

# Analyzing Learners' Reactions and Responses to Create Facilitative Teaching-Learning Environments

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## Abstract

*In the context of learning becoming an engaging task for the learners, it is mandatory that we move away from the irrelevant teaching learning environments. We need to become more adaptable in our approach. In a flexible type of framework sowed in informal environments planning of units and lessons in science classrooms becomes innovative task. The present study is based on an environment in which pre-service science teachers have planned their classroom proceedings using strengths of informal environments in the formal classroom settings. The study focuses on preservice teacher's natural dispositions towards "Tried to Analyze Learners' Reactions and Responses" in terms Teacher's Gender, Nature of School Management and School Type. In the study relevant graphs related to this focus have been drawn and interpreted. 'Statistical Descriptives' of the same have also been interpreted as part of the study. The study did not find any significant difference in pre-service teachers' response to "Tried to Analyze Learners' Reactions and Responses" in terms of Teacher's Gender, Nature of School Management and School Type. Conscious efforts by the teacher for observing, analyzing and interpreting the responses by the learners has the potential to support learning in a more facilitative manner. The teacher doing so has the ability to modify the classroom environment as per the needs and requirements of not just the learners but the whole environment in which the teaching learning process goes on. The study contributes in understanding some of these factors in the designed teaching learning environment in specific contexts described in the study.*

**Key Words:** Culture of Science, learning strands, Science classrooms, Pre-service teacher education Teacher's Gender, Nature of School Management, School Type, Learners' Reactions and Responses.

## Introduction:

In the context of learning becoming an engaging task for the learners, it is mandatory that we move away from the out-of-date type of teaching learning environments. We thus need to become more adaptable in our approach. In a flexible type of framework sowed in informal environments planning of units and lessons in

science classrooms becomes innovative task. In the current study some pre-service teachers have planned their classroom proceedings in a framework that using strengths of informal environments in formal classroom settings. In this innovative work of applying informal Learning Strands in Science Classrooms (Kumar, 2014d; Prabha et al., 2013, 2012; Prabha & Kumar, 2014) formally with unit and lesson planning for teaching-learning science took place. In the process there had been attempts to develop theoretical context of Alternative Frameworks (Kumar, 2011, 2012a, 2015, 2013a, 2013d, 2013f, 2013g, 2013l, 2013i, 2014m, 2014x) and to undertake Concept specific researches (Kumar, 2013m) on Alternative Framework in Science on Magnets (Kumar, 2014c), rain (Kumar, 2014u), soil (Kumar, 2014w), cells (Kumar, 2014n), Electric Current (Kumar, 2014f), light (Kumar, 2014o), blood (Kumar, 2014j), Food (Kumar, 2014l), Mirrors and Lenses (Kumar, 2014s), Universe (Kumar, 2014r), Plant Reproduction (Kumar, 2014t), Sources of Energy (Kumar, 2014v), Air (Kumar, 2014i), Force (Kumar, 2014q), Light (Kumar, 2014o) etc. This had been followed by further research on understanding Natural Dispositions of the engaged teachers in Classroom Context (Kumar, 2013a) and related Processes (Kumar, 2012b, 2012c, 2014b, 2014e, 2014d, 2014h, 2014g, 2014p, 2014k, 2015, 2013b, 2013c, 2013e, 2013h, 2013j, 2013k, 2013n, 2014a). In attempts cited here, there had been a research gap on the factors affecting 'Tried to Analyze Learners' Reactions and Responses'. The current study is an attempt to fill that gap.

## Research Methodology

### Research Questions

The following questions are focused on the three identified factors viz. Teacher's Gender, Nature of School Management and School Type.

1. How do we graphically represent preservice teacher's natural dispositions towards "Tried to Analyze Learners' Reactions and Responses" in terms of the identified factors?
2. How do we interpret 'statistical descriptives' related to preservice teacher's natural dispositions towards "Tried to Analyze Learners' Reactions and Responses" in terms of the identified factors?
3. What are the differences (if any) in preservice teacher's natural dispositions towards "Tried to Analyze Learners' Reactions and Responses" in terms of the identified factors?

### Research Objectives

The study has focused on the following objectives:

1. To draw and interpret relevant graphs related to preservice teacher's natural dispositions towards "Tried to Analyze Learners' Reactions and Responses" in terms of the identified factors.
2. To interpret the 'statistical descriptives' related to preservice teacher's natural dispositions towards "Tried to Analyze Learners' Reactions and Responses" in terms of the identified factors.
3. To locate the differences (if any) in preservice teacher's natural dispositions towards "Tried to Analyze Learners' Reactions and Responses" in terms of the identified factors.

