Facilitating Learning Science in Informal Environments: Study of Pre-service Teachers' Attempt to Withholding Own Ideas and Conclusions

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Abstract

Teaching-learning processes are designed to facilitate the learners in the process of developing their ideas and conceptions in the area of the study. This is true in general and specifically in science classrooms. When teachers start teaching, it is natural for them to express their ideas and the learners getting influenced by these. While we do not explicitly see any cause of concern in this process, a deep reflection reveals something serious. Especially when we explore the reasons for the development of alternative frameworks and also during the processes designed to address these AFs this concern gets puffed-up. A strategy that can be useful in this regard is an attempt by the teacher to withheld own ideas and conclusions and let the learner's ideas come up freely. Giving spaces for learner's ideas has the prospect for the exploration of ideas by the learners in more efficate ways. This had been tried and the trial explored in the present study where 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 "Withheld Own Ideas and Conclusions Effectively" 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 "Withheld Own Ideas and Conclusions Effectively" 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, Informal Learning Environments in Science, Teacher's Gender, Nature of School Management, School Type, Planning in Science, Withholding Own Ideas and Conclusions

Introduction:

(Bell, Lewenstein, Shouse, & Feder, 2009) proposed a "strands of science learning" framework that articulates science-specific capabilities supported by informal environments. It builds on the framework developed for K-8 science learning in Taking Science to School (Duschl, Schweingruber, & Shouse, 2007) "That four-strand framework aligns tightly with the Strands 2 through 5. They have added two additional strands—Strands 1 and 6—which are of special value in informal learning environments. The six strands illustrate how schools and informal environments can pursue complementary goals and serve as a conceptual tool for organizing and assessing science learning. The six interrelated aspects of science learning covered by the strands reflect the field's commitment to participation—in fact, they describe what participants do cognitively, socially, developmentally, and emotionally in these settings. Learners in informal environments:

Strand 1: Experience excitement, interest, and motivation to learn about phenomena in the natural and physical world.

Strand 2: Come to generate, understand, remember, and use concepts, explanations, arguments, models, and facts related to science.

Strand 3: Manipulate, test, explore, predict, question, observe, and make sense of the natural and physical world.

Strand 4: Reflect on science as a way of knowing; on processes, concepts, and institutions of science; and on their own process of learning about phenomena.

Strand 5: Participate in scientific activities and learning practices with others, using scientific language and tools.

Strand 6: Think about themselves as science learners and develop an identity as someone who knows about, uses, and sometimes contributes to science (Bell et al., 2009)".

Background

Teaching-learning processes are designed to facilitate the learners in the process of developing their ideas and conceptions in the area of the study. This is true in general and specifically in science classrooms. When teachers start teaching, it is natural for them to express their ideas and the learners getting influenced by these. While we do not explicitly see any cause of concern in this process, a deep reflection reveals something serious. Especially when we explore the reasons for the development of alternative frameworks and also during the processes designed to address these AFs this concern gets puffed-up. A strategy that can be useful in this regard is an attempt by the teacher to withheld own ideas and conclusions and let the learner's ideas

come up freely. Giving spaces for learner's ideas has the prospect for the exploration of ideas by the learners in more efficate ways. This had been tried in the science classrooms guided by one of the researchers of the team. These had been formally designed using informal environments in science using learning strands described in the introduction part above.

The attempt described above consisted of 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 Withheld Own Ideas and Conclusions Effectively. 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 "Withheld Own Ideas and Conclusions Effectively" in terms of the three identified factors?
2. How do we interpret 'statistical descriptives' related to preservice teacher's natural dispositions towards "Withheld Own Ideas and Conclusions Effectively" in terms of the three identified factors?
3. What are the differences (if any) in preservice teacher's natural dispositions towards "Withheld Own Ideas and Conclusions Effectively" 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 "Withheld Own Ideas and Conclusions Effectively" in terms of the three identified factors.
2. To interpret the 'statistical descriptives' related to preservice teacher's natural dispositions towards "Withheld Own Ideas and Conclusions Effectively" in terms of the three identified factors.

