Exploring Teachers' Perspectives on Promoting the Application of Mathematics in Unfamiliar Situations: A Case Study

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Abstract- *Various commissions and policies stressed on the importance of connecting mathematics to unfamiliar situations while teaching. Position paper of mathematics of National Curriculum Framework (2005) suggested two types of goals of teaching mathematics: broader goal and narrow goal. Broader goal of teaching mathematics is mathematisation and narrow goal is numeracy and computation. But the literature suggests that in present day classroom mathematics teaching practices, component of promoting connection with unfamiliar situations is insufficient and infrequent. Rather few studies particularly suggest whether, how and why teachers should connect mathematics to unfamiliar situations. In this paper, the researchers tried to answer the question: what is the perspective of teachers regarding ability of students to apply mathematics in unfamiliar situations? For answering this question, the researchers conducted a survey with 30 secondary mathematics teachers of 10 different Delhi government schools. The survey contains items that indicate about the factors that promote and/or constrain the ability of students to connect mathematics to unfamiliar situations. Survey is followed up by interview of 10 teachers out of 30 to triangulate the results. The results obtained give an insight about the perspective of teachers as well as suggest other important issues for further research. Moreover, the results may be helpful while devising different mathematics teaching strategies according to varying needs of learners.*

Key Words*:* Unfamiliar Situations, Mathematisation, Teaching Strategies

Introduction

Various commissions and policies in India, since independence, have stressed upon connecting mathematics with real life situations while teaching. But unfortunately, after more than 70 years of independence, students and teachers are still struggling with the same. Although many researchers came into light suggesting how the curriculum of mathematics should be, various policies and commissions suggested that mathematics should be contextual and should enable the learner to think and analyze.

According to the National Policy of Education, NPE (1986), "Mathematics should be visualized as a vehicle to train a child to think, reason, analyze and to articulate logically." As per Yashpal Committee (1992), "in 'Learning without Burden' it is clearly indicated that children are never been 'dropped out' from our education system instead being 'pushed out' due to irrelevant curriculum and moreover children are provided with 'boring and uninteresting' pedagogies". Thus, it is clearly indicating towards the curriculum that is not helping a learner to learn something at his/her own pace and style rather offering the same content to every learner without knowing his/her absorption power.

National Curriculum Framework (2005) deliberated on all the issues and proposed strategies and approaches to teach mathematics as well as set objectives and goals of teaching mathematics. It is clearly mentioned that a child constructs his/her knowledge based on his/her own experiences and construction of knowledge is supported by facilitation of teacher. Position paper on Mathematics NCF (2005) stated two types of goals of teaching Mathematics: Broader goal and narrow goal. Broader goal is mathematisation of child's thought process. Narrow goal is numeracy and computation.

Most of the policies and commissions have been extensively elaborating the linkage of child's own experiences that he/she attains from the real life situations with classroom teaching. National Curriculum Framework NCF (2005) stated that knowledge is not such a sacred thing that a person can give to anyone. But knowledge can be created outside the classroom or inside the classroom provided the student is given all the conditions that will help him/her to create the knowledge.

But literature suggests other aspect also, that is, at present classroom practices promoting connection with real life are insufficient and infrequent. Few studies have also suggested whether, how and why should teachers connect mathematics to real life situations.

In this paper, researchers have tried to answer the question, "What is the perspective of teachers regarding ability of learners to apply mathematics in unfamiliar situations?"

Review of Related Literature

Although classroom mathematics has been an interesting area of research from several decades, mathematics learning as well as mathematics teaching are not unique in classroom mathematics. Researches which have been done on mathematics in unfamiliar situations clearly indicate that the way of engagement of a learner is different in classroom mathematics and in unfamiliar situations.

According to Goldman and Booker (2009) in their work 'Making math a definition of situation; Families as sites for mathematical practices', "when the school and the family are both recognized as site for math learning, opportunities to engage with math as a vibrant part of daily life, then learning multiply. If educators have access to the most common forms of content based mathematical practice in families, this could provide a reference for future school and family

partnership." According to them, "families used a combination of everyday practices and school forms, but generally did not recognize mathematics in their daily life."

