

Learners' Ideas in Informal Science Learning Environments: Study of Preservice Teacher's Pursuit for Posing Interpretative Questions

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

Planning of science lessons has been practiced not just by pre-service teachers but in-service teachers too. Planning science lessons taking care of factors like holistic development, taking care of nature of science, culture of science, developing learners' identity as someone who can even sometimes can contribute to the development of science too, have been on the back foot. In the present study the teachers have planned their classroom proceedings in a framework that allows for such 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 Qualification Level of the Teacher, Teacher's Area of Expertise and Class Taught by the Teacher. 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 Qualification Level of the Teacher and Teacher's Area of Expertise. Whereas a difference in pre-service teachers' response to "Posed Interpretative Questions to the Learners" in terms of Class Taught by the Teacher has been located. Also, the study finds that the strength of association between Posed Interpretative Questions to the Learners and Class Taught by the Teacher is large. Further, the study hints that the teachers teaching at the lower level are posing interpretative questions to the science learners more than their counterparts at higher levels of schooling in the selected schools. Learners' ideas are the best resources to be tapped in the teaching-learning processes. A teacher's efforts in interpreting and exploring those ideas may become one of the very important strengths of a teacher. The present study contributes in understanding the factors affecting this process.

Key Words: Learning Strands, Science Classrooms, Pre-Service Teacher Education, Informal Science Learning Environments, Lesson Planning, Unit Planning Qualification Level of The Teacher, Teacher's Area of Expertise, Class Taught by The Teacher, Posing Interpretative Questions

Introduction:

Planning of science lessons has been practiced not just by pre-service teachers but in-service teachers too. Planning science lessons taking care of factors like holistic development, taking care of nature of science, culture of science, developing learners' identity as someone who can even sometimes can contribute to the development of science too, have been on the back foot. There had been a creative application of informal Learning Strands in formal Science Classrooms (Kumar, 2014n; Prabha, Jha, & Kumar, 2012; Prabha, Kumar, & Jha, 2013; Prabha & Kumar, 2014) 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**

Three research questions are framed based on the following three factors viz. Qualification Level of the Teacher, Teacher's Area of Expertise, Class Taught by the Teacher.

The following questions are focused:

1. How do we graphically represent preservice teacher's natural dispositions towards "Posed Interpretative Questions to the Learners" in terms of the 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 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 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.
2. 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:

On the basis of reflections on his own understanding in the related area enriched by assessment of related literature, 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 of the sample described in the next section. The researchers used SPSS by IBM for exploring the data collected for the purpose.

Sample

The sample consisted of 38 Pre-Service Science teachers from two B.Ed. colleges of University of Delhi and GGSIP University, Delhi. These were engaged in 18 schools for their School Life Experience Program. There was a diversity in their graduation and post-graduation subjects. From Delhi University College there were 8 participants and from GGSIP University college there were 30 participants. For data collection a feedback response from 592 lessons delivered by these 30 pre-service science teachers were received. Out of total 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.

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

Level				
		Value	Count	Percent
Standard Attributes	Label	Qualification Level of the Teacher		
	Type	String		
	Measurement	Nominal		

Valid Values	1	Graduate	25	83.3%
	2	Post Graduate	5	16.7%

Expertise				
		Value	Count	Percent
Standard Attributes	Label	Teacher's Area of Expertise		
	Type	String		
	Measurement	Nominal		
Valid Values	1	Physics	1	3.3%
	2	Bio-Technology	2	6.7%
	3	Life-Sciences	8	26.7%
	4	Mathematics	3	10.0%
	5	Physical Sciences	10	33.3%
	6	Chemistry	4	13.3%
	7	Applied Sciences	1	3.3%
	8	Information Technology	1	3.3%

Class				
		Value	Count	Percent
Standard Attributes	Label	Class Taught by the Teacher		
	Type	String		
	Measurement	Nominal		
Valid Values	6	6th Class	13	43.3%
	7	7th Class	8	26.7%
	8	8th Class	8	26.7%
	9	9th Class	1	3.3%

Tools for data collection

For purpose of the study a questionnaire prepared by the researcher was used. This questionnaire was in the form of self-appraisal consisting of both open-ended and close-ended questions. The questionnaire was distributed and collected by school teachers. Field experts, and colleagues in the teacher education institutions validated the tool prepared.