**Methodology, tool & sample:****Methodology & Tool:**

The researcher developed a wide-ranging tool to explore various questions including the ones expressed in the Research Questions section. These were mainly concerned with the teaching-learning processes in the science classrooms. Field experts, and colleagues in the teacher education institutions validated the tool prepared. The researchers used SPSS for exploring the data thus collected.

This tool was used along with observations and unstructured interviews to triangulate the data. Some issues related to the vagueness of language formatting style etc. were resolved in the process of expert validation. This increased the authenticity of the questionnaire. Feedback responses from 592 lessons delivered by the 30 pre-service science teachers were analyzed in the holistic framework of the study.

**Sample**

Thirty-Eight Pre-Service Science teachers from two B.Ed. colleges of University of Delhi and GGSIP University, Delhi were selected as purposive sample. Data could be collected from 30 of them. These were going in 18 different schools for their School Life Experience Program. The sample teachers had diverse graduation and post-graduation subject combinations. To understand the sample further, first College had 8 participants and second college had 30 participant Teachers. Of these 38 Pre-Service teachers, code numbers 1.01 to code number 1.30 were given to 30 Pre-service teachers from First College of Education and 8 Pre-Service teachers from Second College of Education received code numbers 2.01 to code number 2.08. Without any deliberate attempt to do so, the sample became heterogeneous or representative to some extent. This is visible in the different factors of the sample that had been described below. The science teachers belonged to different socio-economic backgrounds. The science learners belonged to different sorts of school settings. Therefore, we can say that different socio-economic backgrounds and diversity in teaching-learning settings has been represented largely in the sample.

The properties of different factors that had been studied in the sample are described below.

Gender				
		Value	Count	Percent
Standard Attributes	Label	Teacher's Gender		
	Type	String		

	Measurement	Nominal		
Valid Values	1	Male	7	23.3%
	2	Female	23	76.7%
	3	Others	0	0.0%
<b>Management</b>				
		Value	Count	Percent
Standard Attributes	Label	Nature of School Management		
	Type	String		
	Measurement	Nominal		
Valid Values	1	Government School	5	16.7%
	2	Government Aided School	3	10.0%
	3	Private School	21	70.0%
	4	Kendriya Vidyalaya	1	3.3%

<b>School Type</b>				
		Value	Count	Percent
Standard Attributes	Label	School Type		
	Type	String		
	Measurement	Nominal		
Valid Values	1	'Boys Only' School	0	0.0%
	2	'Girl's Only' School	4	13.3%

	3	Co-Ed School	26	86.7%
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## Analysis of Data

The schedule of self-assessment response (described as tool above), originally contained 26 items, and also had the choice of answering in terms of disagree, agree, and strongly agree. These three categories of choices are further given the marks of zero, one and two respectively. From this, the average score of one specific teacher was obtained. And the average scores of these 30 teachers were analysed of their responses on the items in the questionnaire. Graphs and descriptives from this data are being given in “findings” part of the study that follows.