3. To locate the differences (if any) in preservice teacher's natural dispositions towards "Withheld Own Ideas and Conclusions Effectively" in terms of the three identified factors.

Methodology, sample and tools:

Methodology:

On the basis of reflecting on various issues and challenges in the area of science education augmented by assessment of related literature, a wide-ranging tool was developed. The purpose was 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 from IBM for exploring the data thus collected.

Sample

38 Pre-Service Science teachers from two B.Ed. colleges of University of Delhi and GGSIP University, Delhi were selected as purposive sample. These were participating in the 18 schools as interns. These participant Pre-Service teachers had their School Life Experience Program being conducted with guidance in lesson and unit planning by one the researchers form the team. 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 30 pre-service science teachers were received and analyzed in this study. Amongst the sample 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. Although no deliberate attempt was made for the sample to be homogeneous or representative, it got addressed in the process to some extent. 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%

Management				
		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%

School Type				
		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%

Tools for data collection

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. 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. One item from this questionnaire needed a

response on "Withheld Own Ideas and Conclusions Effectively" for self-appraisal. This has been examined here.
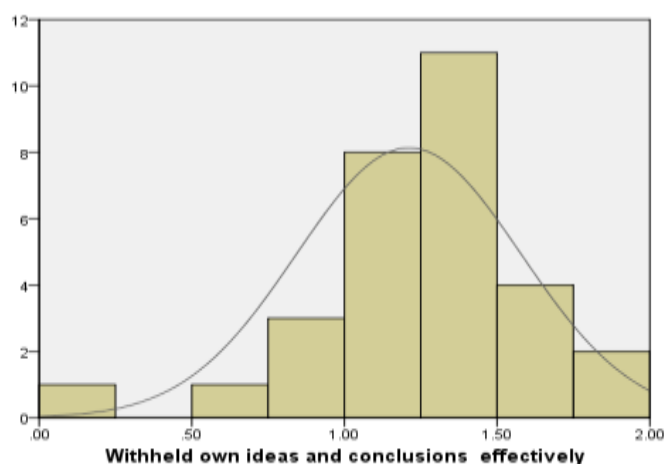
Analysis of Data