When they worked with three families and observed the mathematical interaction of family members, they concluded that "at home, parents and children engaged creatively in solving math relevant problems."

Researchers have supported the fact that mathematics learnt by students in informal situations could support classroom mathematics. According to Martin, Gourley and Dalaney (2014), "we believe that when the mathematics of school and that of everyday life are seen as incommensurable, it impoverishes both contexts, separating the symbolic precision and power of school math from the flexibility and creative sense making of everyday life."

(Marta Civil, 2002) in 'Culture and Mathematics: A Community Approach' stated that, "I observed that students who relied on their everyday knowledge and experiences presented solutions to problems that made a lot of sense, yet often these same students were not among the most successful at mathematics as measured by school standards." It led Marta Civil to explore the beliefs and values connected with varying forms of knowledge. In his work, there are two examples: one is 7 years' old second grader who is given a learning module based on construction which is a context similar to student as well as community and in another case there are parents in a dialogic form. Inputs of parents helped in enriching the module as well as the mathematics workshop. In this paper they tried to find the answer, whether everyday mathematics is helpful or hindrance in school mathematics. They stated in their paper, "Our goal is not so much to capitalize on these community practices (e.g. sewing, construction etc.). We agree with Knijnik (1993) when she writes that merely glorifying popular knowledge does not contribute to the process of social change." Marta Civil (2002) and Benn (1997) both suggested finding a route with the help of children's knowledge and belief in their academic journey. As it is clear from their findings that both the forms of mathematics, that is, out of school as well as school mathematics can be brought closer and it will help those students specially who are left behind in their academic journey. This fact is also supported by Nunes, Schilemann and Carraher (1993) in which they concluded that adult construction workers as well as fishermen who had never been to school solved proportional reasoning problems as well as compared to students studying in school and had studied proportion. Likewise, Nasir (2000) also documented that high school basketball players proficiently solved problems related to basketball when they were allowed to use informal strategies.

As we have seen that most of researches are indicating that it makes easy for students to solve mathematical problems if these are contextual. Thus, this research paper is trying to know how teachers conceptualize this phenomenon. As one of the researchers is a mathematics teacher and has been teaching for more than one decade, she wants to study the perspective of teachers regarding ability of learners to apply mathematics in unfamiliar situations?

Title

Mathematics in Unfamiliar Situations- A Case Study

Research Questions

- What is the perspective of teachers regarding the ability of learners to apply mathematicsin unfamiliar situations?
- What are the factors that support learners to apply mathematics to unfamiliar situations?
- What are the factors that constraint learners to apply mathematics to unfamiliar situations?

Significance of the Study

Position Paper of Mathematics of NCF (2005) considered the following points as a matter of concern:

- In most of the students, fear of mathematics and a sense of failure about mathematics.
- Lack of preparation or assistance for teachers in mathematics teaching.
- Curriculum of mathematics which is forcing students to memorize the formulae of mathematics.

All these issues are great matter of concern. A student is regarded as a genius irrespective of his/her abilities to apply mathematics in unfamiliar situations. According to (Gainsburg, 2008), "Teachers' practices are shaped by their beliefs, knowledge, and goals (Borko and Putnam, 1996; Ernest, 1989; Schenfeld, 1998), as well as by cultural elements, such as school, district and state policies and structures: and parental, student and collegial expectations (Wrnest, 1989; Greer, 1997; Thompson, 1992). To be effective, professional development efforts must understand and address all these areas (Schoenfeld, 1998)." Thus the main idea of this study is to explore the perspective of teachers regarding ability of learners to apply school mathematics in unfamiliar situations. For this study researcher surveyed 30 secondary mathematics teachers and to triangulate the results, survey is followed up by interview of 10 teachers.

Objectives of the Study

1. To study the perspective of teachers regarding ability of learners to apply mathematics in unfamiliar situations.
2. To study the factors that promote the ability of learners to apply mathematics in unfamiliar situations.
3. To study the factors that constraint the ability of learners to apply mathematics in unfamiliar situations.