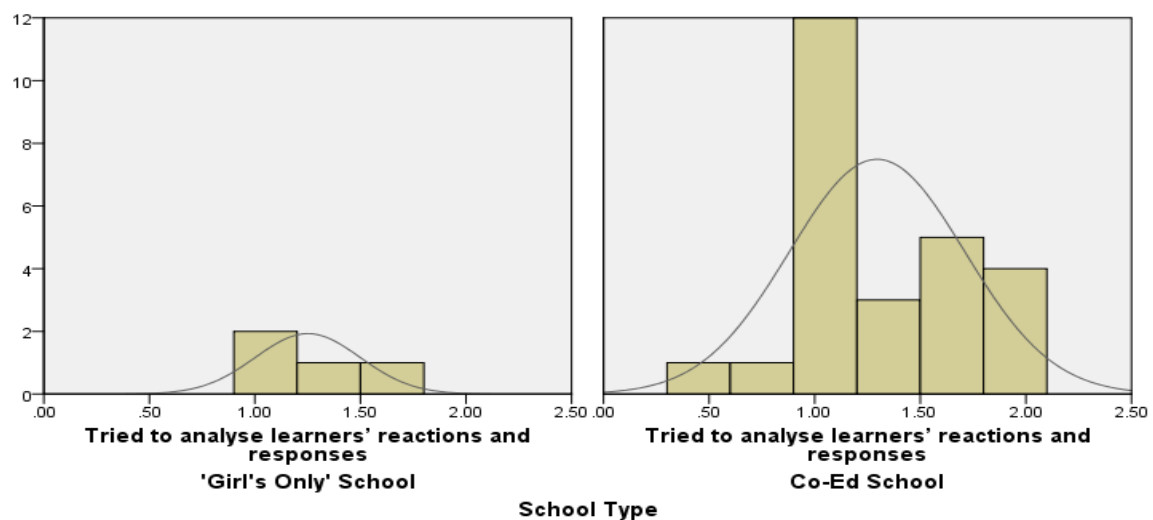
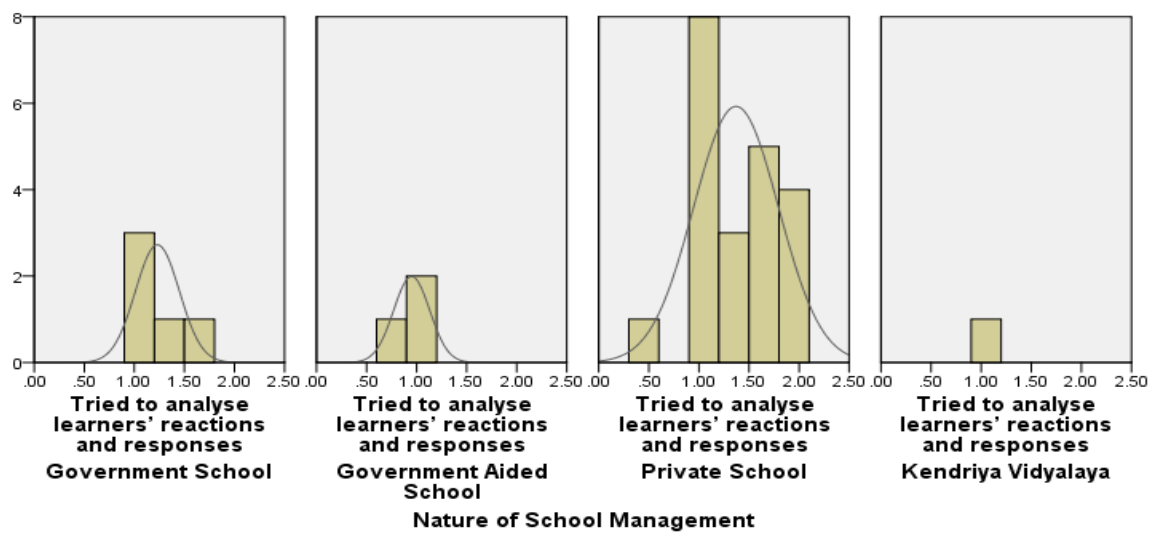
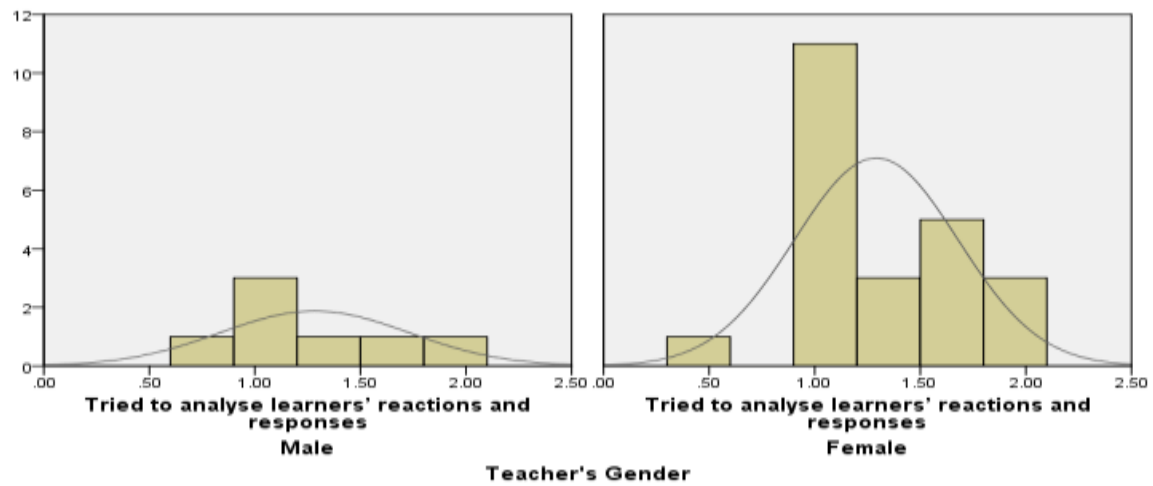
## Findings

Table 1 shows the average scores of several teachers on the feedback schedule related to the Component “Tried to Analyze Learners’ Reactions and Responses” of the teaching-learning environment in damage of Teachers' Self-Assessment. The evaluation, interpretation and appropriate graphical descriptions had been used in the following discussions using the information from the Table 1.