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. These responses in the form of marks of zero, one and two were provided as the feedback to the science teachers from the analysis. Thus, the average score of one specific teacher was obtained. The average scores of the 30 responding pre-service teachers were analyzed using IBM-SPSS. Graphs and descriptives from this data are being given in "findings" part of the study that follows.
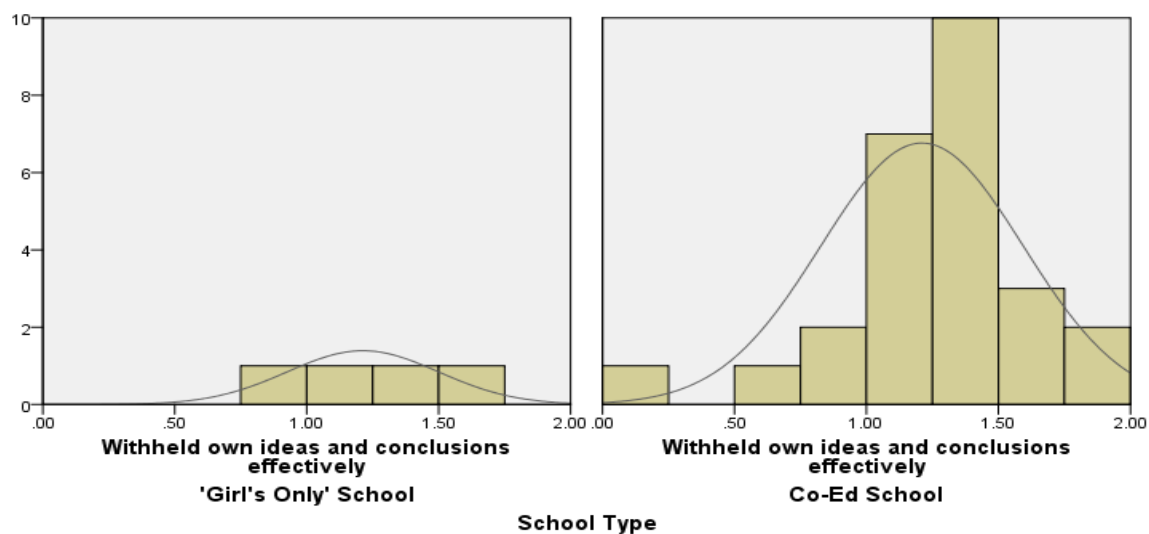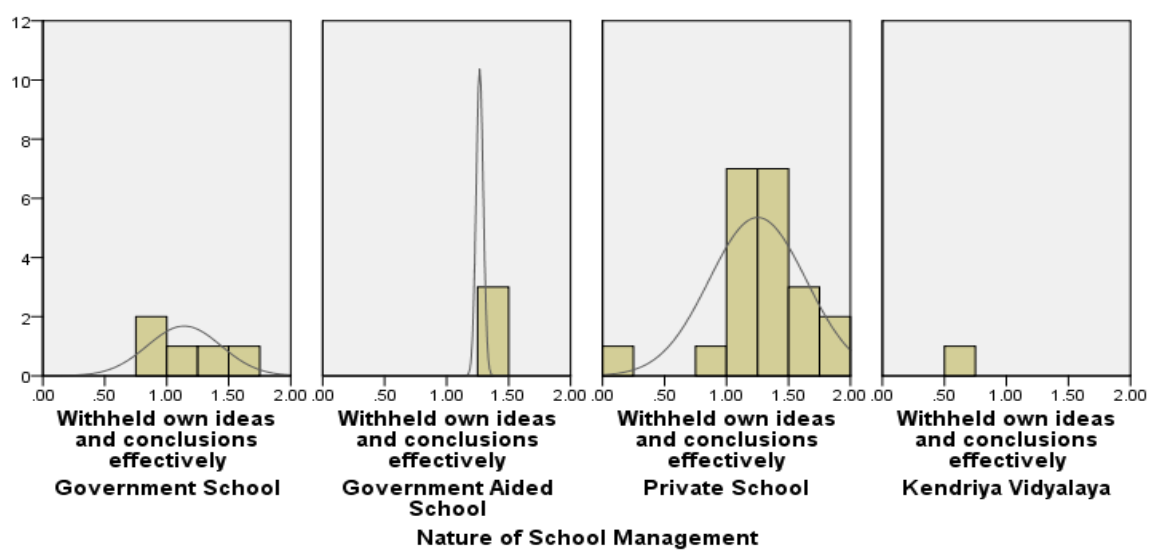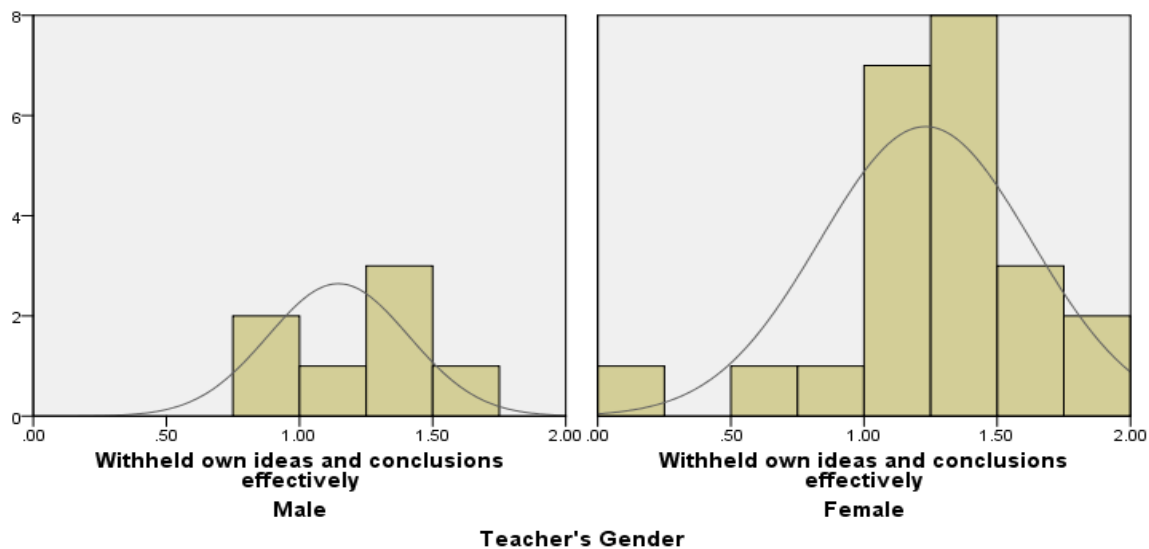
Findings

