



National Education Policy 2020 & New Approach towards Mathematics Teaching and Learning with New Challenges and Opportunities

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ABSTRACT

This paper is dealing with new education policy 2020 and the new era for mathematical education. During the Covid-19 pandemic, the learning system is shifted to online learning. Although it is held online, the ability of undergraduate students to metacognition plays an important role in learning mathematics. Metacognition: intentional thinking about how you think and learn. showing how the mathematics subject and its approach changes from time to time in different education policies and adaptation for teaching and learning methods for mathematics in the new education policy -2020 . Even though mathematical education is as old as Indian civilization here, I have taken some references from national education policy 1968 up to the final draft of new education policy 2020 along with some important programs , activities that the government produces from time to time in development in Mathematics Education.

Key words - NEP-2020 , NIOS , MATLAB , SCiLAB

I. INTRODUCTION

According to 2014 Field Medal winner and Member of NEP drafting committee Manjul Bhargava a renowned American mathematician of Indian origin

“ The biggest mistake that happened in india after independence was the separation of teaching and research in india's higher education system india has some funtastic research institute like TIFR , NBHM ,Indian Statistical Institute Centre for Theoretical science but they are little island of excellence and then there is whole teaching sector , state universities where NO Research happen ”

Students who have good metacognitive skills will have better performance in completing the tasks. Unfortunately, not all of them have this skill; moreover, in the new education policy we have to take care of this for better mathematical education for undergraduate students, especially as they are often experiencing metacognitive failure when solving a mathematics problem. This study is intended to explore the characteristics of Mathematics Education provided in NEP-2020 experienced by an undergraduate student who was studying Mathematics online during the pandemic situation and offline after the pandemic by introducing some new methods and tools of teaching and learning mathematics .

The major milestones of India's education policy from independence to today:

University Education Commission (1948-49) also known as the 'Radhakrishnan Commission' (led by Sarvepalli Radhakrishnan) was focused on higher education. The Education Commission (1964-66), also known as the 'Kothari Commission', as it was led by Dr. DS Kothari. This commission had a holistic approach and advised the government on the national pattern of education and general policies, taking into account each stage from primary to post graduate education. National Policy on Education, 1968: Based upon the recommendations of the Kothari Commission, the government announced a policy which called for equal educational opportunities in order to achieve national integration and greater cultural and economic development. 42nd constitutional Amendment, 1976, which included education in the Concurrent List, so as to be considered by both the states as well as the union government earlier it was on the state list, which gave the state governments precedence in terms of lawmaker. The National Policy on Education, 1986 whose objective was a "special emphasis on the removal of disparities and to equalize educational opportunity," especially for women, Scheduled Tribes (ST) and Scheduled Caste (SC) communities. The NPE of 1986 was modified in 1992.

The Committee for Draft National Education Policy, or Dr. K. Kasturirangan Committee, submitted its report on May 31, 2019. It sought to address the challenges of: (i) access, (ii) equity, (iii) quality, (iv) affordability and (v) accountability faced by the current education system. And, finally, the new National Education policy 2020.

Higher Education

Education NEP's main target concerning higher education is to hit the target of a 50% gross enrolment ratio by 2035 with provision for multiple entry/exit. In cases during multiple entries and exits, certificates would be given after the first year, for diploma, it's after the second year, and for the degree, it's after three-four years. Discontinuation of MPhil courses Only one regulator authority for Higher Education in the country with separate verticals for approval and finance. The regulator will work on the 'Online Self Disclosure Based Transparent System'.