**Table 1 - Individual average score of different respondents on the item: Tried to Analyze Learners’ Reactions and Responses**

Tch. Cd.	Avg. Score
103	0.9
109	1.1
114	2
122	1.73
127	0.75
128	1.35
201	1.15
101	1.1
102	1
104	1.9
105	1.5
106	1.7
107	1
108	1.1
111	1.1
111	1.2
112	1.45
113	1.35
117	1.05
118	2
119	1.15
12	1.1
121	1.85
123	1.5
124	1.75
125	1.1
126	1.35
13	1
202	0.9
203	0.35







Case Processing Summary						
	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Tried to analyze learners' reactions and responses * Teacher's Gender	30	100.0%	0	0.0%	30	100.0%
Tried to analyze learners' reactions and responses * Nature of School Management	30	100.0%	0	0.0%	30	100.0%
Tried to analyze learners' reactions and responses * School Type	30	100.0%	0	0.0%	30	100.0%

### Tried to analyze learners' reactions and responses \* Teacher's Gender

Report								
Tried to analyze learners' reactions and responses								
Teacher's Gender	Mean	Median	Minimum	Maximum	Range	Std. Deviation	Skewness	Kurtosis
Male	1.2825	1.1500	.75	2.00	1.25	.44682	.634	-.630
Female	1.2913	1.1500	.35	2.00	1.65	.38778	-.052	.265
Total	1.2892	1.1500	.35	2.00	1.65	.39421	.107	-.159

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Tried to analyze learners' reactions and responses * Teacher's Gender	Between Groups	(Combined)	.000	1	.000	.003	.960
	Within Groups		4.506	28	.161		
	Total		4.507	29			

Measures of Association		
	Eta	Eta Squared
Tried to analyze learners' reactions and responses * Teacher's Gender	.010	.000

### Measures of Association

### Tried to analyze learners' reactions and responses \* Nature of School Management

Report								
Tried to analyze learners' reactions and responses								
Nature of School Management	Mean	Median	Minimum	Maximum	Range	Std. Deviation	Skewness	Kurtosis
Government School	1.2300	1.1500	1.00	1.55	.55	.21966	.771	-.581
Government Aided School	.9500	1.0000	.75	1.10	.35	.18028	-1.152	.
Private School	1.3703	1.3500	.35	2.00	1.65	.42404	-.323	.006
Kendriya Vidyalaya	.9000	.9000	.90	.90	.00	.	.	.



Total	1.2892	1.1500	.35	2.00	1.65	.39421	.107	-.159
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ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Tried to analyze learners' reactions and responses * Nature of School Management	Between Groups	(Combined)	.652	3	.217	1.467	.247
	Within Groups		3.854	26	.148		
	Total		4.507	29			

Measures of Association		
	Eta	Eta Squared
Tried to analyze learners' reactions and responses * Nature of School Management	.380	.145

### Tried to analyze learners' reactions and responses \* School Type

Report								
Tried to analyze learners' reactions and responses								
School Type	Mean	Median	Minimum	Maximum	Range	Std. Deviation	Skewness	Kurtosis
'Girl's Only' School	1.2500	1.2250	1.00	1.55	.55	.24833	.392	-2.444
Co-Ed School	1.2953	1.1500	.35	2.00	1.65	.41543	.068	-.334
Total	1.2892	1.1500	.35	2.00	1.65	.39421	.107	-.159

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Tried to analyze learners' reactions and responses * School Type	Between Groups	(Combined)	.007	1	.007	.044	.835
	Within Groups		4.499	28	.161		
	Total		4.507	29			

Measures of Association		
	Eta	Eta Squared
Tried to analyze learners' reactions and responses * School Type	.040	.002

### Analysis and Interpretation:

1) The Mean is 1.2892 which means on an average most teachers agree on Tried to Analyze Learners' Reactions and Responses. The Median is 1.15 which means fifty percent of the cases lie above and below it. The Range for Total teachers taken together is 1.65 for which minimum value is 0.35 and maximum value is 2. This shows high difference between minimum and maximum values. This difference can be interpreted as high divergence in the mean scores on the response towards Tried to Analyze Learners' Reactions and Responses. Standard deviation is 0.39421. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.89 and 1.68. This means, on an average most of the teachers agree on Tried to Analyze Learners' Reactions and Responses and some strongly agree with it. Skewness is 0.107. which means that the data is slightly positively skewed. i.e., the number of high scorers is greater than the low scorers on the question of Tried to Analyze Learners' Reactions and Responses. This is evident in the graphical representation of the data as well. Kurtosis is -0.159 which shows that the data distribution will be interpreted not outside the range of normality. This is evident in the graphical representation of the data as well.

