

Knack for Science subjects

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Abstract: *This is the age of globalization, modernization and liberalization and revolution of science and technology has glorified the modern world in various ways. Science has become an integral part of our life and living. It is no longer confined to the eminent scientists. Rather, knowledge of science of an individual has become almost essential irrespective of his/her status. It is also considered as an important quality parameter of a school learner, in particular. In order to keep pace with the rapidly globalizing world there is need to develop and promote scientific interest and ability among students. The students of Jammu and Kashmir are also working at their best to boost their advancement in scientific courses and the appreciable part of the story is that the trend is found to more noticeable among female students. However, the sad part of the story is that the trend remains confined only to higher secondary level. The existence of such a mismatch puts a big question mark which needs to be explored. The present study attempted to study inclination and capacity towards science among college students of Ist year degree course belonging to Jammu division. From a list of colleges available in Jammu division, a sample of 296(148 Male and 148 Female) was drawn by using randomization technique. The data collected was subjected to analysis by using Critical ratio.*

Key Words: *Integral part, Parameter, Pace, Promote.*

1. INTRODUCTION:

As per the results declared by JKBOSE in recent years i.e. 2014, 2015 and 2016 girls have outshined boys which clearly indicate that female section of the society is in no way inferior to male section. But what happens to this talent as they are found to be less interested in higher education (**All India Survey on Higher Education, 201-2012**). Besides this female enrollment in Science courses at the higher education level has been found to be low as compared to their male counterparts. The highest percentage of students is found to be enrolled in Arts (34%). Engineering and Technology comes at the second highest with 19% of the students share. Moreover, in recent year's administrative service results like IAS, female representation has been found to be less as compared to male. The existence of mismatch in terms of science enrollment and achievement at the higher education level indicates that mere percentage at the secondary level is not sufficient predictor of one's achievement and excellence. The psychology of individual differences which speak of individual talent and potentialities if taken into consideration is sufficient to explain the cause of such a mismatch and can play an important role in bridging the gap.

To pursue and to be successful in the scientific arena one needs to have proper scientific aptitude which is supposed to be influenced by a variety of significant determinant's viz, presence of certain study skills and persistence in learning science, motivation, satisfaction derived from learning science subjects, socio-economic factors and cultural background of learners. Scientific aptitude indicates the possibility of future success or failure in the area of science learning. An individual with right aptitude towards science develops better scientific aptitude. Without right aptitude towards a subject one cannot master or show any interest in a subject. Like-wise without good scientific aptitude an individual does not perform much in science. Therefore learners' felt urge in learning science along with their sound scientific aptitude only may result in expected achievement (**Ghosh, 1986**). But unfortunately in the present education system at the time of admission in various fields of study in the higher education, student's aptitude in that discipline is hardly recognized as the matter of consideration (**DST**). As a result, in spite of gradual increasing rate of enrolment of students in science courses, the scenario of students' achievement in science is not as per the level of expectation. This failure in science learning increases the possibility of wastage of human resource and therefore has become a major concern of school teachers, administrators and also science educators (**Ganguli & Vashistha, 1991; NAEP, 1979**).

2. STATEMENT OF THE PROBLEM:

Knack for Science subjects: A Study of Jammu Division.

3. OBJECTIVES:

- 1) To find gender differences in scientific aptitude among college science students of first year degree course.
- 2) To find gender differences in scientific aptitude among college science students of first year degree course with respect to the rural-urban dichotomy.
- 3) To find gender differences among college science students of first year degree course in their:

- 3.1 scientific aptitude (Experimental bent)
 - 3.2 scientific aptitude (Detection of inconsistencies or illogical conclusions)
 - 3.3 scientific aptitude (Ability to deduce conclusions from the data provided)
 - 3.4 scientific aptitude (Accuracy of interpretation)
 - 3.5 scientific aptitude (Ability to reason and solve problems)
 - 3.6 scientific aptitude (Caution and thoroughness)
 - 3.7 scientific aptitude (Accuracy of observation)
- 4) To find gender differences among college science students of first year degree course belonging to rural areas in their:
- 4.1 scientific aptitude (Experimental bent)
 - 4.2 scientific aptitude (Detection of inconsistencies or illogical conclusions)
 - 4.3 scientific aptitude (Ability to deduce conclusions from the data provided)
 - 4.4 scientific aptitude (Accuracy of interpretation)
 - 4.5 scientific aptitude (Ability to reason and solve problems)
 - 4.6 scientific aptitude (Caution and thoroughness)
 - 4.7 scientific aptitude (Accuracy of observation)
- 5) To find gender differences among college science students of first year degree course belonging to urban areas in their:
- 5.1 scientific aptitude (Experimental bent)
 - 5.2 scientific aptitude (Detection of inconsistencies or illogical conclusions)
 - 5.3 scientific aptitude (Ability to deduce conclusions from the data provided)
 - 5.4 scientific aptitude (Accuracy of interpretation)
 - 5.5 scientific aptitude (Ability to reason and solve problems)
 - 5.6 scientific aptitude (Caution and thoroughness)

4. HYPOTHESES:

- H₁) There will be no significant gender differences in scientific aptitude among college science students of first year degree course.
- H₂) There will be no significant gender differences in scientific aptitude among college science students of first year degree course with respect to rural- urban dichotomy.
- H₃) There will be no significant gender differences among college science students of first year degree course in their:
- H_{3.1} scientific aptitude (Experimental bent)
 - H_{3.2} scientific aptitude (Detection of inconsistencies or illogical conclusions)
 - H_{3.3} scientific aptitude (Ability to deduce conclusions from the data provided)
 - H_{3.4} scientific aptitude (Accuracy of interpretation)
 - H_{3.5} scientific aptitude (Ability to reason and solve problems)
 - H_{3.6} scientific aptitude (Caution and thoroughness)
 - H_{3.7} scientific aptitude (Accuracy of observation)
- H₄) There will be no significant gender differences among college science students of first year degree course belonging to rural areas in their:
- H_{4.1} scientific aptitude (Experimental bent)
 - H_{4.2} scientific aptitude (Detection of inconsistencies or illogical conclusions)
 - H_{4.3} scientific aptitude (Ability to deduce conclusions from the data provided)
 - H_{4.4} scientific aptitude (Accuracy of interpretation)
 - H_{4.5} scientific aptitude (Ability to reason and solve problems)
 - H_{4.6} scientific aptitude (Caution and thoroughness)
 - H_{4.7} scientific aptitude (Accuracy of observation)
- H₅) There will be no significant gender differences among college science students of first year degree course belonging to urban areas in their:
- H_{5.1} scientific aptitude (Experimental bent)
 - H_{5.2} scientific aptitude (Detection of inconsistencies or illogical conclusions)
 - H_{5.3} scientific aptitude (Ability to deduce conclusions from the data provided)
 - H_{5.4} scientific aptitude (Accuracy of interpretation)
 - H_{5.5} scientific aptitude (Ability to reason and solve problems)
 - H_{5.6} scientific aptitude (Caution and thoroughness)
 - H_{5.7} scientific aptitude (Accuracy of observation)

6. POPULATION:

The population for the present study includes all Science Students of First Year Degree Course i.e. 5500 studying in various Degree Colleges of Jammu, Samba, Kathua, Udhampur and Reasi Districts.

Sample

Since the study was confined to only five Districts namely Jammu, Samba, Kathua, Udhampur and Reasi, using randomization technique the investigator selected only eight colleges for drawing the required sample. Out of eight selected colleges a sample of 296(148 Male and 148 Female) was drawn by using randomization technique.