Mathematics Education as per NEP-2020

There are ample approaches for teaching and learning of Mathematics and every approach is unique in itself in inculcating mathematical thinking. Before unfolding the approaches, one needs to understand the human information processing system. In context to the young learners, the main features of the system involve: Experience leads to learning i.e. Learning by Induction is the key process for learning as a human being. The human beings have a limited capacity of working memory i.e. more focus on understanding and obtaining skills and less burden on memory. Focus on not only learning but on learning how to learn i.e. meta-cognitive abilities of the human needs to be explored. (NIOS that is National Institute of Open Schooling) The approaches may either have steps or features Proach presents an idea which the teacher can devise for inculcating the teaching learning process. In the present paper, in some approaches an idea is presented and the responsibility of devising a plan using the innovative efforts lies with the teacher whereas in some approaches the steps and features are discussed in detail. The approaches which are suitable as per the vision of NEP 2020 for the young learners considering Mathematics Education are as follows:

Manipulation of Objects , Integrated- Environmentalist Approach , Action Learning , Learner Centred Approaches , Topics approach , Concept Mapping , Representation in Multiple ways , Flipped Classroom Model for Teaching Mathematics , Experiential Learning

Some Useful Softwares for Mathematics Teaching and Learning :- this might be challenging for rural area degree students to adopt online interactive teaching ,but to complete the vision of NEP-2020 its Teaches duty to adopt mathematics software by own and then teach to the students so that mathematics learning becomes enjoyable. Here i give some of the important references of mathematics software as follow

Geogebra :- GeoGebra (geometry and algebra) is an interactive geometry, algebra, statistics and calculus application, intended for learning and teaching mathematics and science from primary school to university level. GeoGebra is available on multiple platforms, with apps for desktops (Windows, macOS and Linux), tablets (Android, iPad and Windows) and web.

MATLAB :- IT is a proprietary multi-paradigm programming language and numeric computing environment developed by MathWorks. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages.

Although MATLAB is intended primarily for numeric computing, an optional toolbox uses the MuPAD symbolic engine allowing access to symbolic computing abilities. An additional package, Simulink, adds graphical multi-domain simulation and model-based design for dynamic and embedded systems.

As of 2020, MATLAB has more than 4 million users worldwide They come from various backgrounds of engineering, science, and economics.

SCiLAB :- Scilab is a high-level, numerically oriented programming language. The language provides an interpreted programming environment, with matrices as the main data type. By using matrix-based computation, dynamic typing, and automatic memory management, many numerical problems may be expressed in a reduced number of code lines, as compared to similar solutions using traditional languages, such as Fortran, C, or C++. This allows users to rapidly construct models for a range of mathematical problems. While the language provides simple matrix operations such as multiplication, the Scilab package also provides a library of high-level operations such as correlation and complex multidimensional arithmetic.

Mathematica :-

Mathematica is a mathematical computation program used in many scientific, engineering, mathematical, and computing fields. Unlike other systems, Mathematica applies intelligent automation in every part of the system, from algorithm selection to plot layout and user interface design. With the collaboration study with computer science and mathematics teachers can explain mathematical examples easily to students using mathematica.

Maxima :- Maxima supports a variety of ways of reorganizing symbolic algebraic expressions, such as polynomial factorization, polynomial greatest common divisor calculation, expansion, separation into real and imaginary parts, and transformation of trigonometric functions to exponential and vice versa. It has a variety of techniques for simplifying algebraic expressions involving trigonometric functions, roots, and exponential functions. It can calculate symbolic antiderivatives ("indefinite integrals"), definite integrals, and limits. It can derive closed-form series expansions as well as terms of Taylor-Maclaurin-Laurent series. It can perform matrix manipulations with symbolic entries. Maxima is a general-purpose system, and special-case calculations as factorization of large numbers .

Wolf Alpha :- Using this software students can submit queries and computation requests via a text field. WolframAlpha then computes answers and relevant visualizations from a knowledge base of curated, structured data that come from other sites and books. It is able to respond to particularly phrased natural language fact-based questions. It displays its "Input interpretation" of such a question, using standardized phrases. Mathematical symbolism can also be parsed by the engine, which responds with numerical and statistical results.