2(a) The Mean is 1.2825 which means on an average most teachers agree on Tried to Analyze Learners' Reactions and Responses. The Median is 1.15 which means fifty percent of the cases lie above and below it. The Range for Male teachers taken together is 1.25 for which minimum value is 0.75 and maximum value is 2. This shows high difference between minimum and maximum values. This difference can be interpreted

as high divergence in the mean scores on the response towards Tried to Analyze Learners' Reactions and Responses. Standard deviation is 0.44682. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.83 and 1.72. This means, on an average most of the teachers agree on Tried to Analyze Learners' Reactions and Responses and some strongly agree with it. Skewness is 0.634. which means that the data is moderately positively skewed. i.e., the number of high scorers is greater than the low scorers on the question of Tried to Analyze Learners' Reactions and Responses. This is evident in the graphical representation of the data as well. Kurtosis is -0.63 which shows that the data distribution will be interpreted not outside the range of normality. This is evident in the graphical representation of the data as well.

**2(b)** The Mean is 1.2913 which means on an average most teachers agree on Tried to Analyze Learners' Reactions and Responses. The Median is 1.15 which means fifty percent of the cases lie above and below it. The Range for Female teachers taken together is 1.65 for which minimum value is 0.35 and maximum value is 2. This shows high difference between minimum and maximum values. This difference can be interpreted as high divergence in the mean scores on the response towards Tried to Analyze Learners' Reactions and Responses. Standard deviation is 0.38778. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.90 and 1.67. This means, on an average most of the teachers agree on Tried to Analyze Learners' Reactions and Responses and some strongly agree with it. Skewness is -0.052. which means that the data is slightly negatively skewed. i.e., the number of low scorers is greater than the high scorers on the question of Tried to Analyze Learners' Reactions and Responses. This is evident in the graphical representation of the data as well. Kurtosis is 0.265 which shows that the data distribution will be interpreted not outside the range of normality. This is evident in the graphical representation of the data as well.

**2(c)** We test the null-hypothesis for the relation Tried to Analyze Learners' Reactions and Responses \* Teacher's Gender the value of the F-ratio comes out to be 0.003 and the p-value comes out to be 0.96 through ANOVA. The interpretation of the p-value reveals that it is more than the alpha level i.e., 0.05 which means that we retain the null hypothesis. The interpretation of the F-ratio reveals that it is less than the critical value 4.196 which means that we retain the null hypothesis. On the basis of this interpretation, we retain the null hypothesis for the relation Tried to Analyze Learners' Reactions and Responses \* Teacher's Gender as a conclusion of this interpretation. The value of eta-squared is 0 as shown in the table. As we retain the null-hypothesis the strength of association between Tried to Analyze Learners' Reactions and Responses \* Teacher's Gender is considered insignificant.

**3(a)** The Mean is 1.23 which means on an average most teachers agree on Tried to Analyze Learners' Reactions and Responses. The Median is 1.15 which means fifty percent of the cases lie above and below it. The Range for Government School teachers taken together is 0.55 for which minimum value is 1 and maximum value is 1.55. This shows low difference between minimum and maximum values. This difference can be interpreted as low divergence in the mean scores on the response towards Tried to Analyze Learners' Reactions and Responses. Standard deviation is 0.21966. S.D. when interpreted with the calculated means,

it implies that most of the teachers scored between 1.01 and 1.44. This means, on an average most of the teachers agree on Tried to Analyze Learners' Reactions and Responses and some strongly agree with it. Skewness is 0.771. which means that the data is moderately positively skewed. i.e., the number of high scorers is greater than the low scorers on the question of Tried to Analyze Learners' Reactions and Responses. This is evident in the graphical representation of the data as well. Kurtosis is -0.581 which shows that the data distribution will be interpreted not outside the range of normality. This is evident in the graphical representation of the data as well.

**3(b)** The Mean is 0.95 which means on an average most teachers agree on Tried to Analyze Learners' Reactions and Responses. The Median is 1 which means fifty percent of the cases lie above and below it. The Range for Government Aided School teachers taken together is 0.35 for which minimum value is 0.75 and maximum value is 1.1. This shows low difference between minimum and maximum values. This difference can be interpreted as low divergence in the mean scores on the response towards Tried to Analyze Learners' Reactions and Responses. Standard deviation is 0.18028. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.77 and 1.13. This means, on an average most of the teachers agree on Tried to Analyze Learners' Reactions and Responses and some strongly agree with it. Skewness is -1.152. which means that the data is highly negatively skewed. i.e., the number of low scorers is greater than the high scorers on the question of Tried to Analyze Learners' Reactions and Responses. This is evident in the graphical representation of the data as well. Kurtosis is incalculable. This is evident in the graphical representation of the data as well.