Analysis of Data

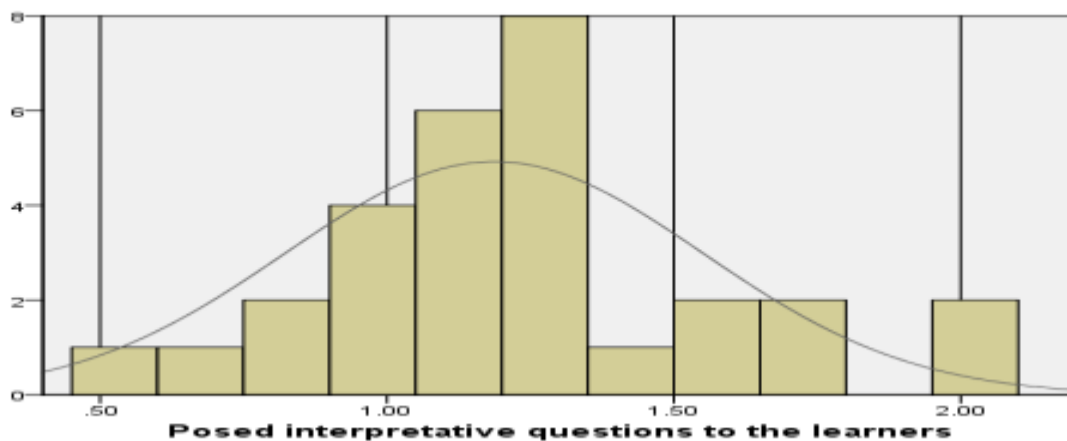
The questionnaire contained 26 items, and had the choices of answering in terms of disagree, agree, and strongly agree. For analysis these were given the marks zero, one and two respectively. In this way the average score of one specific teacher was obtained. The average scores of these 30 teachers were entered in Excel sheet for further analysis of their responses on the items in the questionnaire. This was used in IBM-SPSS to calculate descriptives and plot relevant Graphs. Graphs and descriptives from this data are being given in “findings” part of the study that follows.

