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INNOVATIVE PRACTICES AND ROLE OF TECHNOLOGY IN MATHEMATICS TEACHING AND LEARNING

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Abstract :

The use of innovative methods in educational institutions has the potential not only to improve education, but also to empower people, strengthen governance and galvanize the effort to achieve the human development goal for the country. The basic concepts in Mathematics remain the same, new trends and methods of teaching evolve as per the requirement of the changing the socio-cultural and psychological status of the learners. In order to meet the demands of the curriculum and the present century mathematics learners, in this rapidly changing world, it becomes necessary for mathematics teachers to have innovation in classrooms and also to have innovative teaching learning resources with them. Basically teaching must include two major components sending and receiving information. Improving methodology of problems in teaching mathematics monitoring and diagnosing quality of students mathematical education. This paper highlights the need for the development of innovative teaching - learning resources for the present century Mathematics teachers and employing the innovative practices in Mathematics classrooms.

Key words: *: Innovative Practices, Mathematics Education, Teaching - Learning Resources.*

Introduction :

Education system has a tremendous responsibility to transform a child into a fully developed individual. Over the ages, academicians and educationists of the country were relentlessly working to develop a system of education which can express and promote its social and cultural identity, a system which can full fill the requirement of the time. Education is a light that shows the mankind the right direction to surge. The purpose of education is not just making a student literate but adds rationale thinking, knowledgeablity and self-sufficiency.

Mathematics, being an important subject and occupying a central position since the ancient period till date, has not been of interest to many students. The reason is mainly because there is aspiration but it is hard to achieve. Being highly abstract, it is concerned with ideas, which are interrelated, and with the manipulation of symbols. Teaching of mathematics is not only concerned with the computational knowledge of the subject but is also concerned with the selection of the mathematical content and communication leading to its understanding and application. So while teaching mathematics one should use the teaching methods, strategies.

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Mathematics has a role to play in many different fields: innovations in medicine, digital encryption, communication technology, modelling real life phenomena, predicting disasters, organization of enterprises, business and transport to name a few. Creativity can be developed and innovation benefits to both students and teachers.

Objectives :

- To study the need of development of innovative Mathematics teaching – learning resources.
- Feel the flow of reason while proving a result or solving a problem.
- To study the different strategies and teaching practices in Mathematics education.
- Develop necessary skills to work with modern technological devices such as calculators, computers.
- Develop interest in Mathematics as a problem-solving tool in various fields for its beautiful structures and patterns.
- Consolidate the Mathematical knowledge and skills acquired.
- Acquire knowledge and understanding, particularly by the way of motivation and visualization of basic concepts.
- Apply the Mathematical knowledge and skills to solve real life problems by developing ability to think, analyse and logically.
- The process of innovation is generally described as consisting of three essential steps, starting with the conception of an idea, which is then proposed and is finally adopted. Though many ideas have been conceived to bring about change in the teaching of Mathematics
- The innovations discussed may not be new in terms of the idea but is new in terms of practice.

Mathematics Teachers Status :

In many cases, Mathematics is taught by teachers who are not very confident of their Mathematics. Even in cases where qualified teachers teach the subject, their conceptual understanding was seen inadequate. Their understanding of the nature of Mathematics and attitude to it and its learning are very different from what is underlined in the NCF-2005 and now in NEP-2020. The lack of ability of teachers in Mathematics is probably the result of their preparation at the School and College level. It may also be because of the inadequate efforts at teachers' preparation and lack of innovative pedagogical and methodological planning. Lack of motivation of teachers also results into poor teaching – learning happening in Mathematics classrooms.

Teacher education institutes are making all the efforts in order to make the student teachers to acquire the skills during their course of training. But after the pre-service program when they enter in the profession, they find the methods of teaching, curricula and various other requirements in schools different from those advocated and implemented in teacher education institutes. There is a need of a systematic mechanism for the academic support for teachers in terms of good resources and also for their professional development.