**3(c)** The Mean is 1.3703 which means on an average most teachers agree on Tried to Analyze Learners' Reactions and Responses. The Median is 1.35 which means fifty percent of the cases lie above and below it. The Range for Private School teachers taken together is 1.65 for which minimum value is 0.35 and maximum value is 2. This shows high difference between minimum and maximum values. This difference can be interpreted as high divergence in the mean scores on the response towards Tried to Analyze Learners' Reactions and Responses. Standard deviation is 0.42404. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.94 and 1.79. This means, on an average most of the teachers agree on Tried to Analyze Learners' Reactions and Responses and some strongly agree with it. Skewness is -0.323. which means that the data is slightly negatively skewed. i.e., the number of low scorers is greater than the high scorers on the question of Tried to Analyze Learners' Reactions and Responses. This is evident in the graphical representation of the data as well. Kurtosis is 0.006 which shows that the data distribution will be interpreted not outside the range of normality. This is evident in the graphical representation of the data as well.

**3(d)** The Mean is 0.9 which means on an average most teachers agree on Tried to Analyze Learners' Reactions and Responses. The Median is 0.9 which means fifty percent of the cases lie above and below it. The Range for Kendriya Vidyalaya teachers taken together is 0 for which minimum value is 0.9 and maximum value is 0.9. This shows no difference between minimum and maximum values. This difference can be interpreted as no divergence in the mean scores on the response towards Tried to Analyze Learners'



Reactions and Responses. Standard deviation is incalculable. Skewness is incalculable. Kurtosis is incalculable. This is evident in the graphical representation of the data as well.

**3(e)** We test the null-hypothesis for the relation Tried to Analyze Learners' Reactions and Responses \* Nature of School Management the value of the F-ratio comes out to be 1.467 and the p-value comes out to be 0.247 through ANOVA. The interpretation of the p-value reveals that it is more than the alpha level i.e., 0.05 which means that we retain the null hypothesis. The interpretation of the F-ratio reveals that it is less than the critical value 2.975 which means that we retain the null hypothesis. On the basis of this interpretation, we retain the null hypothesis for the relation Tried to Analyze Learners' Reactions and Responses \* Nature of School Management as a conclusion of this interpretation. The value of eta-squared is 0.145 as shown in the table. As we retain the null-hypothesis the strength of association between Tried to Analyze Learners' Reactions and Responses \* Nature of School Management is considered insignificant.

**4(a)** The Mean is 1.25 which means on an average most teachers agree on Tried to Analyze Learners' Reactions and Responses. The Median is 1.225 which means fifty percent of the cases lie above and below it. The Range for 'Girl's Only' School teachers taken together is 0.55 for which minimum value is 1 and maximum value is 1.55. This shows low difference between minimum and maximum values. This difference can be interpreted as low divergence in the mean scores on the response towards Tried to Analyze Learners' Reactions and Responses. Standard deviation is 0.24833. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 1.00 and 1.49. This means, on an average most of the teachers agree on Tried to Analyze Learners' Reactions and Responses and some strongly agree with it. Skewness is 0.392. which means that the data is slightly positively skewed. i.e., the number of high scorers is greater than the low scorers on the question of Tried to Analyze Learners' Reactions and Responses. This is evident in the graphical representation of the data as well. Kurtosis is -2.444 which shows that the data distribution will be interpreted outside the range of normality. This is evident in the graphical representation of the data as well.

**4(b)** The Mean is 1.2953 which means on an average most teachers agree on Tried to Analyze Learners' Reactions and Responses. The Median is 1.15 which means fifty percent of the cases lie above and below it. The Range for Co-Ed School teachers taken together is 1.65 for which minimum value is 0.35 and maximum value is 2. This shows high difference between minimum and maximum values. This difference can be interpreted as high divergence in the mean scores on the response towards Tried to Analyze Learners' Reactions and Responses. Standard deviation is 0.41543. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.88 and 1.71. This means, on an average most of the teachers agree on Tried to Analyze Learners' Reactions and Responses and some strongly agree with it. Skewness is 0.068. which means that the data is slightly positively skewed. i.e., the number of high scorers is greater than the low scorers on the question of Tried to Analyze Learners' Reactions and Responses. This is evident in the graphical representation of the data as well. Kurtosis is -0.334 which shows that the data distribution will be interpreted not outside the range of normality. This is evident in the graphical representation of the data as well.

4(c) We test the null-hypothesis for the relation Tried to Analyze Learners' Reactions and Responses \* School Type the value of the F-ratio comes out to be 0.440 and the p-value comes out to be 0.835 through ANOVA. The interpretation of the p-value reveals that it is more than the alpha level i.e., 0.05 which means that we retain the null hypothesis. The interpretation of the F-ratio reveals that it is less than the critical value 4.196 which means that we retain the null hypothesis. On the basis of this interpretation, we retain the null hypothesis for the relation Tried to Analyze Learners' Reactions and Responses \* School Type as a conclusion of this interpretation. The value of eta-squared is 0.002 as shown in the table. As we retain the null-hypothesis the strength of association between Tried to Analyze Learners' Reactions and Responses \* School Type is considered insignificant.