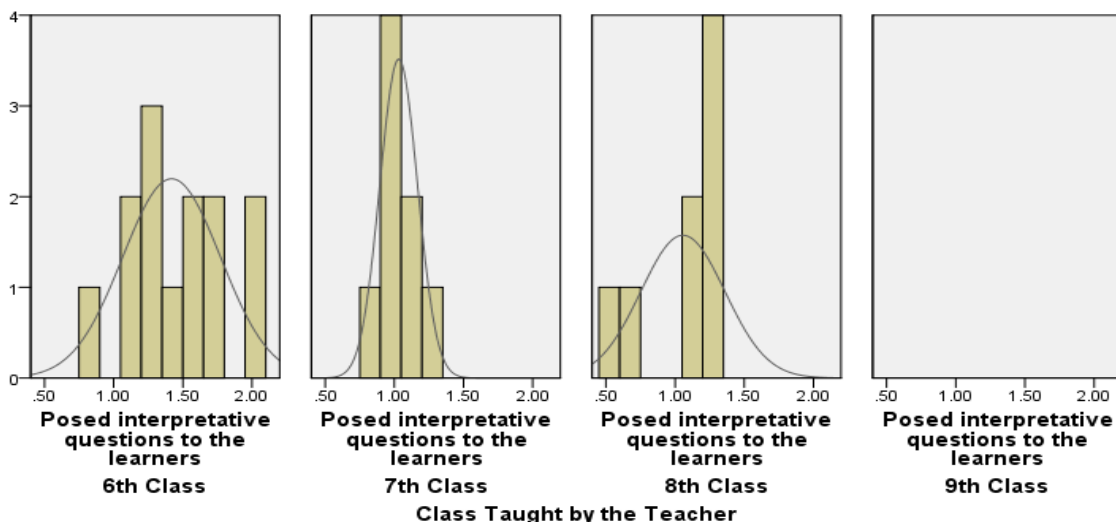
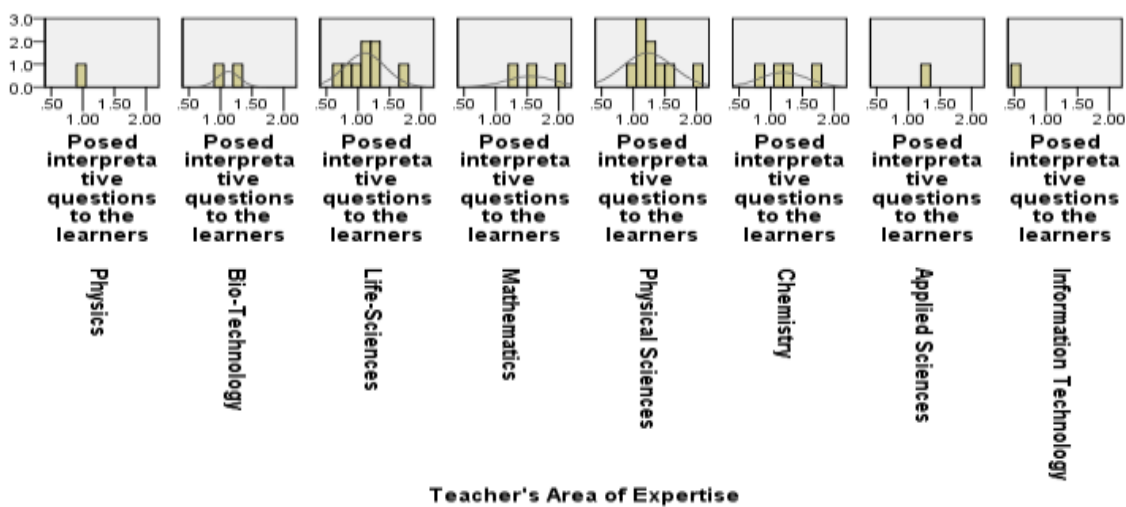
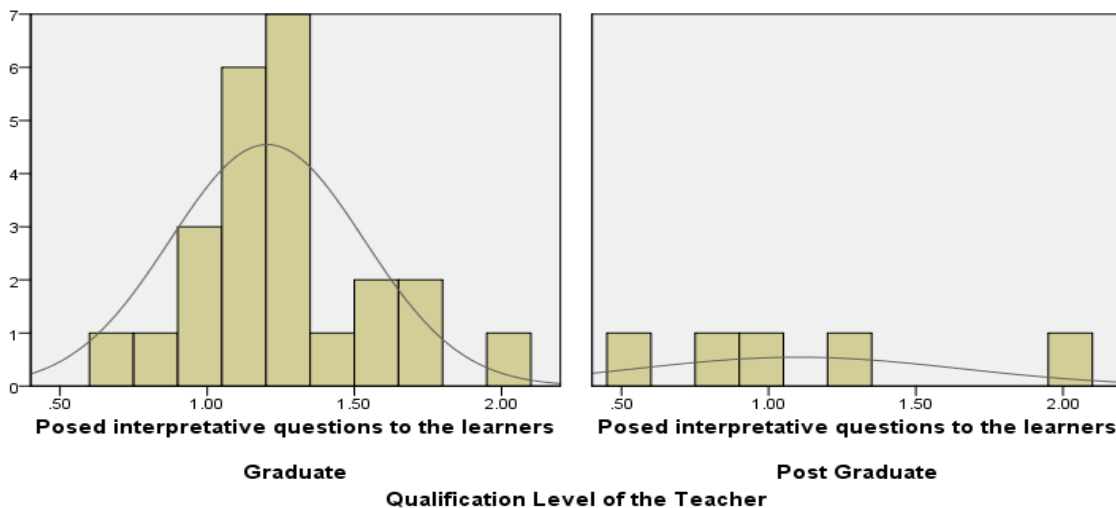
Findings

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

Tch. Cd.	Av. Score
1.03	1.1
1.09	1.2
1.14	1
1.22	1.59
1.27	1.25
1.28	1.25
2.01	0.75
1.01	0.95
1.02	1
1.04	1.4
1.05	0.8
1.06	1.95
1.07	1.1
1.08	1.25
1.1	1.25
1.11	1.15
1.12	1.65
1.13	1.5
1.17	1
1.18	2
1.19	1.1
1.2	1.1
1.21	1.3
1.23	1.65
1.24	1.15
1.25	1.3
1.26	1.25
1.3	0.6
2.02	0.55
2.03	0.45





Case Processing Summary						
	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Posed interpretative questions to the learners * Qualification Level of the Teacher	30	100.0%	0	0.0%	30	100.0%
Posed interpretative questions to the learners * Teacher's Area of Expertise	30	100.0%	0	0.0%	30	100.0%
Posed interpretative questions to the learners * Class Taught by the Teacher	30	100.0%	0	0.0%	30	100.0%



Posed interpretative questions to the learners * Qualification Level of the Teacher

Report								
Posed interpretative questions to the learners								
Qualification Level of the Teacher	Mean	Median	Minimum	Maximum	Range	Std. Deviation	Skewness	Kurtosis