Delimitations of the Study

In this study only 30 secondary mathematics teachers of 10 different schools are taken. This study accesses few dimensions which are related to teaching learning process of mathematics

teachers. It includes discussion on content, pedagogy and factors those affect the ability of learners to apply mathematics in unfamiliar situations.

Research Methodology

The research methodology is a mixed method (quantitative as well as qualitative). To reach on the result basically survey as well as interview technique is used. Analysis of survey sheets and interview schedule has been done with the help of content analysis; percentage analysis as well as thematic analysis.

Population

The population of the study is the set of Trained Graduate Teachers (Mathematics) of schools run by Government of Delhi.

Sample

The sample is selected by purposive sampling technique. 10 different schools from all the Government schools of Delhi were selected. 30 Trained Graduate Teachers were selected for survey and amongst those 10 were selected for the interview.

Tools

Sr. No.	Objective	Tool used
1	To study the perspective of teachers regarding ability of learners to apply mathematics in unfamiliar situations.	Survey schedule Interview Schedule
2	To study the factors that promote the ability of learners to apply mathematics in unfamiliar situations.	Survey Schedule Interview Schedule
3	To study the factors that constraint the ability of learners to apply mathematics in unfamiliar situations.	Survey Schedule Interview Schedule

Procedure

To study the perspective of teachers regarding ability of learners to apply mathematics in unfamiliar situations, the researcher gave survey schedule to 50 teachers and out of those, 30 teachers filled that survey schedule. After survey schedule, researcher approached 15 teachers out of those 30 teachers for interview but due to various constraints, only 10 of them could be interviewed. For taking the interview, prior appointment was taken from them.

Operational Definition

Unfamiliar situations: Problems involving application of mathematical knowledge and skills in real life situations.

Research Design

Scale Construction

A Likert scale on teachers' perspective regarding application of mathematics in unfamiliar situations was developed by the researchers themselves and this scale was used to collect data on

the teaching perspective of teachers. A survey schedule was presented before 50 teachers and out of those, 30 teachers filled that survey schedule. The survey schedule had a total of 28 statements out of which 15 were negative statements and 13 were positive statements. Each statement had five options for responses, Strongly Disagree, Disagree, Can't Say, Agree and Strongly Agree with a score of 1, 2, 3, 4 and 5 in the same order for positive statements and in reverse order for negative statements. An individual's score is the mean of his/her score in all the 28 items.

Item Analysis

The next step was to find out the t-values of each statement of survey schedule which is a basic requirement for item selection. The individual score of each of the 30 respondents was found out and that was sorted in an ascending order. Then 27 percent, that is, 8 subjects with lowest score and 27 percent, that is, 8 subjects with highest score were chosen for the purpose of item selection. Thus, the high and the low score groups were selected that formed the criterion groups and each group had 8 teachers. The individual score of teachers in two groups for each statement was used for calculating the t-value of that statement and a separate worksheet was formed for each statement. The t-value gives a measure of the extent to which a given statement differentiates between the high and the low groups. As many as 24 statements were selected for further analysis based on t-values that significantly differentiated between the high and the low groups with confidence limit from 70 to 95 percent or the level of significance from 0.05 to 0.3. MS-Excel has been used in which t-values for two samples with unequal variances has been used. Different critical values and different degrees of freedoms have been obtained corresponding to different questions and finally 24 items differentiated significantly between mean scores of high and low groups of 8 teachers each. All of these items had absolute critical t-values greater than 1.06. The items in the survey schedule were randomly ordered so that positive and negative statements are distributed throughout the schedule.

