A Study of Factors Affecting 'Posing Interpretative Questions to the Learners'

¹Rakesh Kumar

¹Assistant Professor, University of Delhi (rakesh.sam21@gmail.com)

²Himani Sharma

²Freelance Writer and Researcher

(himaniedu87@gmail.com)

³Karishma Sharma

³Freelance Writer and Researcher

(karishma.edn@gmail.com)

Abstract

In the present study the teachers have planned their classroom proceedings in a framework that allows for strengths of informal environments to be used in formal classroom settings. The study focuses on preservice teacher's natural dispositions towards "Posed Interpretative Questions to the Learners" 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 "Posed Interpretative Questions to the Learners" in terms of Teacher's Gender, Nature of School Management and School Type. These factors have been located as research gaps in the study done by one of the researchers from this research team. The study contributes towards understanding the role of some factors in 'formal' science classrooms settings while trying out 'informal environments' in eighteen selected schools under guidance of one of the researchers from this team.

Key Words: Learning Strands, Science Classrooms, Pre-Service Teacher Education, Teacher's Gender, Nature of School Management, School Type, Planning in Science, Informal Learning Environments, Posing Interpretative Questions

Introduction:

Moving away from the traditional, formal type of teaching-learning environments, full of one-way communication, is not an easy proposition. It can only become a possibility by being open and flexible in our approach. This would need a different type of framework seeded in informal environments. Innovation in planning of units and lessons in science classrooms is the way forward. In the present study the teachers have planned their classroom proceedings in a framework that allows for strengths of informal environments to be used in formal classroom settings. This became a possibility by applying informal Learning Strands in Science Classrooms (Kumar, 2014n; Prabha, Jha, & Kumar, 2012; Prabha, Kumar, & Jha, 2013; Prabha & Kumar, 2014) formally with unit and lesson planning for teaching-learning science. In the process there had been attempts to

develop theoretical context of Alternative Frameworks (Kumar, 2011, 2012c, 2015, 2013k, 2013g, 2013h, 2013n, 2013a, 2013i, 2014m, 2014k) and to undertake Concept specific researches (Kumar, 2013b) on Alternative Framework in Science on Magnets (Kumar, 2014r), rain (Kumar, 2014q), soil (Kumar, 2014h), cells (Kumar, 2014u), Electric Current (Kumar, 2014c), light (Kumar, 2014v), blood (Kumar, 2014x), Food (Kumar, 2014e), Mirrors and Lenses (Kumar, 2014j), Universe (Kumar, 2014s), Plant Reproduction (Kumar, 2014p), Sources of Energy (Kumar, 2014b), Air (Kumar, 2014o), Force (Kumar, 2014i), Light (Kumar, 2014v) 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, 2012a, 2014d, 2014g, 2014l, 2014a, 2014f, 2014t, 2014n, 2015, 2013l, 2013e, 2013j, 2013d, 2013f, 2013m, 2013c, 2014w). During the above cited attempts there had been a research gap on the factors affecting Posed Interpretative Questions to the Learners. 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 "Posed Interpretative Questions to the Learners" in terms of the three identified factors?
- 2. How do we interpret 'statistical descriptives' related to preservice teacher's natural dispositions towards "Posed Interpretative Questions to the Learners" in terms of the three identified factors?
- 3. What are the differences (if any) in preservice teacher's natural dispositions towards "Posed Interpretative Questions to the Learners" in terms of the three 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 "Posed Interpretative Questions to the Learners" in terms of the three identified factors.
- To interpret the 'statistical descriptives' related to preservice teacher's natural dispositions towards "Posed Interpretative Questions to the Learners in terms of the three identified factors
- 3. To locate the differences (if any) in preservice teacher's natural dispositions towards "Posed Interpretative Questions to the Learners" in terms of the three identified factors.

Methodology, sample and tools:

Methodology:

Metacognitive efforts like reflecting on our own thinking and understanding can give a lot of insights into what we need to do improve the conditions prevailing at present. Reflecting on his own understanding in the area of science education and assessment of related literature, the researcher identified some ideas to be explored in the area of teaching and learning in science. These evolved into some questions that needed further probing. In order to probe these questions, the researcher developed a wide-ranging tool to explore various questions concerned with the teaching-learning processes in the science classrooms. This tool was used for understanding the science classrooms in terms of the identified factors using the sample described in the next section. IBM-SPSS was used for exploring the data thus collected.

