A study of role of recreational activities in developing mathematics learning

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Abstract

Mathematics is a compulsory but interesting core subject in the school curriculum. Recreational mathematics has a vital role in making mathematics an interesting one. Experience shows that the basic principles of learning mathematics can be made easier through mathematical fun, activities and games. If mathematics can be turned into a game it can become child’s play. Class room experience indicate clearly that mathematical puzzles, riddles etc encourage an open minded attitude in youngsters and help them to develop their clear thinking. Shakuntala Devi become famous for her simple mathematical facts converting into game, puzzle etc. Ramanujan also has no exception in this regard, above all his famous mathematical contributions. In contrary to this, a big percent of students dislike mathematics due to the lack of fun etc. in mathematics textbook as well as in class room transaction.

There is enormous scope of effective learning of mathematics at elementary level through recreational games, magic etc. which not only help in removing fear psychosis of the learners but also help in developing clear concept of mathematics. The place of fun that is recreational activities in learning mathematics has been studied by the investigator in this study specially at class room as well as school textbook. This paper highlights the finding of the study particularly at elementary level.

Key Words – Recreational mathematics  fear psychosis  learning
1. Introduction

Mathematics is the mother of all sciences. Mathematics has its diverse significant values and aims or goals. So, it is regarded as one of the core part of the school curriculum across the world. However, it is widely perceived as a difficult subject, to be tolerated rather than appreciated. It is considered as a major hurdle in passing the final qualifying examinations by the majority of the students, their parents as well as the learned community as a whole. It may because they did not get proper opportunities to study Mathematics. Many teachers, educators and mathematicians have responded to the challenge of teaching mathematics effectively in various ways like developing powerful pedagogical approaches or teaching learning materials and also introducing some innovations in their teaching. Recreational activities are one of the factors which help in effective mathematics learning.

Though mathematics may deal with some abstractions. But, it is the mathematics teacher who should try to inculcate sufficient interest in the class room transaction so that the subject mathematics may not be treated as dull and tiresome. And the main tool to answer all these for converting mathematics into a loved and enjoyable subject to all is the curriculum and text book which directs the teacher to apply recreational activities for proper and effective mathematics learning.

Recreational activities have a great role in mathematics learning and developing various skills in solving problem as well as developing creative and logical thinking. In one-way recreational mathematics is also a pure mathematics and is often difficult to distinguish pure mathematics from recreational mathematics. The pedagogic value of recreational mathematics is now widely recognized which in turn help the low achievers of mathematics and converting them into a lover of mathematics by removing fear-psychosis from their minds towards the subject. For a lover of mathematics, there is all beauty. One finds a huge treasure of pleasure after getting success in the solution of a Mathematics problem. It was the reason why Pythagoras sacrificed hundred oxen to the Goddess for celebrating his discovery of the theorem that goes by his name. In the same way, Archimedes had also forgotten his nakedness after discovering his principle.

2. Need of Mathematics in the school curriculum

Before learning mathematics, a number of questions come in the minds, why should everyone learn mathematics? Why should this subject be taught to everyone?
What is the place of mathematics in any scheme of studies? What is the importance of this subject in life and in any school curriculum? How does it make any contribution in the development of an individual? Etc.

Mathematics has been proved to be the best tool to study different types of problems in Sciences, Engineering, Economics, Commerce, Management and Agriculture etc. Mathematics is everywhere in all our daily life activities from dawn to late at midnight. The basic aim of learning mathematics at primary stage is to help children to acquire competencies on mathematical concepts and skills which they would use in day-to-day life situations. The main aim of mathematics education in school is the mathematisation of a child’s thinking through which one acquires an ability to handle abstractions and an approach to solve problems faced in their day-to-day life and also for inculcation of value and attitudes related to life situation. Due to these facts mathematics occupies a significant place in the school curriculum. The qualities, competencies and values inherited in mathematics will help the students to be effective members of the democratic society and in the world of technology.