### Conclusion:

Conscious efforts by the teacher for observing, analyzing and interpreting the responses by the learners has the potential to support learning in a more facilitative manner. The teacher doing so has the ability to modify the classroom environment as per the needs and requirements of not just the learners but the whole environment in which the teaching-learning process goes on. There are different factors that need to be analysed to understand what may influence the teachers' natural dispositions in this process. The present study focused on preservice teacher's natural dispositions towards "Tried to Analyze Learners' Reactions and Responses" in terms of Teacher's Gender, Nature of School Management and School Type. In the study relevant graphs related to this focus have been drawn and interpreted. 'Statistical Descriptives' of the same have also been interpreted as part of the study. The study did not find any significant difference in pre-service teachers' response to "Tried to Analyze Learners' Reactions and Responses" in terms of Teacher's Gender, Nature of School Management and School Type.

### References:

- Kumar, R. (2011). Development of Alternative Frameworks Among Learners in Science: A Reflection on the Learning Theories and Models. *Journal of Teacher Education in Developing Nations* (2229-4694), 2(2), 55–61.
- Kumar, R. (2012a). Nature of Science, Science Assessment and Constructivist Epistemology: An Attempt to Decode the Hidden Mysteries. *Indian Journal of Experimentation and Innovation in Education* (ISSN 2278-1730), 1(1).
- Kumar, R. (2012b). A Study of Intending Teachers' Organisation of the Content and Processes of the Science Lesson. *Indian Journal of Experimentation and Innovation in Education* (ISSN 2278-1730), 1(3).
- Kumar, R. (2012c). Encouraging Enquiry Approach in the Learners. *Indian Journal of Experimentation and Innovation in Education* (ISSN 2278-1730), 1(6).
- Kumar, R. (2013a). Addressing the Alternative Frameworks Amongst Learners: A Study of Classroom Context. *Indian Journal of Experimentation and Innovation in Education* (ISSN 2278-1730), 2(6).

- Kumar, R. (2013b). An Analysis of Pre Service Teachers' Natural Disposition For Posing Interpretative Questions to the Learners in Science. *Indian Journal of Experimentation and Innovation in Education*, 2(5).
- Kumar, R. (2013c). Carefully Designing the Science Activities Appropriate for the Group. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, 2(1).
- Kumar, R. (2013d). Encouraging Collaborative Learning Environment in Science Classroom. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495)*, 3(2).
- Kumar, R. (2013e). Attempting to take Learners Along in Conducting Classroom Activities. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, 2(3).
- Kumar, R. (2013f). Identifying Design Features of Science Learning Environment: An Extrapolation of Learning Theories, Models and Ideas. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495)*, 3(3).
- Kumar, R. (2013g). Constructing a Theoretical Framework on Alternative Frameworks Amongst Learners in Science. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495)*, 3(4).
- Kumar, R. (2013h). Motivating Non-Participating Learners in Classroom. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, 2(4), 1–8.
- Kumar, R. (2013i). Differentiating 'Scientific Concepts' from 'OTHER' Concepts: An Analytico-Deductive Approach." *Indian Journal of Education Research Experimentation and Innovation (ISSN-22310495)*, 3(5). <https://doi.org/10.1080/0950069900120507>
- Kumar, R. (2013j). Gauging Teachers' Tolerance towards Individual Interpretations by the Learners. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, 2(5).
- Kumar, R. (2013k). Preconceived Notion of Expected Answer and Teaching-Learning Contexts: An Analysis. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495)*, 3(5).
- Kumar, R. (2013l). Probing the Interplay of Nature of Science with Culture of Science in the Formation of Alternative Frameworks. *Indian Journal of Experimentation And Innovation in Education (ISSN 2278-1730)*, 2(5).
- Kumar, R. (2013m). An Analysis of Concept Specific Researches in the Formation of Alternative Frameworks. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, 2(6).
- Kumar, R. (2013n). Analysis of Pre Service Teachers' Natural Disposition for Testing Pre-Concepts amongst Learners in Science: An Indian Context. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, 2(6).
- Kumar, R. (2014a). Culture of Science and Scaffolding: A Study of Teachers' Focus on Learners' Individual Explorations. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495)*, 4(1).
- Kumar, R. (2014b). Learners' adequacy in using Computer Assisted Learning in the Classroom.