Sample

Total 38 Pre-Service Science teachers participated from two B.Ed. colleges each from University of Delhi and GGSIP University, Delhi. This ensured participation of total 18 schools in which above Pre-Service teachers had their School Life Experience Program. These teachers had diverse graduation and post-graduation subjects. First College had 8 participants and second college had 30 participant Teachers. Feedback responses from 592 lessons delivered by these 30 pre-service science teachers were analyzed in this study. Out of total 38 Pre-Service teachers, code number 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. Clearly, the sample is not a random sample but a purposive one. Although no deliberate attempt was made for the sample to be homogeneous or representative, it got addressed in the process to some extent. This fact is visible in the different factors 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							
	Туре	String							
	Measurement	Nominal							
Valid Values	1	Male	7	23.3%					

 					. –
	2	Female	23	76.7%	
	3	Others	0	0.0%	

		Managamant		
		Management		
			1	
		Value	Count	Percent
Standard Attributes	Label	Nature of School		
		Management		
	Туре	String		
	Measuremen	Nominal		
	t			
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%

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

3

26

Tools for data collection

In the present study questionnaire prepared by the researcher was used along with observations and unstructured interviews to triangulate the data. The questionnaire was designed in the form of self- appraisal consisting of both open ended and close ended questions that can be analysed quantitatively and qualitatively both. The questionnaire design for the purpose was collected by school teachers. Field experts, and colleagues in the teacher education institutions validated the tool prepared. Some issues related to the vagueness of language formatting style etc. were resolved in the process. This increased the authenticity of the questionnaire.

Co-Ed School

Analysis of Data

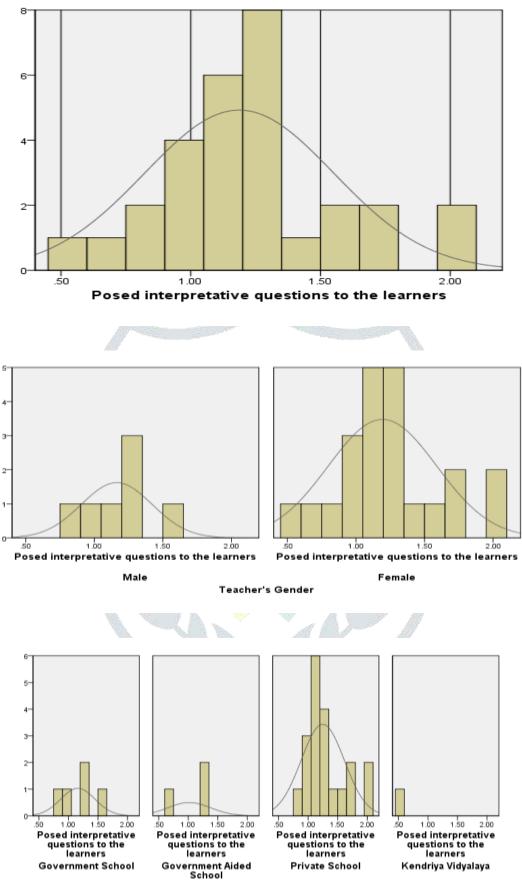
The schedule of self-assessment response, actually contained 26 items, and also had the choice of answering in terms of disagree, agree, and strongly agree. These three categories of choices are further given the marks of zero, one and two respectively in order to quantify them. These responses in the form of marks of zero, one and two were provided as the feedback to the science teachers from the analysis. Also, these responses were then collected on the Microsoft Excel sheet for the duration of overall school time interaction program of all the participating pre-service science teachers. Thus, the average score of one specific teacher was obtained. And the average scores of these 30 teachers were entered in separate Excel sheet for further analysis 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

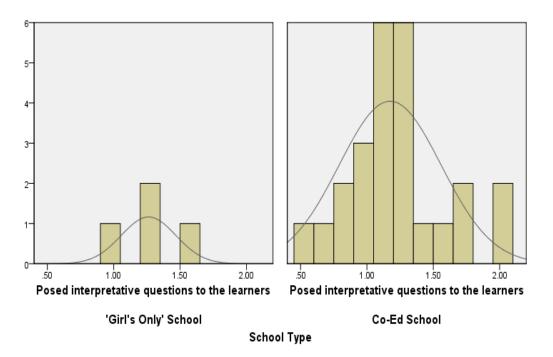
Table 1 shows the average scores of several teachers on the feedback schedule related to the Component "Posed Interpretative Questions to the Learners" of the teaching-learning environment in damage of Teachers' Self-Assessment. The evaluation, interpretation and appropriate graphical descriptions had been used in the following discussions using the information from the Table 1.

