working environment. Creativity plays a key role in the science teaching and science enterprise as ultimately it leads to innovative processes and products. Creativity involves imagination and intuition at work, a process of divergent thinking which, through evaluation and assessment, results in workable solutions and alternatives. Creativity can be understood as the interaction among "aptitude, process and environment" (Plucker *et al.* 2004) or it's a product, person, press or process (Amabile, 1996; Runco, 2014). Vernon, (1989), defined creativity as an individual's capability to produce unique ideas, inventions, restructurings, insights. These all things would be accepted by specialists as being of technological, scientific, social or aesthetic value. The creation or development of unique ideas is also a sign of divergent thinking and creativity (Torrance, 1996). Creative potential is expressed in an individual's ability to create unique ideas (Boden, 1990). The National Advisory Committee on Creativity and Cultural Education in United States stated that the results of creativity as an imaginative activity needs to be of 'value' as well as original (NACCE, 1999). This opinion is supported by Gardner (1993) who suggests that creativity is a depiction kept to those products that are initially seen to be unique within a sphere but that are finally acceptable within suitable community. Creativity encompasses divergent thinking *viz.* the ability to produce numerous, dissimilar and rare ideas in reply to a problem (Guilford, 1967).

Despite the commendable contribution made by the Indian Council of Agricultural Research and State Agricultural University System quality of education in

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most of the universities is adversely affected due to shortage of faculty, little opportunities for faculty development and aging/superannuating faculty. Out of tune, outdated and old faculty restricts creative and forward looking innovative ideas on improving the content, context and pedagogy of education (NAEP draft, 2012). In India, very few studies have been undertaken to assess the creativity of students in higher education in agricultural universities. Therefore, this study was proposed to assess the creative potential of the students pursuing higher education in agriculture and this paper aimed to bring forth the assessment of creativity of the agricultural students pursuing higher education.

METHODOLOGY

Ex-post facto research design was used for the study (Kerlinger, 1978). State agricultural universities (SAUs) and deemed universities (DUs) were selected for the study based on ranking status of agricultural universities for the year 2017 prepared and released by Agricultural Education Division, Indian Council of Agricultural Research (ICAR). According to the rank, state agricultural universities (SAUs) have been grouped into high performing and low performing categories.

The study was conducted in purposively selected six agricultural universities, *viz.,* two deemed universities (ICAR-Indian Agricultural Research Institute, New Delhi (Rank 2) and ICAR-National Dairy Research Institute, Karnal (Rank 1), two high performing state agricultural universities (Punjab Agricultural University, Ludhiana (Rank 5) and Professor Jayashankar Telangana State Agricultural University, Hyderabad (Rank 6) and two low performing state agricultural universities (University of Agricultural Sciences, Raichur(Rank 58) and Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli (Rank 59) located in different parts of the country. From each university, forty students were selected by following simple random sampling. Total number of student respondents for the study was 240, with eighty students each from deemed universities, high performing state agricultural universities and low performing state agricultural universities.

The creative potential or creativity of students was measured based on the following dimensions of creativity, which influences the creativity of students, as expressed by them. The dimensions are fluency, flexibility, originality and problem sensitivity. Creativity assessment test was developed for the study. Test consists of three parts in which a total of six (6) items were selected under part I and three (3) items were selected under part II. In part I, total 8 statements were there under six (6) items. In part II, total 12 statements were there under three (3) items. A relatively high value of 0.82 for total creativity coefficient indicated high degree of stability of constructed creativity test for the study. Raw scores of fluency, flexibility, originality and problem sensitivity were converted into the standardised scores individually to make them follow normal distribution with a mean zero and standard deviation one. The formula used for standardisation was as follows:

$$\text{Standard Score} = \frac{\text{Actual Score} - \text{Mean Score (all students)}}{\text{Standard deviation}}$$

Standard deviation Standardised scores of fluency, flexibility, originality and problem sensitivity were then added to obtain a composite creativity score for each respondent. These scores were used for statistical analysis as statistical analysis requires the data to follow normal distribution with mean zero and standard deviation one. The students were classified into three groups *viz.,* low, medium and high on the basis of individual dimensions as well as composite creativity score. For classifying into groups, all the scores were converted into positive values, for which instead of using the mean in the above formula, an arbitrary value of zero (0) was taken. As a result, all the standard scores were transformed into positive scores. The high, medium and low categories were thus formed on the basis of the transformed scores. The formula used for calculating transformed scores is as follows:

$$\text{Transformed Score} = \frac{\text{Actual score}}{\text{Standard deviation}}$$

RESULTS AND DISCUSSION

From Table 1, it is clear that the majority of the students (58.75 %) from Deemed universities had high level of fluency score. Only 15 per cent of them had a low level of fluency while 26.25 per cent of them fell under medium level of fluency. The results of investigation indicated that more than half of the respondents (55 %) from Deemed universities had medium level of flexibility while 25 per cent of the respondents possessed high level of flexibility followed by 20 per cent who had low level of flexibility. On the originality dimension of creativity, it was found that majority (55 %) of the respondents had medium level of originality. 21.25 per cent of the students from Deemed universities exhibited high originality scores and 23.75 per cent of the respondents were found to have low level of originality. Most of the respondents (58.75 %) had medium level of problem sensitivity whereas 25 per cent had high level and only 16.25 per cent were at a low level of problem sensitivity (Table 1).