Table 1: Rank order of the items in Survey Schedule based on their t-values

Rank Order	Nature of Statement	t-value modulus	Original Sr. No.	Final Sr. No.
1	Negative	10.8012	11	9
2	Negative	7.33253	8	8
3	Negative	5.82435	14	12
4	Negative	5.16671	16	14
5	Negative	5.00000	1	1
6	Negative	4.95318	19	16
7	Negative	4.95318	26	23
8	Negative	4.70989	13	11
9	Negative	3.99418	4	4
10	Negative	3.78892	24	21
11	Negative	3.76123	22	19
12	Negative	3.55242	21	18
13	Positive	3.03488	5	5

14	Positive	2.23607	23	20
15	Positive	2.00000	2	2
16	Positive	1.71679	12	10
17	Positive	1.65503	3	3
18	Negative	1.57181	28	24
19	Positive	1.52753	15	13
20	Positive	1.48758	20	17
21	Negative	1.35724	17	15
22	Positive	1.32288	25	22
23	Negative	1.22963	7	7
24	Positive	1.12815	6	6
25	Positive	0.50918	9	Rejected
26	Positive	0.50918	10	Rejected
27	Positive	0.26591	27	Rejected
28	Positive	0.00000	18	Rejected

Reliability and Validity of the Scale

Validity means truthfulness. The scale developed to test perception has face validity. The scale was discussed with the experts in the field of Education for ascertaining the face validity. The experts agreed for the relevance and usability of the scale developed for collection of data.

Reliability is linked to the accuracy of measurement in a test. The coefficient of internal consistency has been calculated by split half method based on even and odd numbered item criterion. Coefficient of correlation was $r_{h,h}$= 0.87 and Spearman Brown coefficient of reliability was found to be $r_{SB} = 2r_{h,h} / (1 + r_{h,h}) = 0.93$. The coefficient of intrinsic validity was found by taking the square root of the coefficient of reliability and it was found to be 0.97. Thus the scale is highly reliable and valid.

Analysis and Interpretation

Analysis Procedures

The teachers were given survey schedule and the response rate was 60 percent, that is, 30 out of 50. The data collected was analyzed using MS Excel program. It was used in the following manner:

1. Descriptive statistics mean and standard deviations were used to examine the perception of teachers about application of mathematics to unfamiliar situations.
2. Parametric tests such as two samples t-test for unequal variances in excel also known as independent sample t-test, one way ANOVA known by single factor ANOVA in MS Excel were administered to know the significant difference between and within groups.
3. Coefficient of correlation and Spearman Brown validity coefficients were computed to find validity of the data.

Demographic Variables

A total of 50 teachers were selected initially from which 30 responded with a response rate of 60 percent. Out of those who responded, 27 percent (8) had undergraduate (UG) qualification and 73 percent (22) had postgraduate (PG) qualification.

Table 2: Summary of Demographic Variables

Variables		**N**	**Percentage**
Educational Qualification	UG	8	27 %
	PG	22	73 %
Gender	Male	14	47 %
	Female	16	53 %
Teaching Experience	Less than 10 years	9	30 %
	10 or more years but less than 20 years	8	27 %
	20 or more years	13	43 %
	Total	30	

As regards the gender, 47 percent (14) participants were male and 53 percent (16) were female. In terms of teaching experience, 30 percent (9) had a total teaching experience of less than 10 years, 27 percent (8) had a teaching experience of 10 or more years but less than 20 years and 43 percent (13) participants had an experience of 20 or more years. The 'n' values in the Table 2 indicate the number of individuals who responded the survey schedule in corresponding category of demographic variables.

Study of teachers' perception

Objective 1: To study the perspective of teachers regarding ability of learners to apply mathematics in unfamiliar situations.

To study the perspective of teachers regarding ability of learners to apply mathematics in unfamiliar situations, 30 teachers were asked to indicate their degree of agreement in each of the statements in the survey schedule regarding their perception about ability of learners to apply mathematics in unfamiliar situations. Their responses were scored as Strongly Disagree, Disagree, Can't Say, Agree and Strongly Agree with a score of 1, 2, 3, 4 and 5 in the same order for positive statements and in reverse order for negative statements. An individual's score is the mean of his/her score in all the 24 items selected after item analysis. Remaining 4 items were ignored. Score of all 30 teachers were computed in this manner. The mean and standard deviation (SD) have been calculated with respect to each of the demographic variables such as educational qualification (PG and UG), gender (Male and Female) and teaching experience (Less than 10 years, 10 or more years but less than 20 years and 20 or more years) in the survey schedule as in the Table 3. Analysis and interpretation have been done on the basis of highest mean order obtained according to each variable in each level.