Table 1 shows the average scores of several teachers on the feedback schedule related to the Component "Withheld Own Ideas and Conclusions Effectively" 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: Withheld Own Ideas and Conclusions Effectively

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Withheld own ideas and conclusions effectively * Teacher's Gender	30	100.0%	0	0.0%	30	100.0%
Withheld own ideas and conclusions effectively * Nature of School Management	30	100.0%	0	0.0%	30	100.0%
Withheld own ideas and conclusions effectively * School Type	30	100.0%	0	0.0%	30	100.0%

Withheld own ideas and conclusions effectively * Teacher's Gender

Report

Withheld own ideas and conclusions effectively

Teacher's Gender	Mean	Median	Minimum	Maximum	Range	Std. Deviation	Skewness	Kurtosis
Male	1.1455	1.2500	.80	1.50	.70	.26399	-.197	-1.586
Female	1.2304	1.2500	.10	1.95	1.85	.39679	-.784	2.298
Total	1.2106	1.2500	.10	1.95	1.85	.36769	-.651	2.170

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Withheld own ideas and conclusions effectively * Teacher's Gender	Between Groups	(Combined)	.039	1	.039	.280	.601
	Within Groups		3.882	28	.139		
	Total		3.921	29			

Measures of Association

	Eta	Eta Squared
Withheld own ideas and conclusions effectively * Teacher's Gender	.099	.010

Withheld own ideas and conclusions effectively * Nature of School Management

Report

Withheld own ideas and conclusions effectively

Nature of School Management	Mean	Median	Minimum	Maximum	Range	Std. Deviation	Skewness	Kurtosis
Government School	1.1400	1.0500	.85	1.60	.75	.29665	1.064	.614
Government Aided School	1.2667	1.2500	1.25	1.30	.05	.02887	1.732	.
Private School	1.2509	1.3000	.10	1.95	1.85	.39129	-.877	3.004
Kendriya Vidyalaya	.5500	.5500	.55	.55	.00	.	.	.

Total	1.2106	1.2500	.10	1.95	1.85	.36769	-.651	2.170

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Withheld own ideas and conclusions effectively * Nature of School Management	Between Groups	(Combined)	.505	3	.168	1.281	.302
	Within Groups		3.416	26	.131		
	Total		3.921	29			

Measures of Association

	Eta	Eta Squared
Withheld own ideas and conclusions effectively * Nature of School Management	.359	.129

Withheld own ideas and conclusions effectively * School Type

Report

Withheld own ideas and conclusions effectively

School Type	Mean	Median	Minimum	Maximum	Range	Std. Deviation	Skewness	Kurtosis
'Girl's Only' School	1.2125	1.1500	.95	1.60	.65	.28687	1.013	.280
Co-Ed School	1.2103	1.2500	.10	1.95	1.85	.38334	-.700	2.124

Total	1.2106	1.2500	.10	1.95	1.85	.36769	-.651	2.170

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Withheld own ideas and conclusions effectively * School Type	Between Groups	(Combined)	.000	1	.000	.000	.991
	Within Groups		3.921	28	.140		
	Total		3.921	29			

Measures of Association

	Eta	Eta Squared
Withheld own ideas and conclusions effectively * School Type	.002	.000

Analysis and Interpretation:

1) The Mean is 1.2106 which means on an average most teachers agree on Withheld Own Ideas and Conclusions Effectively. The Median is 1.25 which means fifty percent of the cases lie above and below it. The Range for Total teachers taken together is 1.85 for which minimum value is 0.1 and maximum value is 1.95. 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 Withheld Own Ideas and Conclusions Effectively. Standard deviation is 0.36769. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.84 and 1.57. This means, on an average most of the teachers agree on Withheld Own Ideas and Conclusions Effectively and some strongly agree with it. Skewness is -0.651. which means that the data is moderately negatively skewed. i.e., the number of low scorers is greater than the high scorers on the question of Withheld Own Ideas and Conclusions Effectively. This is evident in the graphical representation of the data as well. Kurtosis is 2.17 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(a) The Mean is 1.1455 which means on an average most teachers agree on Withheld Own Ideas and Conclusions Effectively. The Median is 1.25 which means fifty percent of the cases lie above and below it. The Range for Male teachers taken together is 0.7 for which minimum value is 0.8 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 Withheld Own Ideas and Conclusions Effectively. Standard deviation is 0.26399. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.88 and 1.40. This means, on an average most of the teachers agree on Withheld Own Ideas and Conclusions Effectively and some strongly agree with it. Skewness is -0.197. 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 Withheld Own Ideas and Conclusions Effectively. This is evident in the graphical representation of the data as well. Kurtosis is -1.586 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 1.2304 which means on an average most teachers agree on Withheld Own Ideas and Conclusions Effectively. The Median is 1.25 which means fifty percent of the cases lie above and below it. The Range for Female teachers taken together is 1.85 for which minimum value is 0.1 and maximum value is 1.95. 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 Withheld Own Ideas and Conclusions Effectively. Standard deviation is 0.39679. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.74 and 1.53. This means, on an average most of the teachers agree on Withheld Own Ideas and Conclusions Effectively and some strongly agree with it. Skewness is -0.784. which means that the data is moderately negatively skewed. i.e., the number of low scorers is greater than the high scorers on the question of Withheld Own Ideas and Conclusions Effectively. This is evident in the graphical representation of the data as well. Kurtosis is 2.298 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(c) We test the null-hypothesis for the relation Withheld Own Ideas and Conclusions Effectively * Teacher's Gender the value of the F-ratio comes out to be 0.28 and the p-value comes out to be 0.601 through ANOVA. The interpretation of the p-value reveals that it is much 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 Withheld Own Ideas and Conclusions Effectively * Teacher's Gender as a conclusion of this interpretation. The value of eta-squared is 0.01 as shown in the table. As we retain the null-hypothesis the strength of association between Withheld Own Ideas and Conclusions Effectively * Teacher's Gender is considered insignificant.

3(a) The Mean is 1.14 which means on an average most teachers agree on Withheld Own Ideas and Conclusions Effectively. The Median is 1.05 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 0.85 and

maximum value is 1.6. 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 Withheld Own Ideas and Conclusions Effectively. Standard deviation is 0.29665. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.84 and 1.43. This means, on an average most of the teachers agree on Withheld Own Ideas and Conclusions Effectively and some strongly agree with it. Skewness is 1.064. 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 Withheld Own Ideas and Conclusions Effectively. This is evident in the graphical representation of the data as well. Kurtosis is 0.614 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 1.2667 which means on an average most teachers agree on Withheld Own Ideas and Conclusions Effectively. The Median is 1.25 which means fifty percent of the cases lie above and below it. The Range for Government Aided School teachers taken together is 0.05 for which minimum value is 1.25 and maximum value is 1.3. 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 Withheld Own Ideas and Conclusions Effectively. Standard deviation is 0.02887. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.97 and 1.55. This means, on an average most of the teachers agree on Withheld Own Ideas and Conclusions Effectively and some strongly agree with it. Skewness is 1.732. 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 Withheld Own Ideas and Conclusions Effectively. 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 1.2509 which means on an average most teachers agree on Withheld Own Ideas and Conclusions Effectively. The Median is 1.3 which means fifty percent of the cases lie above and below it. The Range for Private School teachers taken together is 1.85 for which minimum value is 0.1 and maximum value is 1.95. 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 Withheld Own Ideas and Conclusions Effectively. Standard deviation is 0.39129. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.85 and 1.64. This means, on an average most of the teachers agree on Withheld Own Ideas and Conclusions Effectively and some strongly agree with it. Skewness is -0.877. which means that the data is moderately negatively skewed. i.e., the number of low scorers is greater than the high scorers on the question of Withheld Own Ideas and Conclusions Effectively. This is evident in the graphical representation of the data as well. Kurtosis is 3.004 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(d) The Mean is 0.55 which means on an average most teachers agree on Withheld Own Ideas and Conclusions Effectively. 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 Withheld Own Ideas and Conclusions Effectively. 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 Withheld Own Ideas and Conclusions Effectively * Nature of School Management the value of the F-ratio comes out to be 1.281 and the p-value comes out to be 0.302 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 Withheld Own Ideas and Conclusions Effectively * Nature of School Management as a conclusion of this interpretation. The value of eta-squared is 0.129 as shown in the table. As we retain the null-hypothesis the strength of association between Withheld Own Ideas and Conclusions Effectively * Nature of School Management is considered insignificant.