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Importance of Mathematics Education :

Education is a light that shows the mankind the right direction to surge. If education fails to inculcate self-discipline and commitment to achieve in the minds of student, it is not their fault. We have to convert education into a sport and learning process has to generate interest in the students and motivate them to stay back in the institution than to run away from it. Education should become a fun and thrill to them rather than burden and boredom. It is an integral part of their growth and helps them become good citizens. Education is an engine for the growth and progress of any society. It not only imparts knowledge, skills and inculcates values, but is also responsible for building human capital which breeds, drives and sets technological innovation and economic growth.

Mathematics is both a practical and theoretical subject. Its aim of teaching at school level being the development of many skills like: Critical Thinking, Problem Solving, Computation, Analytical Thinking, Logical Thinking, Reasoning (inductive and deductive), etc., and also the development of many Life skills too in learners. So, emphasis should be on both rote learning (memorizing the formula, theorem, etc.) and also in applying their meta cognition ability (ability to apply a formula or result in specific problem area).

Content Bank :

Initially developing a structure such that each levels major skills and concepts of Maths are fragmented into number of micro skills and ideas. This list may be exhaustive so that a structure of mathematical skills is developed from initial to higher level showing clear

interdependence. Initially the syllabus of NCERT for each level can be taken as such structure. The text based explanations of which are sufficiently available nationally but it's not same with multimedia based study material for these levels. It can be provided as bank of

contents having multiple features keeping in view the level for which study material is provided. Such a version is still out of reach from school children especially rural, to Maths teachers and parents to other stakeholders.

Teaching Methods :

Interdisciplinary Approach :

It is an approach of curriculum integration which generates an understanding of concepts through different subjects and their connection with the real world. It means combining two or more subjects for enhancing the clarity of a single concept, through activities.

Art Integration :

Art-Integration is a cross-curricular pedagogical approach that utilizes various aspects and forms of art and culture as the basis for experiencing the learning of concepts across subjects. Art-integrated education, if embedded in classroom transactions, can not only create joyful classrooms, but also can help in imbibing the Indian ethos through integration of Indian art and culture in the teaching - learning process at every level.

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Experiential Learning :

Experiential learning is a teaching – learning strategy where in learners learn by doing practically by appreciating the real-world relevance of the subject which helps the students to retain the concepts for a longer period. Such learning by nature, enables the development of a variety of capabilities, such as planning, team work, coping with stressful situations, responsibility and leadership.

Blended Learning :

Learning mathematics can be made easy and attractive if teachers integrate technology in classrooms for today's technology loving learners. Blended learning is a method of teaching that integrates the digital media with traditional teacher led classrooms. This method helps the learners to stay motivated and engaged. Blending Learning is now widely adopted in education with some scholars referring to it as the 'new normal' in course delivery

Teaching with Sense of Humour :

Everyone loves a teacher with an infectious sense of humour. Looking at the lighter side of life not only fosters cordial relations between professors and students, but also provides welcome relief while trying to follow a difficult lecture on a complicated subject. When there is a willingness to change, there is hope for progress in any field. Teaching is a challenge. Learning is a challenge. Combining both effectively is a challenge. Being humorous is a challenge. However, laughing is easy. We are convinced both by experience and research that using humour in teaching is a very effective tool for both the teacher and student.

Humour strengthens the relationship between student and teacher, reduces stress, makes a course more interesting and if relevant to the subject. Humour has the ability to relax people, reduce tension, and thereby create an atmosphere conducive for learning and communication.

It is easy to create a humour in the classroom by reading books of jokes and to listen to professional comics. The students should be encouraged to take notes, especially to learn about the professionals' use of such techniques as exaggeration, pauses, and timing. Observe reality and exaggerate it - much humour lies in observations about real life and truthful situations. In conclusion, humour not only plays an important role in the healing process but is also very important in education.

