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A Study of Learning Environment in Mathematics Classroom at the Primary Level

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Abstract

The Right of Children to Free and Compulsory Education Act is in force since April, 2010. It has generated a series of huge challenges on one hand and provided enormous opportunities for the country on the other. As states think about how to admit children currently out of school into the age-appropriate grade, it is imperative to think about how to help the thousands of children who are already in school achieve the levels of learning appropriate to their grade. The time is right to think about what our schools can do to ensure not just schooling, but guaranteed learning to every child. This is the Right to Education 2009 (RTE) Act, in its true spirit. Parents all over the country are pinning their hopes on education as the cornerstone to a better life for their children. However, this sort of rethinking requires a realistic assessment of the state of affairs and going beyond an evaluation of the inputs that are provided to our children in schools in terms of classrooms, teachers, teaching-learning process and learning environment. There is a need to study the ways in which these inputs are organised and used by schools vis-a-vis what has been suggested in National Curriculum Framework-2005.

Introduction

Mathematics is an essential component of school learning and a basic building block without which desired schooling outcomes, however defined, cannot be achieved. Despite massive investment in primary education, many children lack even basic abilities in arithmetic. The Annual Status of Education Report (ASER), presented annually since 2005 shows that in 2010, only

36 per cent of Class V children in rural India could divide a three-digit number by one digit. Nationally, this situation has hardly changed over the six-year period for which ASER data is available.

Other data on learning achievements, such as that produced by the Education Initiatives and the Government of India's own assessments, use different

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methodologies and indicators, also shows that learning outcomes at the primary stage are far from satisfactory.

The present study titled, 'Study of Learning Environment in Mathematics Classroom at the Primary Level', was undertaken with the aim of studying the learning environment being provided in the Municipal Corporation of Delhi (MCD) primary schools of North West district of Delhi.

Conducting an in-depth study of learning environment in all the five subjects (Mathematics, Hindi, Science, English and Social Science) taught in Class IV, was not feasible. So, for this purpose one subject, i.e. Mathematics was selected.

Operational Definition

Learning Environment: The term 'learning environment' in a mathematics classroom involves physical and social environment of the class, teaching- learning material available in the class, participation and engagement of children, a feel of success and contextual learning being offered to children, different approaches of teaching and evaluation being used without giving a feeling of fear in children and arousing their interest in mathematics by transacting child-centred and joyful learning. Opportunities are given for pupil-pupil and pupil-teacher interaction in the class.

Objective of the Study

To study a learning environment provided in the mathematics classroom in the primary school.

Delimitations of the Study

- Sample comprised students of Class IV in MCD Primary Schools of North West District of Delhi.
- Selection of school sample was based on random sampling technique.
- Tools used in the study were validated using content validity by the experts of the field.
- Classroom selected for conducting Classroom Observation Schedule was observed three times.
- Learning environment was studied in mathematics classroom only.
- Gender and socio-economic backgrounds were not treated as significant variables in the present study.

Research Design

Research Method: Descriptive Survey method was used for studying learning environment being provided to children in mathematics classroom in MC Primary Schools of North West District of Delhi. It involves collection of both types of data i.e., quantitative as well as qualitative.

Sampling

Population: Children studying in Class IV in MCD Primary Schools in Delhi comprised the population of the study.

Sample: North West district of Delhi comes under the jurisdiction of DIET, Pitampura, so the sample was selected from the schools of North West district of Delhi.

Procedure Adopted for the Selection of the Sample

- Ten schools were selected randomly from the MCD primary schools of North West District of Delhi.
- In most of these sample schools, there were two sections of Class IV, so, both the sections were selected for carrying out the study. Three children were selected randomly from each classroom.
- For classroom observation, five schools were selected randomly from the ten sample schools already selected.

Tools Used in the Study

Keeping in view the objective of the study, two tools developed by the researcher were used for the present study.