Tools used

Scientific Aptitude Test for College Students by A.K.P.Sinha and L.N.K.Sinha

7. ANALYSIS AND INTERPRETATION OF DATA:

Hypothesis H₁)

Values of Mean, S.D., CR for scientific aptitude among male and female college science students of first year degree course

Variable	N	Mean	SD	SE _{DM}	CR	Significance
Male	148	48.29	11.39	1.33	2.30	Significant at .05 level
Female	148	45.24	11.48			

Review of Table 4.1 shows that the computed value of critical ratio for scientific aptitude among male and female students is 2.30 which is significant at .05 level of significance. It can therefore, be inferred that there are significant gender differences in scientific aptitude among college science students of first year degree course. Moreover, the mean value of scientific aptitude among male students (48.29) is more than that of female students (45.24). Therefore, it can be concluded that male students exhibit better scientific aptitude than their female counterparts. Hence, the hypothesis, (H₁) that there will be no significant gender differences in scientific aptitude among college Science Students of first year degree course is not accepted.

Hypotheses H₂)

Table 4.2

Values of Mean, S.D., CR for scientific aptitude among male and female college science students of first year degree course with respect to rural-urban dichotomy

S.NO	Variable	N	Mean	SD	SE _{DM}	CR	Significance
1	Rural Male	71	48.71	11.10	2.06	1.39	NS
	Rural Female	68	45.86	12.99			
2	Urban Male	77	47.49	11.73	1.74	1.56	NS
	Urban Female	80	44.71	10.15			

Perusal of Table 4.2 reveals that the computed values of critical ratio for scientific aptitude among rural male-rural female and urban male-urban-female students are 1.39 and 1.56 respectively and all these values of C.R. have failed to reach .05 level of significance. It is evident that none of these values is significant. Thus, it can be inferred that there are no significant differences in scientific aptitude among male and female college science students of first year degree course with respect to rural-urban dichotomy. Hence, the hypothesis, (H₂) that there will be no significant gender differences in scientific aptitude among college science students of first year degree course with respect to rural-urban dichotomy is accepted.

S.No.	Components of Scientific Aptitude	Variable	N	Mean	SD	SE _{DM}	CR	Significance
1	Experimental Bent	Male	148	7.56	2.95	0.67	0.27	NS
		Female	148	7.38	3.07			
2	Detection of inconsistencies or illogical conclusion	Male	148	7.61	3.78	0.46	0.44	NS
		Female	148	7.41	4.09			
3	Ability to deduce conclusion from the data provided.	Male	148	10.97	7.51	0.81	2.01	Significant at 0.05 level
		Female	148	9.34	6.38			
4	Accuracy of Interpretation	Male	148	3.68	1.74	0.23	0.78	NS
		Female	148	3.50	1.91			

5	Ability to reason and solve problems	Male	148	13.43	4.88	0.59	1.36	NS
		Female	148	12.63	5.07			
6	Caution and thoroughness	Male	148	5.03	1.94	0.58	0.59	NS
		Female	148	4.69	1.96			
7	Accuracy of observation	Male	148	0.08	0.42	0.24	0.83	NS
		Female	148	0.28	0.88			

Hypotheses H₃)

Table 4.3

Values of Mean, S.D., CR for different components of Scientific Aptitude among male and female college science students of first year degree course