Table 3: Perception according to educational qualification, gender and teaching experience

Variables		N	Percentage	Perception Score	
Educational Qualification	UG	8	27 %	3.77	0.77
	PG	22	73 %	3.75	0.59
Gender	Male	14	47 %	3.65	0.77
	Female	16	53 %	3.84	0.43
Teaching Experience	Less than 10 years	9	30 %	3.92	0.50
	10 or more years but less than 20 years	8	27 %	4.00	0.45
	20 or more years	13	43 %	3.52	0.68
	Total	30		**3.75**	**0.61**

Table 3 shows that all the teachers have perception favoring (mean = 3.75, SD = 0.61) towards the application of mathematics by students to unfamiliar situations.

In terms of educational qualification, UG teachers have a little bit more favorable perception (mean = 3.77) than PG teachers (mean 3.75) but with more uncertainty in terms of a considerably more SD for UG teachers (SD = 0.77) than PG teachers (SD = 0.59).

As regards the gender, Female teachers were found having more favorable perception (mean = 3.84) than male participants (mean = 3.65) and further there was less spread in scores of female (SD = 0.43) than in scores of male teachers (SD = 0.77). In terms of teaching experience, it can be observed from the Table 3 that teachers within 20 years of service have much more favorable stand (mean = 3.92 and mean = 4.00) towards applying mathematics to unfamiliar situations than teachers having completed 20 or more years of service (mean = 3.52). Teachers having completed 20 or more years of service have more spread around mean (SD = 0.68) than the remaining teachers (SD = 0.50 and SD = 0.45).

t-Test: Two-Sample Assuming Unequal Variances		
	Male	Female
Mean	3.651786	3.841146
Variance	0.58857	0.186856
Observations	14	16
Hypothesized Mean Difference	0	
df	20	
t Stat	-0.817	
P(T<=t) one-tail	0.211776	
t Critical one-tail	1.724718	
P(T<=t) two-tail	0.423553	
t Critical two-tail	2.085963	

From above tables it is clear that P-value for ANOVA test done to check significance of perception difference on the basis of teaching experience is 0.13. So there is 1-0.13 = .87 or 87 percent probability that teaching experience does impact on the average perception score of teachers and different span of service leads to different perception. So, inferences drawn on the basis of teaching experience are significant with 87 percent confidence level.

From the table on comparison of difference on perception between male and female, since P(T<=t) two-tail is 0.423553, so inferences drawn on the basis of gender are significant with 0.58 or 58 percent probability. But the table showing the difference of perception among teachers on the basis of qualification shows that inferences drawn on the basis of qualification are significant only with 1 - .93 = .07 or 7 percent probability. So it can be said that the qualification almost doesn't impact on the perception of teachers about application of mathematics by students on unfamiliar situations and differences in mean score were only because of sample fluctuations.

Objective 2: To study the factors that promote the ability of learners to apply mathematics in unfamiliar situations.

Some of the questions in survey schedule gave insight about the factors that promote the ability of learners to apply mathematics in unfamiliar situations. Following table gives average and standard deviation of the score obtained by 30 teachers in the indicated items that give insight about the factors that promote the ability of learners to apply mathematics in unfamiliar situations.

Table4: Factors that promote ability of learners to apply mathematics in unfamiliar situations

Item Sr. No. in Revised Survey Schedule with 25 items	Mean	SD
3	4.166667	0.461133
5	4.4	0.674665
6	4.433333	0.504007
10	4.1	0.607425
15	2.966667	1.098065
16	4	0.909718
17	4.233333	0.935261
22	3.8	1.095445

It may be seen from the Table 4 that the teachers had an agreement over almost every item (except item at Sr. No. 15, mean = 2.966667) with mean around 4. So the factors that promote the ability of learners to apply mathematics in unfamiliar situations can be listed as follows:

Item 3: Encouragement of students for writing their experiences in the form of reflective journal

Item 5: Teachers should provide the students with situations that help them to connect mathematical concepts with real life problems.