Innovative Tools :

Multimedia, is the combination of various digital media types such as text, images, audio and video, into an integrated multi-sensory interactive application or presentation to convey information to an audience. Traditional educational approaches have resulted in a mismatch between what is taught to the students and what the industry needs. As such, many institutions are moving towards problem based learning as a solution to producing graduates who are creative; think critically and analytically, to solve problems. In this paper, we focus on using multimedia technology as an innovative teaching and learning strategy in a problem-based learning environment by giving the students a multimedia project to train them in this

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skill set. Currently, many institutions are moving towards problem-based learning as a solution to producing graduates who are creative and can think critically, analytically,
and solve problems. Since knowledge is no longer an end but a means to creating better problem solvers and encourage lifelong learning. Advantage of creating multimedia projects in the classroom setting is that when students create multimedia projects, they tend to do this in a group environment. By working in a group, the students would have to learn to work cooperatively and collaboratively, using their group skills and a variety of activities to accomplish the project's overall objectives.

Some limitations which may prevail in teaching methods are:

- The material presented is only based on lecturer notes and textbooks.
- Teaching in classroom using chalk and talk is "one way flow" of information.
- Teachers often continuously talk for an hour without knowing students response and feedback.
- There is insufficient interaction with students in classroom.
- More emphasis has been given on theory without any practical and real life time situations.
- Learning from memorization but not understanding.
- Marks rather than result oriented.

Results and Discussions :

1. Curriculum planning, methods of teaching and pedagogical planning are few important aspects of school education and the quality of school education depends on the quality of these aspects.
2. Every period must start with some warm up activity / activities involving the previous knowledge checking.
3. Swift corrections of the previous day's assignment are very essential in the period itself, with proper positive comments. This every day's practice inculcates a habit in learners to complete their tasks and assignments on time.
4. Specific technology integration, as per the requirement of the chapter / topic to be done. This can be in terms of explaining an abstract concept with the help of a video, etc. Web link / video link and other links for references of related topics need to be provided in order to enhance the concept clarity and to develop the interest of learners in the subject.
5. At the end of every period, quick recapitalization of the learned concepts must be made as a habit.
6. The period must end by assigning some learning activities or practice works on the basis of the learned concepts of the day.
7. A comprehensive series of self-assessment questions to be provided to do in class rooms or at home, at the convenience of the learners.
8. Projects based on "Art Integration" and "Experiential Learning" to be assigned by keeping in mind the mandated learning outcomes, from the topics or concepts taught.

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9. One period must be utilized for the conduct of a Formative Assessment of the completed chapter.
10. If a Mathematics teacher follows the exact style and the process mentioned above for the teaching of a Mathematics topic, the researcher guarantees the improvement in academic performance of the learners.

Conclusion :

At present in India, for improvement in Mathematics teaching – learning, a system improvement rather than the improvement of individual teachers is needed. As the demand for technology continues to rise, colleges and universities are moving all sorts of student services, from laundry monitoring to snack delivery online. The concepts of paperless and pen less classroom are emerging as an alternative to the old teaching learning method. Nowadays there is democratization of knowledge an the role of the teacher is changing to that of facilitator. We need to have interactive teaching and this changing role of education is inevitable with the introduction of multimedia technology and the spawning of a technologically generation of youths. The analysis reveals some of the suggestions that the teaching community can practice in the classrooms. Ultimately the teaching people are satisfied when he could reach the students community with his ideas and views. So, teaching depends upon successful mode of communication and Innovation though we mean the changes that we propose to be included in our medium of communication or even inclusion of some other elements in communicating information.

A system to be framed to engage more mathematicians, mathematics education researchers, etc., to study more about the development strategies which can enhance the quality of works by mathematics teachers. More contributions in this area in terms of developing strategies, practices, resources and professional enrichment program. May solve the existing problems and may help in achieving the quality Mathematics Education. India's education sector is eagerly waiting to see the immediate and urgent measures of implementing the same to achieve the years' long expectations and requirement of the desired improvement in Education System and Quality of teaching – learning, especially in Mathematics.

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