1. *Learning Environment Scale (LES)*: To take views of the children about the learning environment being provided to them in mathematics classroom.
2. *Classroom Observation Schedule (COS)*: To observe the learning environment being provided in mathematics classroom in actual situations.

Description and Development of Tools

The first draft of both the tools was developed. Two days workshop was organised and a team of eminent professors of the field were invited for the content validity of the tools. Each

tool was discussed item-wise. Valuable suggestions given by the experts were incorporated and tools were finalised.

(A) Learning Environment Scale (LES)

LES was developed in Hindi language as it was to be administered on children, studying in Class IV in MCD primary school. LES was developed by taking the following parameters of mathematics classroom into consideration:

- Physical environment including sitting arrangement of the students, visibility of the blackboard work, TLM available and charts displayed in the class.
- Social environment including freedom to students for questioning regarding concepts not understood, teachers' response, teacher listening to learners' experiences and uses them while teaching, Learners are praised on correct responses and teachers' reaction if students give incorrect response.
- Activities carried out in the classroom, Teaching Learning Material (TLM) used/available in the classroom, opportunities provided for learning by doing, applying mathematical knowledge in day-to-day life and use of TLM, even in absence of teacher.
- Transactional methodology including method of teaching, engaging learners and providing opportunities for pupil-pupil and pupil-teacher interaction.

- Identification and remediation of learning difficulties in mathematics and continuous and comprehensive evaluation.
- Enrichment/Project work including mathematical concepts are enriched through project work and homework.

There were thirty items in all. Three options were given to the learners for each item. The three options were: no, sometimes and yes. Three items in the tool had negative statements. Maximum and minimum score one could get in this tool are eighty four and thirty six. The score range and the category of learning environment in mathematics classroom were classified as follows:

- 36-52 Traditional teacher-centred classroom environment
- 53-68 Transforming learning environment
- 69-84 Child-friendly learning environment

(i) Traditional teacher-centred classroom environment

Traditional teacher-centred classroom environment in mathematics are dominated by:

- An objective view of the mathematical knowledge.
- Interests that view the curriculum as a product to be delivered.
- The methods of teaching are limited to blackboard writing, reading from the book and teachers' talk in the classroom.

- Children's role of passive listeners in the class.
- Children's difficulties are neither identified nor remedied through Continuous and Comprehensive Evaluation.

(ii) Child-friendly learning environment

Child-friendly learning environment as emphasised by *NCF-2005* is one in which:

- Children learn by doing activities with concrete objects and exploring something on their own using teaching-learning material.
- All the children of the class participate in learning.
- Children discuss their experiences with teachers as well as with peers.
- Children ask their doubts or difficulties to teachers without any fear and hesitation.
- Children make mathematics relevant to their world outside the school.
- Children work joyfully and fearlessly in small groups or individually.
- Teacher engages every child of the class in learning.
- Children learn mathematical operations contextually.
- Teachers offer a sense of success to every child of the class through Continuous and Comprehensive Evaluation.

(iii) Transforming Learning Environment

The transforming learning environment is one which involves

the partial coexistence of both types of learning environment, i.e. the learning environment of the classroom is teachers dominated but the teaching methods are not limited to blackboard writing, reading from the book or teachers talk in the classroom. Teachers try to involve children in the teaching through activities and use teaching-learning material to certain extent. Teachers motivate children to ask questions and discuss their doubts.

(B) Classroom Observation Schedule (COS)

For the genuineness and verification of the results obtained through LES it was necessary to develop and administer a tool for classroom observation (COS) of learning environment being provided in MCD primary schools.

COS helps to examine how the curriculum content is actually transacted in the classroom. Major policy documents such as the *NCF-2005* and the National Curriculum Framework for Teacher Education – 2009 emphasise the fact that learning outcomes depend fundamentally on what happens inside the classroom.