Perusal of Table 4.3 shows that the values of critical ratio computed for the six components of scientific aptitude i.e. Experimental bent, Detection of inconsistencies or illogical conclusions, Accuracy of interpretation, Ability to reason and solve problems, Caution and thoroughness and Accuracy of observation are 0.27, 0.44, 0.78, 1.36, 0.59 and 0.83 respectively and all these values of C.R. have failed to reach .05 level of significance. Obviously, none of these values is significant. Thus, it can be inferred that there are no significant gender differences in the components of scientific aptitude at S.No. 1, 2, 4, 5, 6 and 7 (Table 4.3) viz; Experimental bent, Detection of inconsistencies or illogical conclusions, Accuracy of interpretation, Ability to reason and solve problems, Caution and thoroughness and Accuracy of observation. Hence, the hypotheses, (**H_{3,1}, H_{3,2}, H_{3,4}, H_{3,5}, H_{3,6} and H_{3,7}**) that there will be no significant gender differences among college science students of first year degree course in the components of scientific aptitude i.e. Experimental bent, Detection of inconsistencies or illogical conclusions, Accuracy of interpretation, Ability to reason and solve problems, Caution and thoroughness and Accuracy of observation is accepted. Moreover, Table 4.3 shows that the computed value of C.R. for the third component of scientific aptitude i.e. ability to deduce conclusions from the data is 2.01 which is significant at 0.05 level of significance. It can therefore, be inferred that there are significant gender differences in ability to deduce conclusions from the data among college science students of first year degree course. In this regard, Table 4.3 shows that male science students of first year degree course possess better ability to deduce conclusions from the data than their female counterparts, since male students mean value of this component of scientific aptitude (M=10.97) is more than that of females (9.34). Hence, the hypothesis, (**H_{3,3}**) that there will be no significant gender differences in ability to deduce conclusions from the data i.e. third component of scientific aptitude is not accepted.

Hypotheses H₄)

Table 4.4

Values of Mean, S.D., CR for different components of Scientific Aptitude among male and female college science students of first year degree course belonging to rural areas

S.No	Components of Scientific Aptitude	Variable	N	Mean	SD	SE _{DM}	CR	Significance
1	Experimental Bent	Rural Male	71	8.07	3.0	0.53	1.40	NS
		Rural Female	68	7.33	3.16			
2	Detection of inconsistencies or illogical conclusion	Rural Male	71	8.07	3.97	0.67	0.20	NS
		Rural Female	68	7.94	3.95			
3	Ability to deduce conclusion from the data provided.	Rural Male	71	11.33	7.81	1.25	1.69	NS
		Rural Female	68	9.22	6.85			
4	Accuracy of Interpretation	Rural Male	71	3.69	1.54	0.29	0.93	NS
		Rural Female	68	3.42	1.74			
5	Ability to reason and solve problems	Rural Male	71	13.30	5.01	0.59	1.36	NS
		Rural Female	68	12.19	4.57			
6	Caution and thoroughness	Rural Male	71	5	2.16	0.36	0.69	NS
		Rural Female	68	4.77	2.02			
7	Accuracy of observation	Rural Male	71	0.44	1.07	0.12	2.67	Significant at .01 level
		Rural Female	68	0.12	0.50			

Review of Table 4.4 reveals that the values of critical ratio computed for the six components of scientific aptitude i.e. Experimental bent, Detection of inconsistencies or illogical conclusions, ability to deduce conclusions from the data, Accuracy of interpretation, Ability to reason and solve problems and Caution and thoroughness are 1.40, 0.20, 1.69, 0.93, 1.36 and 0.69 respectively and all these values of C.R. have failed to reach .05 level of

significance. It is evident that none of these values is significant. Thus, it can be inferred that there are no significant gender differences among college science students of first year degree course belonging to rural areas in the components of scientific aptitude at S.No. 1, 2, 3, 4, 5 and 6 (Table 4.4) viz; Experimental bent, Detection of inconsistencies or illogical conclusions, ability to deduce conclusions from the data, Accuracy of interpretation, Ability to reason and solve problems and Caution and thoroughness. Hence, the hypotheses, ($H_{4.1}$, $H_{4.2}$, $H_{4.3}$, $H_{4.4}$, $H_{4.5}$ and $H_{4.6}$) that there will be no significant gender differences among college science students of first year degree course belonging to rural areas in the components of scientific aptitude i.e. Experimental bent, Detection of inconsistencies or illogical conclusions, ability to deduce conclusions from the data, Accuracy of interpretation, Ability to reason and solve problems and Caution and thoroughness is accepted.