- Kumar, R. (2014c). Studying Learners Alternative Frameworks on ‘Magnets.’ *International Journal of Innovative Education (ISSN 2393-8404), 1(4).*
- Kumar, R. (2014d). Scaffolding Learners to Generate Explanations, Arguments and Models: Taking Indication from Learning Strands Framework. *International Journal of Innovative Education (2393-8404), 1(1).*
- Kumar, R. (2014e). Teachers’ Dispositions to Assist Learners in Metacognitive Processes. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278 -1730), 3(1).*
- Kumar, R. (2014f). Context of Forming Concepts and ‘Other Concepts’: “Electric Current” as a Theme of Weaving Linkages.” *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730), 3(2).*
- Kumar, R. (2014g). Giving Space to Children’s Voices, Experiences and Needs: An Analysis of Pre-service Teachers’ Natural Dispositions. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495), 4(2).*
- Kumar, R. (2014h). Practicing Culture of Science by Encouraging Learners’ Attempt to Generate Solutions to Problems. *International Journal of Innovative Education (ISSN 2393-8404), 1(2).*
- Kumar, R. (2014i). Science Learning Contexts and Network of Conceptions in Reference to the Topic – AIR. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495), 4(2).*
- Kumar, R. (2014j). What are Learners’ Thinking While the Topic “Blood” is Undertaken in the Class? *International Journal of Innovative Education (ISSN 2393-8404), 1(2).*
- Kumar, R. (2014k). Analysing Learners’ Reactions and Responses: Study of an Indian Science Classroom Context. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730), 3(3).*
- Kumar, R. (2014l). Formation of Conceptions and ‘Other Conceptions’ Related to “Food”.” *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730), 3(3).*
- Kumar, R. (2014m). Need and Significance of Exploring Alternative Frameworks Amongst Learners in Science. *International Journal of Innovative Education (ISSN 2393-8404), 1(3).*
- Kumar, R. (2014n). Understanding Classroom Settings in Indian Context While Topic ‘Cells’ is Taken-Up in Class.’ *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495), 4(3).*
- Kumar, R. (2014o). Understanding Teaching-Learning Context in Developing Students’ Ideas on ‘Light’.’ *International Journal of Innovative Education (ISSN 2393-8404), 1(3).*
- Kumar, R. (2014p). Validating Language by Modifying the Language as Per Learners’ Needs: An Analysis of Science Classroom Context. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495), 4(3).*
- Kumar, R. (2014q). Learners and Their Concepts of ‘Force’.’ *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495), 4(4).*

- Kumar, R. (2014r). Studying the Science Learning Contexts While the Topic / Area of Explorations was 'UNIVERSE.' *Indian Journal of Education Research Experimentation and Innovation* (ISSN 2231-0495), 4(4).
- Kumar, R. (2014s). 'Mirrors and Lenses': Concept and Conceptual Change in Indian Science Classroom.' *Indian Journal of Education Research Experimentation and Innovation* (ISSN-22310495), 4(5).
- Kumar, R. (2014t). Strategies for Identifying Conceptions and 'Other Conceptions' Related to 'Plant Reproduction.' *Indian Journal of Experimentation and Innovation in Education* (ISSN 2278-1730), 3(5).
- Kumar, R. (2014u). Study of Learners' Alternative Frameworks Related to 'Rain'.' *International Journal of Innovative Education* (ISSN 2393-8404), 1(5).
- Kumar, R. (2014v). Conceptions, "Other Conceptions" and their sites: Specific case of studying "Sources of Energy." *Indian Journal of Experimentation and Innovation in Education* (ISSN 2278-1730), 3(6).
- Kumar, R. (2014w). Learners' Ideas on 'Soil' and Classroom Implications.' *Indian Journal of Education Research Experimentation and Innovation* (ISSN 2231-0495), 4(6).
- Kumar, R. (2014x). Pre-service Teachers Notions about Alternative Frameworks/Misconceptions Amongst Learners in Science. *Indian Journal of Experimentation and Innovation in Education* (ISSN 2278-1730), 3(6).
- Kumar, R. (2015). Accommodating Teachers' Encounters and Learners' Speculations Related to Alternative Frameworks in Science. *International Journal of Innovative Education* (ISSN 2393-8404), 2(1).
- Prabha, S., Jha, A. K., & Kumar, R. (2012). Efficacy of Learning Strands in Science Education: Implications for Pre-service Teachers and Teaching in India. *Canada International Conference on Education-2012*, 157–162.
- Prabha, S., & Kumar, R. (2014). Prospective Science Teachers' Reflections on the Use of Learning Strands in Developing Lesson Design. *European Scientific Journal September 2014 /SPECIAL/, 1*, 121–131.
- Prabha, S., Kumar, R., & Jha, A. K. (2013). Learning Strands: Empowering Prospective Teachers for Science Practices in Indian Context. *International Journal for Cross-Disciplinary Subjects in Education (IJCDSE)*, 4(3), 1205–1212.