4(a) The Mean is 1.2125 which means on an average most teachers agree on Withheld Own Ideas and Conclusions Effectively. The Median is 1.15 which means fifty percent of the cases lie above and below it. The Range for 'Girl's Only' School teachers taken together is 0.65 for which minimum value is 0.95 and maximum value is 1.6. 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 Withheld Own Ideas and Conclusions Effectively. Standard deviation is 0.28687. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.92 and 1.49. This means, on an average most of the teachers agree on Withheld Own Ideas and Conclusions Effectively and some strongly agree with it. Skewness is 1.013. 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 Withheld Own Ideas and Conclusions Effectively. This is evident in the graphical representation of the data as well. Kurtosis is 0.28 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 1.2103 which means on an average most teachers agree on Withheld Own Ideas and Conclusions Effectively. The Median is 1.25 which means fifty percent of the cases lie above and below it. The Range for Co-Ed School teachers taken together is 1.85 for which minimum value is 0.1 and maximum value is 1.95. 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 Withheld Own Ideas and Conclusions Effectively. Standard deviation is 0.38334. S.D. when interpreted with the calculated means, it implies that most of the teachers scored between 0.82 and 1.59. This means, on an average most of the teachers agree on Withheld Own Ideas and Conclusions Effectively and some strongly agree with it. Skewness is -0.7. which means that the data is moderately negatively skewed. i.e., the number of low scorers is greater than the high scorers on the question of Withheld Own Ideas and Conclusions Effectively. This is

evident in the graphical representation of the data as well. Kurtosis is 2.124 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(c) We test the null-hypothesis for the relation Withheld Own Ideas and Conclusions Effectively * School Type the value of the F-ratio comes out to be '0' and the p-value comes out to be 0.991 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 as compared to 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 Withheld Own Ideas and Conclusions Effectively * School Type 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 Withheld Own Ideas and Conclusions Effectively * School Type is considered insignificant.

Conclusion:

The study focuses on preservice teacher's natural dispositions towards "Withheld Own Ideas and Conclusions Effectively" 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 "Withheld Own Ideas and Conclusions Effectively" in terms of Teacher's Gender, Nature of School Management and School Type.

References:

- Bell, P., Lewenstein, B., Shouse, A. W., & Feder, M. A. (2009). *Learning Science in Informal Environments: People, Places, and Pursuits*. Washington, D.C.: THE NATIONAL ACADEMIES PRESS.

- Duschl, R. A., Schweingruber, H. A., & Shouse, A. W. (2007). *Taking Science to School: Learning and Teaching Science in Grades K-8*. (R. A. Duschl, H. A. Schweingruber, & A. W. Shouse, Eds.), *Taking Science to School*. Washington, D.C.: THE NATIONAL ACADEMIES PRESS.

- 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. (2013l). 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 Pre-service 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. (2014l). 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).

- 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.