Moreover, Table 4.4 shows that the computed value of the critical ratio for the seventh component of scientific aptitude i.e. Accuracy of observation is 2.67 which is significant at .01 level of significance. It means, in other words, that there are significant gender differences in Accuracy of observation among college science students of first year degree course belonging to rural areas. In this regard, Table 4.4 shows that male science students of first year degree course have higher Accuracy of observation than their counterparts; since male students mean value of this component of scientific aptitude (0.44) is more than that of females (0.12). Hence, the hypothesis, ($H_{4.7}$) that there will be no significant gender difference in accuracy of observation component of scientific aptitude among college science students of first year degree course belonging to rural areas is not accepted.

Hypotheses H_5

Table 4.5

Values of Mean, S.D., CR for different components of Scientific Aptitude among male and female college science students of first year degree course belonging to urban areas

S.No.	Components of Scientific Aptitude	Variable	N	Mean	SD	SE _{DM}	CR	Significance
1	Experimental Bent	Urban Male	77	7.10	2.99	0.46	0.70	NS
		Urban Female	80	7.42	2.72			
2	Detection of inconsistencies or illogical conclusion	Urban Male	77	7.15	3.63	0.62	0.23	NS
		Urban Female	88	7.01	4.01			
3	Ability to deduce conclusion from the data provided.	Urban Male	77	10.54	7.18	1.07	0.96	NS
		Urban Female	88	9.53	6.04			
4	Accuracy of Interpretation	Urban Male	77	3.92	1.67	0.31	1.85	NS
		Urban Female	88	3.35	2.18			
5	Ability to reason and solve problems	Urban Male	77	13.81	4.91	0.81	1.32	NS
		Urban Female	88	12.75	5.18			
6	Caution and thoroughness	Urban Male	77	5.06	1.63	0.63	0.71	NS
		Urban Female	88	4.62	1.82			
7	Accuracy of observation	Urban Male	77	0.03	0.34	0.08	1.46	NS
		Urban Female	88	0.15	0.66			

Perusal of table 4.5 reveals that the values of critical ratio computed for seven components of scientific aptitude i.e. Experimental bent, Detection of inconsistencies or illogical conclusions, ability to deduce conclusions from the data, Accuracy of interpretation, Ability to reason and solve problems, Caution and thoroughness and Accuracy of observation are 0.70, 0.23, 0.96, 1.85, 1.32, 0.71 and 1.46 respectively and all these values of C.R. have failed to reach .05 level of significance. Obviously none of these values is significant. Thus, it can be inferred that there are no significant gender differences in components of scientific aptitude at S.No. 1, 2, 3, 4, 5, 6 and 7 (Table 4.5) viz; Experimental bent, Detection of inconsistencies or illogical conclusions, ability to deduce conclusions from the data, Accuracy of interpretation, Ability to reason and solve problems, Caution and thoroughness and Accuracy of observation. Hence, the hypotheses, ($H_{5.1}$, $H_{5.2}$, $H_{5.3}$, $H_{5.4}$, $H_{5.5}$, $H_{5.6}$ and $H_{5.7}$) that there will be no significant gender differences among college science students of first year degree course belonging to urban areas in the components of scientific aptitude i.e. Experimental bent, Detection of inconsistencies or illogical conclusions, ability to deduce conclusions from the data, Accuracy of interpretation, Ability to reason and solve problems, Caution and thoroughness and Accuracy of observation is accepted.

8. DISCUSSION OF THE RESULTS:

- The discussion of the results has been attempted along the undertaken variables namely scientific aptitude and learning styles with respect to gender and rural- urban dichotomy.
- The results of the study reveal that there are significant gender differences in the scientific aptitude among college science students of first year degree course. Moreover, the mean score of male students being more

than that of female students indicates that male students have higher level of scientific aptitude than the females. These findings are in line with the findings of **Patal (2007)** who found that males are more superior to females in scientific aptitude. The findings of the study also corroborate with the findings of **Ghosh (1986)** who concluded that males are higher in scientific aptitude than females.