Table 1 - Individual average score of different respondents on the item: Posed Interpretative Questions to the Learners

Av. Score	1.1	1.2	-	1.59	1.25	1.25	0.75	0.95	T	1.4	0.8	1.95	1.1	1.25	1.25	1.15	1.65	1.5	1	ю	1.1	1.1	1.3	1.65	1.15	1.3	1.25	0.6	0.55	0.45
Tch. Cd.	1.03	1.09	1.14	1.23	1.27	1.28	2.01	1.0.1	1.02	1.04	1.05	1.06	1.07	1.08	1.1	1.1.1	1.12	1.13	1.17	1.18	1.19	1.2	1.21	1.23	1.24	1.25	1.26	1'9	5.05 5	2.03



Nature of School Management



			TD			
	Cas	e Processing	g Summary			
			Ca	ses		
	Inclu	ıded	Excl	uded	То	tal
	Ν	Percent	Ν	Percent	Ν	Percent
Posed interpretative questions to the learners * Teacher's Gender	30	100.0%	0	0.0%	30	100.0%
Posed interpretative questions to the learners * Nature of School Management	30	100.0%	0	0.0%	30	100.0%
Posed interpretative questions to the learners * School Type	30	100.0%	0	0.0%	30	100.0%

Posed interpretative questions to the learners * Teacher's Gender

	Report								
Posed interpre	tative que	stions to	the learne	ers					
Teacher's		Media	Minim	Maxim		Std.	Skewne	Kurtosi	
Gender	Mean	n	um	um	Range	Deviation	SS	s	
Male	1.1630	1.2000	.75	1.59	.84	.25843	.064	1.239	
		1.2000		1.0 5				1.203	
Female	1.1935	1.1500	.45	2.00	1.55	.39580	.168	.146	
Total	1.1864	1.1750	.45	2.00	1.55	.36447	.198	.392	
	L	7111 - 20-11							

	10 -				110					
	ANOVA Table									
			Sum of		Mean					
			Squares	df	Square	F	Sig.			
Posed	Between	(Combin	.005	1	.005	.036	.850			
interpretative	Groups	ed)								
questions to the learners *	Within Grou	ps	3.847	28	.137					
Teacher's Gender	Total		3.852	29						
		22	~							

Measures of Association										
	Eta	Eta Squared								
Posed interpretative questions to the learners *	.036	.001								
Teacher's Gender										

Posed interpretative questions to the learners * Nature of School Management

	Report							
Posed interpretative	e question	s to the l	earners					
Nature of School		Media	Minim	Maxim		Std.	Skewne	Kurtos
Management	Mean	n	um	um	Range	Deviation	SS	is
Government School	1.1600	1.2500	.75	1.50	.75	.29026	515	476
Government Aided School	1.0167	1.2000	.60	1.25	.65	.36171	-1.695	
Private School	1.2472	1.1500	.45	2.00	1.55	.36613	.317	.601
Kendriya Vidyalaya	.5500	.5500	.55	.55	.00			
Total	1.1864	1.1750	.45	2.00	1.55	.36447	.198	.392
	10	1.2					L	L

		ANO	VA Table		~		
			Sum of Squares	df	Mean Square	F	Sig.
Posed interpretative questions to the	Between Groups	(Combin ed)	.573	3	.191	1.513	.235
learners * Nature	Within Group	DS	3.280	26	.126		
of School Management	Total		3.852	29			

Measures of	Association	l
	Eta	Eta Squared
Posed interpretative	.386	.149
questions to the learners *		
Nature of School		
Management		

Posed interpretative questions to the learners * School Type

Report								
Posed interpretative questions to the learners								
			Minimu	Maximu		Std.	Skewnes	Kurtosi
School Type	Mean	Median	m	m	Range	Deviation	S	S
'Girl's Only'	1.2625	1.2750	1.00	1.50	.50	.20565	356	1.282
School								
Co-Ed School	1.1747	1.1500	.45	2.00	1.55	.38464	.277	.216
Total	1.1864	1.1750	.45	2.00	1.55	.36447	.198	.392

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Posed interpretative questions to the	Between Groups	(Combin ed)	.027	1	.027	.196	.662
learners * School	Within Groups		3.825	28	.137		
Туре	Total		3.852	29			

Measures of Association					
	Eta	Eta Squared			
Posed interpretative questions to the learners *	.083	.007			
School Type					

Analysis and Interpretation:

1) The Mean is 1.1864 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.175 which means fifty percent of the cases lie above and below it. The Range for Total teachers taken together is 1.55 for which minimum value is 0.45 and maximum value is 2. This shows high difference between minimum and maximum values. This difference can be interpretated as high divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.36447. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.82 and 1.55. This means, on an average most of the teachers agree on Posed Interpretative Questions to the Learners and some strongly agree with it. Skewness is 0.198. 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 Posed Interpretative Questions to the Learners. This is evident in the graphical representation of the data as well. Kurtosis is 0.392 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 1.163 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.2 which means fifty percent of the cases lie above and below it. The Range for Male teachers taken together is 0.84 for which minimum value is 0.75 and maximum value is 1.59. This shows high difference between minimum and maximum values. This difference can be interpretated as high divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.25843. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.90 and 1.42. This means, on an average most of the teachers agree on Posed Interpretative Questions to the Learners and some strongly agree with it. Skewness is 0.064. 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 Posed Interpretative Questions to the Learners. This is evident in the graphical representation of the data as well. Kurtosis is 1.239 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.

2(b) The Mean is 1.1935 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. 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 1.55 for which minimum value is 0.45 and maximum value is 2. This shows

www.jetir.org (ISSN-2349-5162)

high difference between minimum and maximum values. This difference can be interpretated as high divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.3958. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.79 and 1.58. This means, on an average most of the teachers agree on Posed Interpretative Questions to the Learners and some strongly agree with it. Skewness is 0.168. 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 Posed Interpretative Questions to the Learners. This is evident in the graphical representation of the data as well. Kurtosis is 0.146 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 Posed Interpretative Questions to the Learners * Teacher's Gender the value of the F-ratio comes out to be 0.036 and the p-value comes out to be 0.85 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 Posed Interpretative Questions to the Learners * Teacher's Gender as a conclusion of this interpretation. The value of eta-squared is 0.001 as shown in the table. As we retain the null-hypothesis the strength of association between Posed Interpretative Questions to the Learners * Teacher's Gender is considered insignificant.

3(a) The Mean is 1.16 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.25 which means fifty percent of the cases lie above and below it. The Range for Government School teachers taken together is 0.75 for which minimum value is 0.75 and maximum value is 1.5. This shows high difference between minimum and maximum values. This difference can be interpretated as high divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.29026. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.86 and 1.45. This means, on an average most of the teachers agree on Posed Interpretative Questions to the Learners and some strongly agree with it. Skewness is -0.515. which means that the data is moderately negatively skewed. i.e., the number of low scorers is greater than the high scorers on the data as well. Kurtosis is -0.476 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 1.0167 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.2 which means fifty percent of the cases lie above and below it. The Range for Government Aided School teachers taken together is 0.65 for which minimum value is 0.6 and maximum value is 1.25. This shows low difference between minimum and maximum values. This difference can be interpretated as low divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.36171. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.65 and 1.37. This means, on an average most of the teachers agree on Posed

www.jetir.org (ISSN-2349-5162)

Interpretative Questions to the Learners and some strongly agree with it. Skewness is -1.695. 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 Posed Interpretative Questions to the Learners. Kurtosis is incalculable. This is evident in the graphical representation of the data as well.

3(c) The Mean is 1.2472 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.15 which means fifty percent of the cases lie above and below it. The Range for Private School teachers taken together is 1.55 for which minimum value is 0.45 and maximum value is 2. This shows high difference between minimum and maximum values. This difference can be interpretated as high divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.36613. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.88 and 1.61. This means, on an average most of the teachers agree on Posed Interpretative Questions to the Learners and some strongly agree with it. Skewness is 0.317. 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 Posed Interpretative Questions to the Learners. This is evident in the graphical representation of the data as well. Kurtosis is 0.601 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 0.55 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 0.55 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 0.55 and maximum value is 0.55. This shows no difference between minimum and maximum values. This difference can be interpretated as no divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. 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 Posed Interpretative Questions to the Learners * Nature of School Management the value of the F-ratio comes out to be 1.513 and the p-value comes out to be 0.235 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 Posed Interpretative Questions to the Learners * Nature of School Management as a conclusion of this interpretation. The value of eta-squared is 0.149 as shown in the table. As we retain the null-hypothesis the strength of association between Posed Interpretative Questions to the Learners * Nature of School Management is considered insignificant.