Item 6: Relevant and contextual examples should be posed to the learners to increase their understanding about the subject.

Item 10: Orientation given in in-service trainings regarding connecting mathematical concepts with real life situations is useful.

Item 15: Trend was towards reluctance of teachers for agreement or disagreement about the statement, "The questions given in NCERT books give ample opportunity to learners to connect mathematics with their daily life situations". (Mean = 2.966667)

Item 16: Use of sources other than the text books (reference books, worksheets, online material etc.) should be made while teaching, to increase the connection of mathematics with unfamiliar situations.

Item 17: Peer learning in the class should be promoted to achieve the desired objective.

Item 22: In mathematics classes, learner should be engaged in formulating problems from their real life.

But there was considerably more variation in the responses owing to large standard deviation values.

Objective 3: To study the factors that constraint the ability of learners to apply mathematics in unfamiliar situations.

Some of the questions in survey schedule gave insight about the factors that constraint the ability of learners to apply mathematics in unfamiliar situations. Following table gives average and standard deviation of the score obtained by 30 teachers in the indicated items that give insight about the factors that constraint the ability of learners to apply mathematics in unfamiliar situations.

Table 5: Factors that constraint ability of learners to apply mathematics in unfamiliar situations

Item Sr. No. in Revised Survey Schedule with 25 items	Mean	SD
9	3.4	1.132589
11	3.133333	0.980265
12	3.033333	1.188547

On all the items listed in Table 5, there was a favorable stand by the teachers. So the factors that constraint the ability of learners to apply mathematics in unfamiliar situations can be listed as follows:

Item 9: More time devoted in solving the questions only will not help in connecting the concept with real life situations.

Item 11: More preference to solving exercises in the text books for getting the learners score better in examinations over real life problems solving will not be proved to be worthy for increasing the ability of students to apply mathematics in unfamiliar situations.

Item 12: More focus on procedural knowledge only over real life problems solving will not be proved to be beneficial for increasing the ability of students to apply mathematics in unfamiliar situations.

But again there was a large spread in the responses of teachers due to high value of standard deviations compared to means.

Analysis and Interpretation of Interview Schedule
10 respondents out of 30 were interviewed. Among them, 5 were male and 5 were female.

Item 1: Is it feasible to connect every mathematical concept to unfamiliar situations? Justify your answer.
Analysis: Out of 10 respondents, 8 were in favor of the statement. According to them, it is possible to connect but with some conditions, like

1. It is possible only up to higher level.
2. Teachers have to learn first.
3. Contextualization of the concept is necessary.
4. Only after knowing the level of the students.

Two respondents who were not in the favor of the statements said that it is not possible to connect as every concept may not be connected to students' life.

Interpretation: We can see that respondents have perception that every mathematical concept cannot be connected with unfamiliar situations, only some can be. As such we always say that mathematics is everywhere. But while teaching, it is not evident by the perception of respondents. It is also true that connection needs contextualization of the concepts. Context can be work context, shopping, games, and household activities and so on. Inclusive mathematics education has been one of the important goals of mathematics documented by various policies and commissions in India and further strongly suggested by National Curriculum framework (NCF, 2005). One of the important aspects of inclusive mathematics education is to make a connection between out of school mathematics and classroom mathematics. Responses of respondents have also indicated towards this connection. They had a strong notion that classroom mathematics can be connected to real life situations by connecting them to the contexts.

Item 2: How do you try to connect mathematical concepts to unfamiliar situations while teaching?

Analysis: In response of third question, respondents described their practices that they adopted while teaching. These are as follows:

1. Teaching strategies like learning by doing. It includes project works, field trips and experiential learning.
2. Starting teaching with learners' own experiences and then coming to formal topics, that is, moving from known to unknown.
3. By contextualizing the concepts. In his support, one teacher gave an example, "If I am teaching measurement and I know that most of the students are coming from families where they see their mother or father stitching the clothes, then first I will start discussing the units and measurement instruments that they have seen, then I will move towards the standardized and non-standardized units".
4. By giving them examples that would force them to think and correlate the concepts-like before teaching the probability, one respondent said, "I will use this example that, Students: tomorrow I will come to your house 110 percent".