Quantitative Analysis of Learning Environment Scale (LES)

LES was administered in all the ten sample schools selected for the study. The analysis reveals:

- The learning environment of sixty per cent schools in the sample has Traditional Teacher Centered Learning Environment.
- The learning environment of forty per cent schools in the sample has Transforming Learning Environment. Score of fifty per cent of such schools is fifty four, which is the lowest range of second category. Thus twenty per cent of the sample schools are at the margin of the second category. In case some inputs are provided in such schools in the form of motivation, awareness and encouragement to teachers for transforming the learning environment of their classroom no doubt better results may be achieved.
- Child Friendly Learning Environment was not found in any of the classroom of the sample schools.

The scores of the sample schools in LES (in ascending order) are as follows:

S.No.	School	Scores	Category Name
1	A	45	Traditional teacher-centred Learning Environment
2	B	46	Traditional teacher-centred Learning Environment
3	C	47	Traditional teacher-centred Learning Environment
4	D	51	Traditional teacher-centred Learning Environment
5	E	52	Traditional teacher-centred Learning Environment
6	F	52	Traditional teacher-centred Learning Environment

7	G	54	Transforming Learning Environment
8	H	54	Transforming Learning Environment
9	I	62	Transforming Learning Environment
10	J	64	Transforming Learning Environment

Qualitative Analysis of Learning Environment Scale (LES)

Physical environment: Children were using desks for sitting in all the sample schools. Seating facility was adequate. Classes were organised in well-built rooms. Adequate space was available in the room for organising activities. Ventilation, light facility and number of fans were adequate in the classrooms. Blackboard was visible to all the children sitting in the classroom. As far as the physical facilities of the classroom were concerned, there were no problems either for teacher or for children in sitting, teaching and organising activities.

Average pupil-teacher ratio in all the classrooms observed was 34, which was the right number to carry out activities individual as well as in groups. Out of ten classrooms observed in the study, one classroom had 44 children and in rest of the classrooms had children ranging from 29 to 38. The pupil-teacher ratio was adequate and reasonably good to carry out activities (individual as well as group) in the classroom. Teaching learning material other than charts was not available in the classrooms.

Social environment: It was observed that children were not asking any questions or raising any query about

the concept being taught. They were just busy copying from the blackboard. Whenever some questions were asked by the teacher, only a few children raised their hand to answer and other children were ignored. Children who answered correctly were praised by the teacher. In one of the classroom, on giving incorrect answer the teacher told the child to slap himself on the cheek.

Teachers were rarely found sharing learning experiences of children and using such experiences for constructing new knowledge.

Teaching-learning material: There was a large gap between teachers' saying and the actual practicing of using concrete material for teaching mathematics in the classroom. Teachers were rarely using any material or activities for teaching. They were using '*chalk and talk method*' for teaching mathematics. This might be one of the reasons for fifty per cent children having mathematics phobia at the primary level. Children did not find anything interesting and joyful in learning mathematics. Children were not given opportunities to explore mathematical concepts on their own using concrete material or by solving puzzles, riddles and mathematical games etc.

Transactional methodology:

Transactional methodology adopted by teachers for teaching mathematics at the primary level in selected schools was neither made joyful nor interesting. Activity-based teaching was not adopted and children were not engaged in learning.

Continuous and Comprehensive Evaluation (CCE):

Teachers were not found practising strategies of continuous and comprehensive evaluation. Children were not given opportunities to interact with peer and explore mathematical concepts.

Enrichment work in mathematics:

Work done in mathematics classroom was neither enriched by assigning project work nor by any practical exercises to the children. Opportunities of solving mathematical problems by the children themselves were neither given in the classroom nor at home.

Child-friendly learning environment

- Children were not learning by doing activities with concrete objects or by exploring something on their own using teaching-learning material, in most of the classrooms observed under study. In two classrooms, teacher used a rope and a scale for teaching measurement of length. But that too was neither planned nor involved children's participation.
- All the children of the class were not participating in learning. In the name of interaction with children, teacher was asking

certain questions to a few children of her class (say 15% to 20%), rest of the children were neither raising their hands for giving answer nor teacher gave them opportunity to answer. It was observed in almost all classrooms. In two classrooms more than fifty per cent children were involved in learning.