3. Need of Recreational activities in Mathematics Curriculum and textbook

The abstract nature of mathematics makes it appear a very dull and difficult subject. As a result most of the students lose interest in the subject and try to avoid it. It is necessary to remove this indifference for mathematics from the minds of the students. They need to be motivated. Their interest in mathematics needs to be aroused and nurtured. Thus to remove the years old blame of the subject which creates fear-psychosis and hatred for the learner and to achieve higher aim of the subject which is responsible for developing a child’s inner potentialities, the role of mathematics is vital, for that recreational activities plays a great role for all these. Recreational activity is such a tool which not only help in developing different mathematical concepts but also help to retain those for a long time in the minds of the learner and there by help in reproduce them as and when required. That is why curriculum for mathematics education must be ambitious and coherent with recreational activities. Also the text books of mathematics to be affordable to every child and at the same time enjoyable, which are also possible by incorporating
Recreational activities. Thus in reforming curriculum and textbook following points to be rightly looked for –

**General Pedagogy**

The curriculum must be developed in such a manner that it helps in the all round development of a learner at the same time it is easily understood by all. That is why, in developing the mathematics curriculum following must be specified -

(i) Scope should be there for removing “fear psychosis” among the learners on the subject with proper instruction for creating interest and love for the subject.

(ii) Mathematics curriculum must be more realistic, practical, useful, suitable and justified upto the learner’s mental ability according to its level rather than stereo type, theoretical and traditional.

(iii) It should be aimed at the learner’s 100% competency development and making her/him a competent person covering her/his total mental growth, which can be, reflected in the day to day actions and whole life activities.

(iv) Scope to be provided for the use of the essence of mathematics against the success of any type of programme at home as well as outside.

(v) To make mathematics more understandable, enjoyable & permanently retained in the mind of the learner more use of fun and recreational activities, TLM, practical work, project work, interaction, exploration etc. are to be ensured and to be reflected in the curriculum specially. For this introduction of mathematics lab, mathematics corner etc. in each school/class in necessary.

(vi) Effective approach of teaching learning process of the subject must be specified as activities based, learner centered, load free, stress free, enjoyable and effective.

(vii) Content to be made more relevant to the children’s life and experiences and spiraling of content is necessary in mathematics curriculum at elementary level.

Mathematics club can be maintained with the help of the community for spreading the message that there is no other subject like mathematics, which is so
interesting, enjoyable and useful and that nothing can be done in this world without mathematics.

Curriculum is reflected through the text books to the students and the teacher community. Hence, developing a learner friendly textbook is a challengeable task in present education system which to be - **Joyful, Child centric, activity based, competency based and enjoyable** to the children. Fear psychosis can be removed by using more number of recreational activities like fun, puzzles, riddles, stories, interesting facts and examples in the mathematics text book. Each lesson must be potential enough to construct the knowledge in the minds of the learner through their experiences in the environment by group activities, peer activities and individual activities for development of each competency by all learners.

4. **Role of Recreational Activities in Mathematics Learning**

Whatever good curriculum and textbook are prepared for mathematics education, its success and the learning of mathematics depends on the teacher and the way of their classroom transaction in a learner friendly environment. Here also recreational activities plays a vital role in developing and understanding a mathematical concept in an enjoyable way by relating it to the everyday life activities so that it can be permanently retained and use as and when necessary. Using Fun and Magic can make mathematics learning very exciting and interesting. Games provide opportunities for students to be actively involved in learning. They enable students to experience success and satisfaction, there by build the enthusiasm and self-confidence. But these recreational activities are not only about fun and confidence building, they also, help students to –

- Understand Mathematical concepts
- Develop Mathematical skills
- Know Mathematical facts
- Lean the language of Mathematics
- Develop ability in mental thinking and reasoning
Many fun can be created in Mathematics learning in the classroom through various activities using TLM like match sticks, seeds, leaves, string, blocks, tangrams, geo-board, puzzles, songs, various games etc. These should be specially reflected in the text books at elementary stage otherwise teacher will not practice these ideas in the class room as teachers and learners are mostly dependent on the text book.

5. Role of Teacher Educator in different activities for mathematics learning

Teacher educators have one of the key-position to meet the challenges of teaching mathematics effectively. Yes they have responded rightly to meet that challenges in various ways -

• Some have developed powerful pedagogical approaches or teaching learning materials,
• Some have introduced innovations in their teaching,
• Some have worked with teachers,
• Some with students and
• Some others have taken up research to understand more deeply the teaching and learning of mathematics.

Following examples witnessed some such challenges through different recreational activities during long and short term training courses.

• Group forming games by applying mathematical operations creates very much excitement even among the trainees.
• Housie game is also a brain storming activity creates enthusiasm among the trainees.