Interpretation: It is seen in almost all the responses that respondents try to connect the mathematical concepts with those situations which they know from their own ideas and experiences.

"Mathematics teachers generally rely on the textbooks for their teaching" (Schmidt et. al., 1997; Tyson, 1997). As no respondent has mentioned textbook as a resource of ideas, so it is indicated that either text books have no such contextual problems or respondents use them without connecting with real life situations.

Secondly, no respondent has mentioned in-service training or any other online resource that they think are useful.

Thus the factors that promote the connection of mathematical concepts with unfamiliar situations are contextualization of concepts, learner-centered pedagogies and socio constructivism approach etc.

Item 3: Are the strategies like questioning, reflective journal, exploration, elaborative technique, inductive reasoning etc. useful in making mathematical concepts more realistic?

Analysis:
All the respondents answered in favor of these strategies. All agreed that these strategies could make mathematical concepts more relevant and meaningful, but these should be used as per the need of the learners.

Interpretation: All the answers indicated that respondents are familiar of different teaching learning strategies and in favor of using these strategies while teaching as that will reduce the gap between mathematics out of classroom and classroom mathematics. "The relationship between real world experiences, learning abstracts and formal mathematics concepts is complex" (Bransford et. al. 1999). Besides this, it is evident that (Cognition and Technology group at

Vanderbilt, 1990; Greeno and MMAP, 1997) "Everyday experiences provide a strong foundation for learning mathematical ideas".

In this study also, respondents find mathematical concepts can be related to unfamiliar situations to a large extent by using some strategies that could make the content more relevant and meaningful to learners.

Item 4: What are the factors that create hindrance in application of mathematics in unfamiliar situations?

The factors that were enlisted by the respondents are as follows:

1. Preconceived notions regarding the ability of learners.
2. Huge syllabus.
3. Time Constraint.
4. Need based in-service trainings.
5. Lack of knowledge regarding new researches which help in giving new insights.
6. Learners are very comfortable with procedural knowledge as it requires just drill and practice.
7. Lack of knowledge of learners' level.
8. Rigidness to use new teaching learning methods.
9. Lack of pedagogical content knowledge.
10. Marks oriented assessment which is persuading learners to memorize only.

Interpretation: All the factors that were enlisted by the respondents have indicated that teachers avoid making connections because there is a need of planning and time. 8 out of 10 respondents indicated that connection building needs more time and resources. 5 out of 10 respondents also indicated towards huge and irrelevant syllabus. 4 out of 10 respondents said that teaching mathematics without making connection was 'boring' and 'dull', on the other hand 8 respondents were saying that they need more time and resources.

Majority of respondents laid stress on the faulty assessment process which is only giving importance to marks. NCF (2005) has also advocated for reforms in assessment of mathematics education.

6 out of 10 respondents told that learners were comfortable in learning procedural knowledge as they are given training of procedures from their childhood in the name of mathematics whereas some have indicated towards the lack of knowledge regarding new resources; it means proper in-service teacher trainings are required.

Item 5: Do you find any correlation between the scores obtained by learners in mathematics examination and ability to correlate mathematical concepts with unfamiliar situations?

Analysis and Interpretation: All 10 respondents said, "no" in response to this question. But 6 out of 10 respondents indicated towards the different problem solving strategies of high scorers and low scorers. It is in line with the results obtained by Nunes, Schilemann and Carraher (1993) in which they stated that "there is a contrast between the problem solving strategies adopted by the participants trained and untrained in mathematics."

Conclusion

Resnick (1987) emphasized that "knowledge gaps appear because of lack of connection between informal, intuitive knowledge and formal school knowledge". It is clear from results of the study that mathematics teaching learning becomes joyful and meaningful if teaching involves familiar context. It makes easy for learners to transit from familiar context to unfamiliar context. This study is also indicating toward teaching from informal knowledge of learners to formal knowledge. There is a great need to meet equity demands for all learners of mathematics right from the early stages as NCF (2005) has also advocated for the quality education of every learner.

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