Table 1: Distribution of students of Deemed Universities on different dimensions of creativity based on their transformed score

n = 80

Dimension of Creativity	Creativity level of students	Range of transformed creativity score	Frequency (*f*)	Percentage (%)
Fluency	High	> 2.10	47	58.75
	Medium	0.10 – 2.10	21	26.25
	Low	< 0.10	12	15.00
Flexibility	High	> 3.00	20	25.00
	Medium	1.00 – 3.00	44	55.00
	Low	< 1.00	16	20.00
Originality	High	> 2.88	17	21.25
	Medium	0.88 – 2.88	44	55.00
	Low	< 0.88	19	23.75
Problem Sensitivity	High	> 3.11	20	25.00
	Medium	1.11 – 3.11	47	58.75
	Low	< 1.11	13	16.25

The study further showed that majority of the students (46.25%) from Deemed universities had high level of creativity followed by 35 per cent of them with a medium level of creativity while 18.75 per cent of students were found to possess medium level of creativity (Table 2). The overall picture of creativity among Deemed universities students showed a high level of creativity. The overall picture of different dimensions of creativity from Deemed universities had shown that most of the students had medium levels of flexibility, originality and problem sensitivity dimensions of creativity while they were high on fluency score.

Table 2: Distribution of students of Deemed Universities based on overall transformed creativity score

n = 80

Creativity level of students	Range of transformed creativity score	Frequency (*f*)	Percentage (%)
High	> 9.10	37	46.25
Medium	7.10 – 9.10	15	18.75
Low	< 7.10	28	35.00

From Table 3, it was found that the majority of the students (50%) from high performing universities had medium level of fluency score, 26.25 per cent of them had a low level of fluency while 23.75 per cent of them fell under high level of fluency. The results of investigation indicated that more than half of the respondents (61.25 %) from high performing universities had medium level of flexibility while 26.25 per cent of the respondents possessed low level of flexibility. On the originality dimension of creativity, it was found that majority (53.75%) of the respondents had medium level of originality. It was also astonishing to know that only 12.25 per cent of the students from high performing universities exhibited high originality scores and 33.75 per cent of the respondents were found to have low level of originality. More than half of the respondents (63.75%) had medium level of problem sensitivity whereas 31.25 per cent had low level of problem sensitivity (Table 3).

Table 3: Distribution of students of High Performing Universities on different dimensions of creativity based on their transformed score

n = 80

Dimension of Creativity	Creativity level of students	Range of transformed creativity score	Frequency (*f*)	Percentage (%)
Fluency	High	> 2.90	19	23.75
	Medium	0.90 – 2.90	40	50.00
	Low	< 0.90	21	26.25
Flexibility	High	> 3.06	10	12.50
	Medium	1.06 – 3.06	49	61.25
	Low	< 1.06	21	26.25
Originality	High	> 2.84	10	12.50
	Medium	0.84 – 2.84	43	53.75
	Low	< 0.84	27	33.75
Problem Sensitivity	High	> 3.20	4	5.00
	Medium	1.20 – 3.20	51	63.75
	Low	< 1.20	25	31.25

The study further showed that majority of the students (48.75 %) from high performing universities had high level of creativity followed by 35 per cent of them who had a low level of creativity and 16.25 per cent of students were found to possess medium level of creativity (Table 4). The overall picture of creativity among high performing universities students showed a high level of creativity. The overall picture of different dimensions of creativity from high performing universities showed that most of the students had medium levels of fluency, flexibility, originality and problem sensitivity dimensions of creativity.

Table 4: Distribution of students of High Performing Universities based on overall transformed creativity score

n = 80

Creativity level of students	Range of transformed creativity score	Frequency (*f*)	Percentage (%)
High	> 8.70	39	48.75
Medium	6.70 – 8.70	13	16.25
Low	< 6.70	28	35.00

Table 5 revealed that majority of the students (87.50%) from low performing universities had medium level of fluency score, 10 per cent of them had a high level of fluency while only 2.50 per cent of them fell under low

level of fluency. The results of investigation indicated that more than half of the respondents (88.75%) from low performing universities had medium level of flexibility while 6.25 per cent of the respondents possessed high level of flexibility. Majority (45 %) of the respondents had low level of originality. It was also astonishing to know that while only 12.50 per cent of the students from low performing universities exhibited high originality scores, 42.50 per cent of the respondents had medium level of originality. More than half of the respondents (51.25 %) had medium level of problem sensitivity whereas 35 per cent had low level of problem sensitivity (Table 5).