Graduate	1.2036	1.2000	.45	2.00	1.55	.32898	.041	1.159
Post Graduate	1.1000	.9500	.55	1.95	1.40	.55000	1.026	.615
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 learners * Qualification Level of the Teacher	Between Groups	(Combined)	.045	1	.045	.329	.571
	Within Groups		3.807	28	.136		
	Total		3.852	29			

Measures of Association		
	Eta	Eta Squared
Posed interpretative questions to the learners * Qualification Level of the Teacher	.108	.012

Posed interpretative questions to the learners * Teacher's Area of Expertise

Report								
Posed interpretative questions to the learners								
Teacher's Area of Expertise	Mean	Median	Minimum	Maximum	Range	Std. Deviation	Skewness	Kurtosis
Physics	.9500	.9500	.95	.95	.00	.	.	.
Bio-Technology	1.1250	1.1250	1.00	1.25	.25	.17678	.	.

Life-Sciences	1.1063	1.1000	.60	1.65	1.05	.32342	.088	.266
Mathematics	1.5500	1.5000	1.20	1.95	.75	.37749	.586	.
Physical Sciences	1.2291	1.2000	.45	2.00	1.55	.40199	.045	1.871
Chemistry	1.2000	1.2000	.75	1.65	.90	.36968	.000	1.139
Applied Sciences	1.2500	1.2500	1.25	1.25	.00	.	.	.
Information Technology	.5500	.5500	.55	.55	.00	.	.	.
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 learners * Teacher's Area of Expertise	Between Groups (Combined)	.939	7	.134	1.014	.449
	Within Groups	2.913	22	.132		
	Total	3.852	29			

Measures of Association

	Eta	Eta Squared
Posed interpretative questions to the learners * Teacher's Area of Expertise	.494	.244

Posed interpretative questions to the learners * Class Taught by the Teacher

Report								
Posed interpretative questions to the learners								
Class Taught by the Teacher	Mean	Median	Minimum	Maximum	Range	Std. Deviation	Skewness	Kurtosis
6th Class	1.4185	1.4000	.75	2.00	1.25	.35408	-.007	-.205
7th Class	1.0313	1.0000	.80	1.25	.45	.13611	-.040	.511
8th Class	1.0563	1.2000	.55	1.30	.75	.30406	-1.270	-.213
9th Class	.4500	.4500	.45	.45	.00	.	.	.
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 learners * Class Taught by the Teacher	Between Groups	(Combined)	1.571	3	.524	5.968	.003
	Within Groups		2.281	26	.088		
	Total		3.852	29			

Measures of Association			
		Eta	Eta Squared
Posed interpretative questions to the learners *	Class Taught by the Teacher	.639	.408

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 interpreted 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 1.2036 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 Graduate 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 interpreted as high divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.32898. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.87 and 1.53. 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 0.041. 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 1.159 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 1.1 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 0.95 which means fifty percent of the cases lie above and below it. The Range for Post Graduate teachers taken together is 1.4 for which minimum value is 0.55 and maximum value is 1.95. 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 Posed Interpretative Questions to the Learners. Standard deviation is 0.55. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.55 and 1.65. 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 1.026. which means that the data is highly 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 0.615 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 * Qualification Level of the Teacher the value of the F-ratio comes out to be 0.329 and the p-value comes out to be 0.571 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 * Qualification Level of the Teacher as a conclusion of this interpretation. The value of eta-squared is 0.012 as shown in the table. As we retain the null-hypothesis the strength of association between Posed Interpretative Questions to the Learners * Qualification Level of the Teacher is considered insignificant.

3(a) The Mean is 0.95 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 0.95 which means fifty percent of the cases lie above and below it. The Range for Physics teachers taken together is 0 for which minimum value is 0.95 and maximum value is 0.95. 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 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(b) The Mean is 1.125 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.125 which means fifty percent of the cases lie above and below it. The Range for Bio-Technology teachers taken together is 0.25 for which minimum value is 1 and maximum value is 1.25. 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 Posed Interpretative Questions to the Learners. Standard deviation is 0.17678. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.94 and 1.30. 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 incalculable. Kurtosis is incalculable. This is evident in the graphical representation of the data as well.