- Children were not observed, discussing their experiences with teachers as well as with peers in any of the classroom. A lot of examples are given in the textbook of mathematics for Class IV, in which children are involved in teaching-learning process by asking them their experiences of using mathematics outside the classroom.
- Children were not observed, asking their doubts or difficulties to teachers related to topic being done in the class. Lack of such an environment was felt in the classroom in which children don't hesitate to ask what they did not understand.
- Children were not given opportunities to make mathematics relevant to their world outside the school. This is an essential activity of mathematics classroom, without which teaching of meaningful mathematics is not possible.
- Children were not observed working joyfully and fearlessly in small groups or individually in any of the classroom. This might be the

reason why teacher was unable to engage every child of the class in learning.

- Children were rarely provided opportunities to learn mathematical operations contextually.
- Teachers offering a sense of success to every child of the class through CCE was found missing in mathematics classrooms. This requires a lot of planning on the part of teachers, but due to other responsibilities they are not able to do justice with the teaching and assessing what children have learnt and what need remediation.

Activities in the Class were Teacher/Children-driven

The learning environment of the classrooms was found to be teacher-driven as children were not involved in either planning or executing teaching plan. Teaching methods adopted by teachers were limited to blackboard writing, reading from the book or teachers talk in the classroom with an objective view of the mathematical knowledge. Teachers' interests view the curriculum as a product to be delivered without planning and adopting activities which create and sustain children's interest in learning. Children's role was perceived as passive listeners in the class. Rarely were they involved in the talk or interaction of learning experience of any kind regarding the mathematical concepts to be taught in the class. They were not in habit of raising their

doubts on the concepts being taught. Children work or portfolios were not displayed in the classrooms.

Child-friendly Learning Environment was not found in any of the classroom of the sample schools. Traditional Teacher Centered Learning Environment was found in more than half of the classroom observed. Learning environment in one-fifth of the sample classrooms was at the lowest margin of Transforming Learning Environment. Twenty per cent sample classrooms were having Transforming Learning Environment.

Conclusion

The present study is an attempt to study the learning environment in mathematics classroom at the primary level to know how far it fulfils the expectations of learning environment as recommended in *NCF-2005* in actual mathematics classrooms at the primary level.

The findings of the study are not very encouraging as after passing seven years of *NCF-2005*, the child-friendly environment was not found in any of the classrooms of the sample schools. Traditional Teacher Centered Learning Environment was found in sixty per cent of the classrooms observed. Transforming Learning Environment was observed in rest forty per cent of the classroom. Out of which fifty per cent classrooms had learning environment at the lowest ebb of Transforming Learning Environment. Twenty per cent sample

classrooms were having Transforming Learning Environment.

The infrastructure of the classroom in terms of availability of desks, blackboard, light, ventilation and fans was satisfactory qualitatively as well as quantitatively. The average pupil-teacher ratio was 34 in the sample schools, which was close to the pupil-teacher ratio recommended in *NCF*. Resource material was not available in the classrooms. The only teaching-learning material available in the classroom was charts hanging on the walls.

Almost all the teachers accepted that teaching of mathematics at the primary level must involve use of concrete material and activities which helps children in learning mathematical concepts joyfully without any fear. Some teachers knew the concrete material and activities through pre-service training and in-service trainings they are attending time to time. But they were not making use of them in classroom teaching.

Teachers did not pay much attention to share experiences of the children to construct new knowledge. Pedagogy adopted by teachers was '*chalk and talk method*' and writing on the blackboard. Activity method of teaching was rarely adopted. Group, paired and individual activities were not planned. Teachers adopting strategies for making teaching of mathematics joyful for children was hardly seen. Teaching strategies like visualisation guess and verify,

estimation and approximation, use of patterns were not used in the teaching process. It was also observed that no teacher was offering multiplicity of approaches, procedures and solutions in any class.