Likewise many more activities are there. These activities help in drilling the known facts and prepared the trainees/students to grasp any new concept or understand the same properly.
6. *Investigation of Place of Recreational Activities in the Curriculum and Text Book at Elementary Stages of Assam*

The investigators have studied the state mathematics curriculum and text book up to class VII developed by SCERT, Assam during the period 1998 to 2009 and found the following -

**Step – 1 Development of 4 year curriculum for lower primary level.**

To bring the changes required for proper mathematics learning, SCERT, Assam has developed a 4 –year curriculum for lower primary level in the year 1999 after maintaining all the formalities along with field study etc. In this curriculum the places of recreational activities got preference with mathematical fun, puzzle, riddles, songs, stories etc in developing pre-number concepts, number concepts, to acquire the skill of forming different geometrical shapes by folding papers along with picture reading, discussing, applying logical thinking.

There was a scope to acquaint with coin and currency, time, classification and grouping etc. and also the preliminary concept of fraction, perimeter and area in geometry, preparation of problem sums and solving them by developing conceptual skills along with application of learned areas to help the learners in mastering the use of all competencies.

To achieve the objectives through the reflection and effective transaction of the mathematics curriculum, mathematics textbooks from class II – IV were developed to imbibe learning activities and their usefulness and permanent learning of Mathematics during 1999 to 2002, as class I text book is an integrated text book covering all the subjects including mathematics.

**Step – 2 State curriculum for UP stage of school education.**

To fulfill the compulsory education to all children up to the age of 14 years and after declaration of fundamental rights in 2002 and to cover UEE it become necessary to develop a holistic curriculum suitable for all children of Elementary stage up to the age of 14 years. And accordingly in 2002 to 2005, the state curriculum for UP stage was developed in continuity and sequence with lower primary curriculum after maintaining necessary criteria and formalities. Thus for proper mathematics learning, the curriculum has been developed in such a manner that it
helps in the all round development of the of a learner and is easily understood by all. To fulfill the chronological and cognitive thirst of upper primary stage more emphasis has been given in the analysis and solving the problems with – What is given, what to do and how to do and why to do etc through recreational and group activities etc. For systematic and effective learning of mathematics the total course content was divided into 10 major areas with their sub areas. A complete area was there for Mathematical magic, fun, puzzle, quiz, logical thinking and analysis etc reflecting the actual contents.

Upper Primary Mathematics Textbooks were developed accordingly from Class V – VII during the period 2003 to 2005.

- Information about different mathematical facts for introduction of any topic through story/tale/play, mathematical riddle, puzzle, quiz etc were there for effective transaction and permanent learning of Mathematics.

- Games, experiments, projects work, field trip, mathematics fair, visiting market, arranging picnic/ function, festival etc got equal importance in the textbooks through which learners can get a scope of applying their learning, developing their logical thinking, developing confidence, inculcating values, realizing and analyzing actual situation, solving different problems, differentiating the right and wrong with reasoning.

**Step - 3 Adaptation of NCERT, Textbooks**

Recently in 2009, according to NCF 2005 the textbooks developed by NCERT, were translated in the major languages of Assam and adopted for the schools of Assam. Here also it is found that the mathematics books comprises of full of mathematical games, riddles etc. in developing concepts to drilling of the contents.

The findings of recreational activities on the text books were presented below in the tabular form in Table – 1 (SCERT, Assam developed text books) and Table – 2 (adapted text books developed by NCERT)
7. **Findings of presence of recreational activities in the lessons of SCERT Text Books (Class II – VII)**