3(c) The Mean is 1.1063 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.1 which means fifty percent of the cases lie above and below it. The Range for Life-Sciences teachers taken together is 1.05 for which minimum value is 0.6 and maximum value is 1.65. 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 Posed Interpretative Questions to the Learners. Standard deviation is 0.32342. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.78 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 0.088. 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 0.266 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 1.55 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.5 which means fifty percent of the cases lie above and below it. The Range for Mathematics teachers taken together is 0.75 for which minimum value is 1.2 and maximum value is 1.95. 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 Posed Interpretative Questions to the Learners. Standard deviation is 0.37749. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 1.17 and 1.92. 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 0.586. 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 Posed Interpretative Questions to the Learners. 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(e) The Mean is 1.2291 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 Physical Sciences 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 interpreted as high divergence in the mean scores on the response towards Posed Interpretative Questions to the Learners. Standard deviation is 0.40199. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.82 and 1.63. 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 0.045. 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 1.871 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.

3(f) The Mean is 1.2 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 Chemistry teachers taken together is 0.9 for which minimum value is 0.75 and maximum value is 1.65. 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 Posed Interpretative Questions to the Learners. Standard deviation is 0.36968. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.83 and 1.56. 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. Kurtosis is 1.139 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.

3(g) The Mean is 1.25 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 Applied Sciences teachers taken together is 0 for which minimum value is 1.25 and maximum value is

1.25. 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 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(h) 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 Information Technology 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 interpreted 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(i) We test the null-hypothesis for the relation Posed Interpretative Questions to the Learners * Teacher's Area of Expertise the value of the F-ratio comes out to be 1.014 and the p-value comes out to be 0.449 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 2.464 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 Area of Expertise as a conclusion of this interpretation. The value of eta-squared is 0.244 as shown in the table. As we retain the null-hypothesis the strength of association between Posed Interpretative Questions to the Learners * Teacher's Area of Expertise is considered insignificant.

4(a) The Mean is 1.4185 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1.4 which means fifty percent of the cases lie above and below it. The Range for 6th Class 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 Posed Interpretative Questions to the Learners. Standard deviation is 0.35408. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 1.06 and 1.77. 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 -0.007. 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 -0.205 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(b) The Mean is 1.0313 which means on an average most teachers agree on Posed Interpretative Questions to the Learners. The Median is 1 which means fifty percent of the cases lie above and below it. The Range for 7th Class teachers taken together is 0.45 for which minimum value is 0.8 and maximum value is 1.25. 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 Posed Interpretative Questions to the Learners. Standard deviation is 0.13611. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.89 and 1.16. 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 -0.04. 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 0.511 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) The Mean is 1.0563 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 8th Class teachers taken together is 0.75 for which minimum value is 0.55 and maximum value is 1.3. 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 Posed Interpretative Questions to the Learners. Standard deviation is 0.30406. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.75 and 1.36. 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 -1.27. 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. This is evident in the graphical representation of the data as well. Kurtosis is -0.213 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(d) The Mean is 0.45 which means on an average most teachers disagree on Posed Interpretative Questions to the Learners. The Median is 0.45 which means fifty percent of the cases lie above and below it. The Range for 9th Class teachers taken together is 0 for which minimum value is 0.45 and maximum value is 0.45. 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 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.

4(e) We test the null-hypothesis for the relation Posed Interpretative Questions to the Learners * Class Taught by the Teacher the value of the F-ratio comes out to be 5.968 and the p-value comes out to be 0.003 through ANOVA. The interpretation of the p-value reveals that it is less than the alpha level i.e., 0.05 which means that we reject the null hypothesis. The interpretation of the F-ratio reveals that it is more than the critical value 2.975 which means that we reject the null hypothesis. On the basis of this interpretation, we reject the null hypothesis for the relation Posed Interpretative Questions to the Learners * Class Taught by the Teacher as a conclusion of this interpretation. The value of eta-squared is 0.408 as shown in the table. As we reject the null-hypothesis the strength of association between Posed Interpretative Questions to the Learners * Class Taught by the Teacher indicates a large effect.

Conclusion:

Learners' ideas are the best resources to be tapped in the teaching-learning processes. A teacher's efforts in interpreting and exploring those ideas may become one of the very important strengths of a teacher. The present study focused on preservice teacher's natural dispositions towards "Posed Interpretative Questions to the Learners" in terms of Qualification Level of the Teacher, Teacher's Area of Expertise and Class Taught by the Teacher. 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 Qualification Level of the Teacher and Teacher's Area of Expertise. Whereas a difference in pre-service teachers' response to "Posed Interpretative Questions to the Learners" in terms of Class Taught by the Teacher has been located also the study finds that the strength of association between Posed Interpretative Questions to the Learners and Class Taught by the Teacher is large. Further, the study hints that the teachers teaching at the lower level are posing interpretative questions to the science learners more than their counterparts at higher levels of schooling in the selected schools.

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