4(a) The Mean is 1.2625 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.275 which means fifty percent of the cases lie above and below it. The Range for 'Girl's Only' School teachers taken together is 0.5 for which minimum value is 1 and maximum value is 1.5. This shows low difference between minimum and maximum values. This difference can be interpretated as low

divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.20565. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.76 and 1.76. This means, on an average most of the teachers agree on Posed Interpretative Questions to the Learners and some strongly agree with it. Skewness is -0.356. 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 Posed Interpretative Questions to the Learners. This is evident in the graphical representation of the data as well. Kurtosis is 1.282 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 1.1747 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. 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 1.55 for which minimum value is 0.45 and maximum value is 2. This shows high difference between minimum and maximum values. This difference can be interpretated as high divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.38464. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.79 and 1.55. This means, on an average most of the teachers agree on Posed Interpretative Questions to the Learners and some strongly agree with it. Skewness is 0.277. 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 Posed Interpretative Questions to the Learners. This is evident in the graphical representation of the data as well. Kurtosis is 0.216 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 Posed Interpretative Questions to the Learners * School Type the value of the F-ratio comes out to be 0.196 and the p-value comes out to be 0.662 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 Posed Interpretative Questions to the Learners * School Type as a conclusion of this interpretation. The value of eta-squared is 0.007 as shown in the table. As we retain the null-hypothesis the strength of association between Posed Interpretative Questions to the Learners * School Type is considered insignificant.

Conclusion:

The study focuses on preservice teacher's natural dispositions towards "Posed Interpretative Questions to the Learners" 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 "Posed Interpretative Questions to the Learners" 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). 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. (2012b). Encouraging Enquiry Approach in the Learners. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730), 1*(6).
- Kumar, R. (2012c). 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. (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 Concept Specific Researches in the Formation of Alternative Frameworks. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, 2(6).
- Kumar, R. (2013c). 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. (2013d). 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. (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). Carefully Designing the Science Activities Appropriate for the Group. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, 2(1).
- 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). 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. (2013i). Encouraging Collaborative Learning Environment in Science Classroom. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495), 3*(2).
- 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). 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. (20131). Motivating Non-Participating Learners in Classroom. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, 2(4), 1–8.
- Kumar, R. (2013m). 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. (2013n). 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. (2014a). 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. (2014b). 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. (2014c). 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. (2014d). 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. (2014e). Formation of Conceptions and 'Other Conceptions'' Related to "Food"." *Indian Journal of Experimentation and Innovation in Education (ISSN 2278-1730)*, *3*(3).
- Kumar, R. (2014f). Giving Space to Children's Voices, Experiences and Needs: An Analysis of Preservice Teachers' Natural Dispositions. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495)*, 4(2).
- Kumar, R. (2014g). Learners' adequacy in using Computer Assisted Learning in the Classroom. *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495)*, 4(6).
- Kumar, R. (2014h). Learners' Ideas on 'Soil'' and Classroom Implications.' *Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495)*, 4(6).
- Kumar, R. (2014i). Learners and Their Concepts of 'Force''.' Indian Journal of Education Research Experimentation and Innovation (ISSN 2231-0495), 4(4).
- Kumar, R. (2014j). '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. (2014k). Need and Significance of Exploring Alternative Frameworks Amongst Learners in

Science. International Journal of Innovative Education (ISSN 2393-8404), 1(3).

- Kumar, R. (20141). 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. (2014m). 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. (2014n). 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. (2014o). 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. (2014p). 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. (2014q). Study of Learners' Alternative Frameworks Related to 'Rain''.' *International Journal of Innovative Education (ISSN 2393-8404)*, 1(5).
- Kumar, R. (2014r). Studying Learners Alternative Frameworks on 'Magnets.' *International Journal of Innovative Education (ISSN 2393-8404)*, *1*(4).
- Kumar, R. (2014s). 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. (2014t). Teachers' Dispositions to Assist Learners in Metacognitive Processes. *Indian Journal of Experimentation and Innovation in Education (ISSN 2278 -1730)*, 3(1).
- Kumar, R. (2014u). 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. (2014v). Understanding Teaching-Learning Context in Developing Students' Ideas on 'Light''.' *International Journal of Innovative Education (ISSN 2393-8404)*, 1(3).
- Kumar, R. (2014w). 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. (2014x). 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. (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. In *Canada International Conference on Education-2012* (pp. 157–162).

www.jetir.org (ISSN-2349-5162)

- Prabha, S., & Kumar, R. (2014). Prospective Science Teachers' Reflections on the Use of Learning Strands in Developing Lesson Design. In *European Scientific Journal September 2014 /SPECIAL/* (Vol. 1, pp. 121–131). Portugal.
- 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.