- c. The reason could be either due to biological setup or environmental factors. On the one hand, number of researches have shown that males are biologically more superior as compared to their female counterparts but on the other hand there is no dearth of researches showing that males and females are cognitively same and is due to environmental and social factors that contribute for weak scientific aptitude among female section of the society. E.g. the phenomena of stereotype threat (women are weak as compared to males in science related subjects) leaves a bad impression upon the female folk there by resulting in their poor performance in science subjects. Social dimension highlights women's docility and submissiveness contrary to demands of science.
- d. Moreover the trend of stereotype images existing in our textbooks might be also a cause for lower scientific aptitude among females. One can hardly see any textbook in which women is being portrayed in a dominant way. The rules assigned to women are always of inferior nature as compared to their male counterparts. Presenting women in an inferior way is not only the routine of textbooks but also movies which are supposed to have a long lasting appeal on the social aspect of society have been found to picture females in an inferior way. E.g. If a scene of operation theatre is to be shown in the textbook, you can hardly see any textbook in which female is shown as doctor and male as nurse.
- e. No significant gender differences have been found in scientific aptitude among college science students of first year degree course with respect to rural-urban dichotomy. The findings are supported by the conclusion drawn by **Mitra, Chatterji and Mukherji (1975)** who found no significant gender differences in scientific aptitude among rural-urban students. **Ghosh (1986)** also concluded that no significant differences exist among students with respect to rural-urban dichotomy.
- f. The present research work shows that there are no significant gender differences among college science students of first year degree course in the six components of scientific aptitude i.e. Experimental bent, Detection of inconsistencies or illogical conclusions, Accuracy of interpretation, Ability to reason and solve problems, Caution and thoroughness and Accuracy of observation.
- g. However, significant gender differences have been found in Ability to deduce conclusions from the data i.e. third component of scientific aptitude among college science students of first year degree course. Moreover, the mean score of males on Ability to deduce conclusions from the data came out to be (10.97) which is higher than females (9.34) which indicates that males have higher Ability to deduce conclusions from the data than females. This could be due to the fact that males are always in hurry to draw conclusions than females. Males jump to conclusions more quickly as compared to their female counterparts since they consider themselves smarter in terms of intelligence. Moreover, research has supported the convergent patterns in thinking of males which stand them apart from their female counterparts in their thinking and ability to deduce.
- h. The results of the study reveals that there are no significant gender differences among college science students of first year degree course belonging to rural areas in the six components of scientific aptitude i.e. Experimental bent, Detection of inconsistencies or illogical conclusions, Ability to deduce conclusions from the data, Accuracy of interpretation, Ability to reason and solve problems and Caution and thoroughness.
- i. However, significant gender differences have been found in Accuracy of observation i.e. seventh component of scientific aptitude among college science students of first year degree course belonging to rural areas. Moreover, the mean score of males on Accuracy of observation came out to be (0.44) which is higher than females (0.12) which indicate that males have higher Accuracy of observation than females. This might be due to the fact that life in rural areas is more difficult as compared to urban areas and the responsibility of handling day to day life activities rests wholly on males, hence they have to exercise higher observation skills as compared to their female counterparts. Since, I belong to rural area, I know the responsibility of rural males. E.g. which pesticide should be used when a fruit or crop displays particular symptoms' or when to cut crop can best be judged by males as compared to females.
- j. No significant gender differences have been found in components of scientific aptitude i.e. Experimental bent, Detection of inconsistencies or illogical conclusions, ability to deduce conclusions from the data, Accuracy of interpretation, Ability to reason and solve problems, Caution and thoroughness and Accuracy of observation among college science students of first year degree course belonging to urban areas. The probable explanation for this result is that Government is now trying to provide rural schools with needed resources like staff, laboratory, library facilities and easy accessibility to scientific world. The old rural deficit model is being replaced by rural strength model. The digital revolution exposes rural students to life in cities and they too feel an urge to excel. Rural students now know the importance of having good education unlike before when they only know what happened around them in the rural settings.

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