Table 5: Distribution of students of Low Performing Universities on different dimensions of creativity based on their transformed score

n = 80

Dimension of of Creativity	Creativity level of students	Range of transformed creativity score	Frequency (*f*)	Percentage (%)
Fluency	High	> 3.00	8	10.00
	Medium	1.00 – 3.00	70	87.50
	Low	< 1.00	2	2.50
Flexibility	High	> 2.77	5	6.25
	Medium	0.77 – 2.77	71	88.75
	Low	< 0.77	4	5.00
Originality	High	> 1.91	10	12.50
	Medium	0.08 – 1.91	34	42.50
	Low	< 0.08	36	45.00
Problem Sensitivity	High	> 2.09	11	13.75
	Medium	0.09 – 2.09	41	51.25
	Low	< 0.09	28	35.00

Table 6 showed that majority of the students (42.50%) from low performing universities had low level of creativity score followed by 30 per cent of them with a high level of creativity and 27.50 per cent of students were found to possessed medium level of creativity. The overall picture of creativity among low performing universities students showed a low level of creativity. The overall picture of different dimensions of creativity from low performing universities had showed that most of the students had medium levels of fluency, flexibility and problem sensitivity dimensions of creativity while they were low on originality score.

Table 6: Distribution of students of Low Performing Universities based on overall transformed creativity score

n = 80

Creativity level of students	Range of transformed creativity score	Frequency (*f*)	Percentage (%)
High	> 6.79	24	30.00
Medium	4.79 – 6.79	22	27.50
Low	< 4.79	34	42.50

After the combined analysis of Deemed, High Performing and Low Performing Universities, researcher have combined the transformed score of the creativity for the deemed, high performing and low performing universities and obtained a combined transformed score for the agricultural students on the creativity and its dimensions *i.e.* fluency, flexibility, originality and problem sensitivity.

The results showed that the majority of the students (46.67 %) had medium level of fluency score, 30.83 per cent of them had a low level of fluency while only 22.50 per cent of them fell under high level of fluency (Table 7). The results of investigation indicated that more than half of the respondents (77.50%) had medium level of flexibility while 18.75 per cent of the respondents possessed high level of flexibility. Majority (71.25 %) of the respondents had medium level of originality, 17.50 per cent of the students exhibited low originality scores followed by11.25 per cent of the respondents who had high level of originality. More than half of the respondents (76.67%) had medium level of problem sensitivity whereas 13.13 per cent had low level of problem sensitivity. Only 10 per cent students were at a high level of problem sensitivity.

Table 7: Distribution of all respondent agricultural student son different dimensions of creativity based on their transformed score

n = 240

Dimension of Creativity	Creativity level of students	Range of transformed creativity score	Frequency (*f*)	Percentage (%)
Fluency	High	> 2.76	54	22.50
	Medium	0.76 – 2.76	112	46.67
	Low	< 0.76	74	30.83
Flexibility	High	> 2.71	45	18.75
	Medium	0.71 – 2.71	186	77.50
	Low	< 0.71	9	3.75
Originality	High	> 2.31	27	11.25
	Medium	0.31 – 2.31	171	71.25
	Low	< 0.31	42	17.50
Problem Sensitivity	High	> 2.47	24	10.00
	Medium	0.47 – 2.47	184	76.67
	Low	< 0.47	32	13.33

Table 8 showed that majority of the students (47.08%) had low level of creativity score followed by 40.83 per cent who had a high level of creativity and 12.08 per cent possessed medium level of creativity. The overall picture of creativity among agricultural students shows a low level of creativity (Fig. 1). The overall picture of different dimensions of creativity showed that majority of

the students had medium levels of fluency, flexibility, originality and problem sensitivity dimensions of creativity. Nagasri (2000) studied the creative potential of extension personnel and reported the similar findings. Leahy *et al.* (2009) in his address to the American Educational Research Association conference said that substantial increases in students' achievement from 70 to 80 per cent with respect to increase in the speed of learning. Hence, they suggested that there is a strong need for the use of formative assessment to improve student's outcomes.