To achieve the goal of NEP-2020 the main challenges in mathematical education is to replace old methods of teaching mathematics and to grab the new opportunities in teaching . here is some of the List of free e-Learning platforms developed by the Government of India

Free e-Learning platform :-

1. **Swayam:** The objective of SWAYAM is to provide a learning platform to all, including the most disadvantaged. It hosts almost all the courses taught in classrooms from Class 9 till post-graduation. More information on SWAYAM can be obtained on the official website, swayam.gov.in
2. **Diksha:** This is an initiative of the National Council of Educational Research and Training, Ministry of Education, Government of India. DIKSHA can be accessed at diksha.gov.in by learners and teachers across the country. It currently supports various courses of NCERT, CBSE and SCERTs across India.
3. **e-ShodhSindhu:** It will continue to provide current as well as archival access to more than 10,000 peer-reviewed journals and a number of bibliographic, citation and factual databases to its member institutions. e-ShodhSindhu can be accessed at ess.inflibnet.ac.in.
4. **e-PG Pathshala:** It is an initiative taken by the MHRD under its National Mission on Education through ICT, which is being executed by the UGC. The platform, epgp.inflibnet.ac.in provides interactive e-content in 70 subjects across all disciplines of social sciences, arts, fine arts and humanities, natural & mathematical sciences.
5. **Swayam Prabha:** It consists of 34 DTH channels, which is devoted to telecasting high-quality educational programmes 24X7. The course contents are provided by NPTEL, IITs, UGC, CEC, IGNOU, NCERT and NIOS. The website is swayamprabha.gov.in.
6. **NPTEL:** The National Programme on Technology Enhanced Learning was initiated by IIT Bombay, IIT Delhi, IIT Kanpur, IIT Kharagpur, IIT Madras, IIT Guwahati, IIT Roorkee along with Indian Institute of Science, Bangalore in 2003. NPTEL platform, nptel.ac.in provides open online courses around engineering and core science subjects.

Government Efforts and Initiative towards Improving , encouraging mathematics

RAA (Rastriya Avishkar Abhiyan)

In pursuance of the focus on connecting Mathematical knowledge to life outside the school, Colleges and making learning of Science Mathematics a joyful and meaningful activity, to bring focus on innovation and use of technology, the Ministry of Human Resource Development has set up the Rashtriya Avishkar Abhiyan (RAA)- a convergent framework that aims at nurturing a spirit of inquiry and creativity, love for Science and Mathematics and effective use of technology and encourage those who show an inclination and talent for math

and science to be encouraged and supported to heights of academic excellence and research. The Kothari Commission (1964) noted that the destiny of this country is shaped in the classrooms and laboratories of schools, colleges and universities.

NBHM :- The National Board for Higher Mathematics (NBHM) was set up by the Government of India under the Department of Atomic Energy (DAE), in the year 1983, to foster the development of higher mathematics in the country, to formulate policies for the development of mathematics, help in the establishment and development of mathematical centers and give financial assistance to research projects and to doctoral and postdoctoral scholars. NBHM functions essentially autonomously .

Mathematics olympiad :- Indian national mathematics olympiad started in 1986, along with this India regularly participating in international mathematical olympiad since 1989 . To achieve the goal of NEP -2020 we have to encourage rural area college students to participate in the mathematics olympiad. Some workshops , coursework regarding the math olympiad must be conducted at the college , university level each year.

II. CONCLUSION

NEP 2020 regarding the subject of Mathematics teaching and learning impacts directly on teachers. First, the role of mathematics teachers is more important in NEP-2020 to enhance mathematics teaching , because teachers have to play the mediator role between students and online teaching. Without losing its identity as a good teacher with new techniques A teacher may have an implicit view of mathematics and her approach to teaching will reflect the suggested approaches in one way or another. The professional development programmes may extend the understanding and reflection of teachers in the teaching . At the same time students also adopt new mathematical tools , different softwares , better use of the internet without losing their own curiosity.

III. REFERENCES

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