Corporal punishment was not given to the children. No discrimination of any type on the basis of gender, caste, religion and disability was observed in any of the class.

Children participation was seen rarely in the classroom. The only activity done by teachers to elicit participation of children was asking questions to them. These questions were generally mechanical in nature and the element of challenge was missing. Engaging all the children in learning and providing a feel of success to every child were missing activities in mathematics classroom.

Traditional and monotonous methods of evaluation were adopted. Teachers were not clear about strategies of continuous and comprehensive evaluation.

Work done in mathematics classroom was neither enriched by assigning project work nor by any practical exercises to the children. Opportunities of solving mathematical problems by the children themselves were neither given in the classroom nor at home.

The vision enlightened in *NCF-2005* was not practised in the classroom.

Finally the researcher concludes that there is an ultimate challenge of translating innovative, meaningful and child-friendly methodologies, pedagogies and successful experiments of teaching mathematics in the primary classes to the level of children and bringing about change in classroom practices by providing the appropriate learning environment to the children in the classroom.

Implications of the Study

- The findings of the study reveal that there is a dearth of resource material in the classroom. In-service training programmes must be organised in workshop mode where teachers may be given training to develop need, based resource material and some exemplar resource material may be provided to them for use in the classroom. Teaching strategies involving child participation, sharing learning experiences of the learners, providing opportunities for pupil-pupil and pupil-teacher interaction in the classroom may be added in the course design of in service trainings organised for primary teachers in teaching of mathematics.
- Teachers may be given training of 5E's (Engage, Explore, Explain, Elaborate and Evaluate): an instructional model based on the constructivist approach to learning, which says that learners build or construct new learning

on the top of their old learning. Demonstration lessons, videos, exemplar material etc., on child-centred learning and learning environment in mathematics classroom at the primary level may be provided to the teachers.

- One of the findings of the study reveal that there is a need of acquainting the teachers with the concept of CCE, its importance and different strategies used to evaluate children at the primary level, e.g., displaying their portfolio in the classroom, i.e. keeping and displaying the best work of every child in a folder in the classroom. This can be shown to her parents during parents-teacher meeting. Other children may also observe and follow. The child herself can reflect her work and improve upon.
- It was perceived from the Classroom Observation Schedule that the spirit of enquiry in children is missing. No child was raising any doubt or enquiry in the concepts being taught in mathematics class. There is a need of introspecting the existing teacher education programmes and equip the prospective elementary school teachers to enable them to teach in such a way that their children imbibe a spirit of enquiry. The same applies to programmes offered by university departments of education. A related aspect is the hierarchical nature of student-teacher relationship which renders

the teacher as the controller and chief disseminator of all knowledge, rather than the facilitator of

sharing experiences and fostering an environment of enquiry in the classroom.

REFERENCES

- CENSUS OF INDIA. 2011. *Provisional Population Tables*. Table 2.
- DEMIREL, TUNCEL, AND TUNCEL. 2007. A Study on Quality of Teaching Learning Process in Elementary Education in Turkey: A Case Study. *American-Eurasian Journal of Scientific Research*. 5(1): 50-59.
- FRASER, B. J., AND D. L. FISHER. 1983. Student achievement as a function of person environment fit: A regression surface analysis. *British Journal of Educational Psychology*. 53: 89-99.
- _____. 1986. *Classroom environment*. Croom Helm. London.
- TAYLOR, P. C., AND B. J. FRASER. 1997. Monitoring Constructivist Learning Environments. *International Journal of Science Education*. 459: 414-419.
- The Government of India reports a Net Enrolment Ratio (NER) of 98.3% for 2009-10. According to ASER 2010, 96.5% of all children in the 6-14 year age group are enrolled in school.
- WALBERG, H. J., AND G. J. ANDERSON. 1968. Classroom climate and individual learning. *Journal of Educational Psychology Research Association*. New Orleans, LA.