Table 8: Distribution of all respondent agricultural students based on overall transformed creativity score

n=240

Creativity level of students	Range of transformed creativity score	Frequency (*f*)	Percentage (%)
High	> 7.24	98	40.83
Medium	5.24 – 7.24	29	12.08
Low	< 5.24	113	47.08

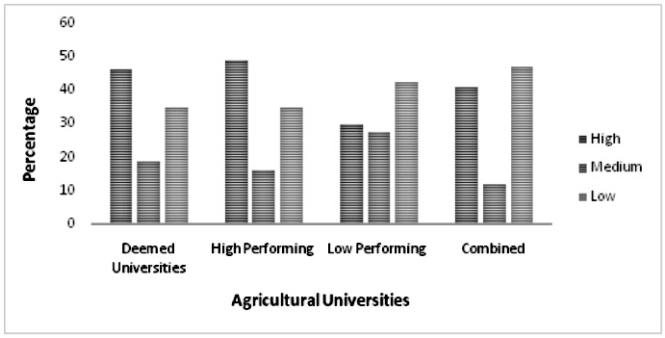

Fig. No. 1 Comparison between overall transformed creativity score of Deemed, High Performing and Low Performing Universities

Table 9 showed the mean and standard deviation of all the three categories of the Universities *i.e.* Deemed, High Performing and Low Performing. We have carried out one-way Analysis of Variance (ANOVA) by considering type of University *i.e.* Deemed, High Performing and Low Performing as factor which affects the creativity score of the students. It has been observed that at 5 per cent level of significance the effect of type of university on creativity score was significant (Table 10).

Table 9: Mean creativity score and standard deviation of Deemed, High Performing and Low Performing Universities

Universities	Sample size (n)	Creativity Score	
		Mean	Standard deviation
Deemed	80	10.62	4.38
High performing	80	9.98	4.49
Low performing	80	4.53	2.83

Table 10: ANOVA of creativity score of Deemed, High Performing and Low Performing Universities

Source of variation	Degree of freedom	Sum of squares	Mean square	P value
University	2	1795.60	897.80	<0.0001

High Performing and Low Performing Universities

Further we have conducted pair wise comparison between the levels of the factor *viz.,* Deemed, High Performing and Low Performing Universities in terms of creativity score. Results showed that there is significant difference between Deemed and Low Performing Universities. Also, there is significant difference between High and Low Performing Universities. In contrast, it was observed that there is no significant difference between Deemed and High Performing Universities which indicate that both the categories were at par as far as creativity score of the students were concerned (Fig. 2). Alencar *et al.* (2017) reported that the significance of enhancing student creativity in higher education has been broadly accepted because there is a need for preparing young students for the uncertain and complex world of work, which requires individuals to be able to use their creative abilities.

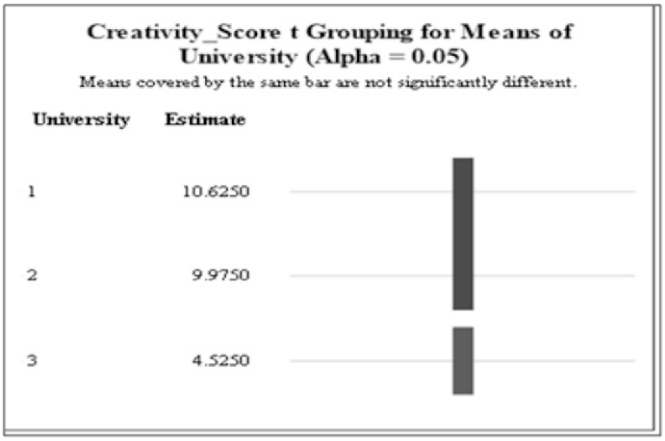

Fig. No. 2 Figure showing pairwise comparison between creativity score of Deemed, High Performing and Low Performing Universities

CONCLUSION

Creativity plays an important role in development of science and technology. The field of agriculture cannot be exception to it. Findings of the present investigation have clearly brought out that the majority of the agricultural students had low level of creativity score. These findings have an implication for the educationists, planners, research workers and policy makers. The findings clearly indicate that about 70 per cent of the respondents from Low Performing Universities and more than 50 per cent from Deemed and High Performing Universities were found in medium to low level of creativity score.

Therefore, it is implied that there is a need to elevate the creativity level among the students by organising special capacity building programme in the field of agriculture and related subjects and changing their learning style and behaviour. It is also suggested that there is a necessity of organising group discussions and symposium on creativity and divergent thinking skills for better understanding of the concept among the students. In order to inculcate creative behaviour among the agricultural students, it is suggested that the planners and administrators start thinking to develop and incorporate special course on creativity enhancement in the educational system in vogue. The existence of creative students in the each and every field of science and technology is the need of twenty first century to meet the challenges in all sections of life. Therefore, it is suggested that the planners as well as educationists should divert their attention to include a special course on creativity from early stages in the school education and continue in higher education.

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