<table>
<thead>
<tr>
<th>Class</th>
<th>Lesson No.</th>
<th>Type of Recreational Activity</th>
<th>Scope of Involvement of learner</th>
<th>Page No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>3, 6, 7</td>
<td>Game</td>
<td>Whole Class</td>
<td>34, 35, 36</td>
<td>Interesting for all children as well as exploration of ideas in their own environment.</td>
</tr>
<tr>
<td>III</td>
<td>1, 2, 5</td>
<td>Rhyme, creative activities</td>
<td>Whole Class, individual</td>
<td>23, 24, 25</td>
<td>For better understanding, application and opportunity for development of creative ideas having fantasy and puzzle.</td>
</tr>
<tr>
<td>IV</td>
<td>6, 10, 15, 17, 18 etc.</td>
<td>Puzzle, creative activity</td>
<td>Individual, Group</td>
<td>43 – 50, 70 – 80, 81 – 85</td>
<td>Correlation of global knowledge through exploration of shape, application and aesthetic sense through creative ideas.</td>
</tr>
<tr>
<td>V</td>
<td>11, 19, 22, 23</td>
<td>Puzzle, fun activity</td>
<td>Individual, Peer, Group</td>
<td>56, 112 – 116, 130 – 139, 140</td>
<td>Through these puzzle fear psychosis towards the subject can be removed, permanent retention, better understanding of the concepts and its application.</td>
</tr>
<tr>
<td>VI</td>
<td>6, 7, 8, 9, 13, 14, 17, 18, 21</td>
<td>Fantasy, Puzzle, tangram activity, games</td>
<td>Individual, group, whole class</td>
<td>36 – 41, 55 – 59, 80 – 87, 103 – 111, 123 – 127</td>
<td>Reduces dullness, interesting explorative, fantasy elements, play and game having potentiality of practical works, enough fun and brain storming activities.</td>
</tr>
<tr>
<td>VII</td>
<td>5, 7, 13, 14, 21, 24, 25</td>
<td>Games, Puzzles, practical activity, story, conversation riddles, brain teasers</td>
<td>Individual, group, peer and whole class</td>
<td>54 – 57, 93 – 104, 135 – 139, 153 – 166</td>
<td>Activities help in permanent retention of the concept, creates interest, fun through puzzles etc.</td>
</tr>
</tbody>
</table>
**Finding of presence of recreational activities in the lessons of NCERT Books adapted by SCERT (class I – VIII)**

Table – 2

<table>
<thead>
<tr>
<th>Class</th>
<th>Lesson No.</th>
<th>Type of Recreational Activity</th>
<th>Scope of Involvement of learner</th>
<th>Page No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I - VIII</td>
<td>Almost every lesson</td>
<td>Game, Story, Conversation, puzzle, fun, practical activity etc.</td>
<td>Whole Class, Individual, Group.</td>
<td>Covers maximum pages of the books</td>
<td>Interesting for all children as well as exploration of ideas in their own environment with fun. Some are creative, requires calculation, unknowingly doing operation on mathematics and implementing the subject matter in real life situation creates permanent retention through recreational activities.</td>
</tr>
</tbody>
</table>

8. **Field Experience and Analysis by the Teacher Educator -**

After necessary teachers’ empowerment and support from the authority during the period of DPEP to SSA, Assam, it is being observed from the field that where the teachers are implementing their gathered knowledge of recreational activities to the classroom transaction, there the mathematics learning become playful event to the young stars and they carried it to the home to home and village to village. Some examples of these are – shape game, dung gooti game, close open figure puzzle, par – pani (teer – neer / pond – bank), different body moments etc. Students find this type of activities quite interesting in the learning of the subject mathematics unknowingly through games. But where it is not implemented properly, the scenario is opposite.
9. **Conclusion**

Through the learner friendly curriculum, text books and by improve teaching learning process, each individual learner can learn mathematics in easy and enjoyable way. There are enough scope of incorporating various recreational activities having logical reasoning and creative thinking necessary for developing mathematics learning in the lessons of any text books of elementary stage which surely help the learner to build concept as well as to enjoy mathematics learning. And thus class room can be changed in to a play ground for both the teacher and the learner where they can develop their thinking and creativity and making mathematics learning enjoyable and thus fear-psychosis can be removed from the minds of the learner permanently and they will start to love the subject.

10. **Suggestion**

Looking the students condition at the grass root level and investigating the developed text books following measures can be suggested to overcome the conditions of the students.

- Regular teacher training on mathematics text books may be organized specially on recreational activities mentioned in the text books which to be used in interacting with the children in the class room transaction and outside.

- Monitoring the class room transaction of the teachers in a regular basis to allow them to implement their gathered knowledge more and more.

- Those teachers can be awarded who are able to bring the mathematics learning up to the respective level of the students.
REFERENCES

- Four year curriculum for lower primary level, developed by SCERT, Assam, 1999.
- State curriculum for upper primary stage of school education, developed by SCERT, Assam, 2003.
- NCF 2005 developed by NCERT.
- Mathematics text books from class II – VII developed by SCERT, Assam from 1999 to 2007.
- Mathematics text books from class I – VIII developed by NCERT and adapted by SCERT, Assam 2009.

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