Pedagogic Thoughts

Download previous years' University question papers here...

BOUDHIK : PSC ONLINE QUIZ : K-TET : LP-UP : HSA CLICK TO OPEN

Click here for RECENT ANNOUNCEMENTS

Friday, 10 February 2017

Science and science education in post-independence period

After independence we realized the crucial importance of science for economic growth and social transformation. In the context of establishing modern science and technology as a live and vital force, the importance of science education cannot be forgotten. Indeed, science education plays a crucial role in the fields of scientific research and technological innovations. Addressing the then National Institute of Sciences (now INSA). Nehru stated. "Who indeed can afford to ignore science today? At every turn, we have to seek it's aid and the whole fabric of the world is of its making."
Raman, one of India's most eminent scientists said. "There is only one solution for India's economic problems and that is science, more science and still more science."

The important landmarks in the development of Science education in India are the following

In 1953 the **Secondary education commission** recommended the teaching of general Science as a compulsory subject m high schools and higher secondary schools. **All India Seminar on teaching of science** held in 1956 made serious discussions on almost all the aspects concerning the teaching of Science in schools. Indian parliament has adopted major policy statements relating to higher education and Science & Technology development. These developments have been largely guided by the **Scientific Policy Resolution of 1958**. It is one of the most comprehensive science policy documents ever approved. It envisaged the cultivation of science and scientific research in all its aspects. It has helped the nation to build up an Science & Technology base.

Scientific Policy Resolution 1958

The focus on the development of science and technology is a very strong characteristic of Free India, inaugurated under the dynamic leadership of Jawaharlal Nehru. We present below the Science Policy adopted by the government and the Indian Parliament in 1958. This document continues to be the cornerstone of India's quest for science and technology. The Government of India have accordingly decided that the aims of their scientific policy will be -

- to foster, promote, and sustain, by all appropriate means, the cultivation of science, and scientific research in all its aspects - pure, applied, and educational;
- to ensure an adequate supply, within the country, of research scientists of the highest quality, and to recognize their work as an important component of the strength of the nation;
- to encourage, and initiate, with all possible speed, program for the training of scientific and technical personnel, on a scale adequate to fulfill the country's needs in science and education, agriculture and industry, and defense;
- to ensure that the creative talent of men and women is encouraged and finds full scope in scientific activity;
- to encourage individual initiative for the acquisition and dissemination of knowledge, and for the discovery of new knowledge, in an atmosphere of academic freedom;
- and, in general, to secure for the people of the country all the benefits that can accrue from the acquisition and application of scientific knowledge.

Indian parliamentary and scientific committee was set up in 1961 under the chairmanship of Sri Lal Bahadur Shastri. The committee took up the study of science education m schools.

National Council of Educational Research and Training (NCERT) established in 1961 has a separate department of science education and is giving much importance to science education. It has set up a National Centre for Computer-based Education to promote training and development of teachers and teacher-educators. The centre will eventually sustain development of school teachers with a culture of resistance to change and provide schools with IT based inexpensive learning materials in support of the curriculum.

In **1964** the **Kothari commission** stressed that science education should be integral part of education.
The period marked the influence of science on the progress, welfare and security of nation. The commission recommended that upgrading school curriculum by research in curriculum development, the revision of textbook and teaching learning

...Congrats... K-TET Winners : Feb

...Congrats... K-TET Winners : Dec

REJI
View my complete profile

REJISH. M. M.Sc, M.Ed. NET. Asst.Pro

DROP BOX :: Previous Questions B.Ed : K-TET : LPSA : UPSA : HSA

K-TET PREVIOUS YEARS QUESTION POOL

K-TET PREVIOUS YEARS QUESTION POOL

B.Ed Practicals 2020 : CHECKLIST

material. It emphasis that science education should start right from primary stage and should become a part of all courses at the university stage.

The **constitutional amendment of 1976** places education including science and technology education in the concurrent list which implies the joint responsibility of the central and the state governments. The Government of India has established **Ministry of Human Resource Development** to function as an administrative ministry.

The **University Grants Commission (UGC)** of India is a statutory organisation set up by the Union government in 1956. The **University Grants Commission (UGC)** of India is a statutory organisation set up by Union government in 1956, for the coordination, determination and maintenance of standards of university education. It provides recognition for universities in India, and provides funds for government-recognized universities and colleges.

UGC's Efforts in Promoting Excellence: In recent years the UGC has launched a large number of program aimed at promoting excellence. These include:

- Autonomous colleges
- Faculty improvement programs
- Academic staff colleges, centers for advanced studies curriculum development councils career development program
- Support for strengthening infrastructure in S&T and removal of obsolescence in the universities
- Identification of universities with a potential and supporting them to become comparable with the best anywhere.

Inter-University Centres: One of the most innovative steps taken by the UGC for promoting excellence was the setting up of Inter- University Centres equipped with most modern experimental facilities or providing access to national facilities such as accelerators, nuclear reactors, etc to students and teachers from various universities. Nuclear Science Centre at Delhi. Inter- University Centre for Astronomy and Astrophysics at Pune and Inter-University Consortium for the Department of Atomic Energy Facilities with headquarters at Indore have already been set up and have been extremely useful.

The **All India Council for Technical Education (AICTE)** is the statutory body and a national-level council for technical education, under Department of Higher Education. Ministry of Human Resource Development established in November 1945 first as an advisory body and later on in 1987 given statutory status by an Act of Parliament. **AICTE** is responsible for proper planning and coordinated development of the technical education and management education system in India. The **AICTE** accredits postgraduate and graduate programs under specific categories at Indian institutions as per its charter.

For Science education and training several institutions comprising the **Indian Institute of Technology (IIT's), Indian Institute of Science (IISc).** about a dozen institutes of national importance, hundreds of universities, and over 8.000 colleges, exist. This infrastructure has already made a substantial impact on the country's scientific, industrial and economic development.

Indian Institute of Technology (IIT)
The Indian Institutes of Technology (IITs) are a group of autonomous public engineering institutes of India. The IITs are governed by the Institutes of Technology Act, 1961 which has declared them as “institutions of national importance”, and lays down their powers, duties, framework for governance etc.
The Institutes of Technology Act, 1961 lists sixteen institutes located at Bhubaneswar, Chennai, Delhi, Gandhinagar, Guwahati, Hyderabad, Indore, Jodhpur, Kanpur, Kharagpur, Mandi, Mumbai, Patna, Ropar, Roorkee and Varanasi. Each IIT is an autonomous institution, linked to the others through a common IIT Council, which oversees their administration. The IITs usually offer many degrees starting from B.Tech to Ph.D. The Indian Institutes of Technology (popularly known as IITs) are institutions of national importance established through an Act of Parliament for fostering excellence in education. There are 23 IITs at present,. Over the years IITs have created world class educational platforms dynamically sustained through internationally recognized research based on excellent infrastructural facilities.

Indian Institute of Science (IISc) is a premier university for scientific research and higher education located in Bangalore. India. Established in 1909 with active support from Jamshetji Tata it is also locally known as the "Tata Institute". It acquired the status of a Deemed University in 1958. IISc is widely regarded as India's finest institution in its field, and has made significant contribution to advanced computing, space, and nuclear technologies. Some of the academic research institutions such as IISc. Bangalore: TIFR. Mumbai: IITs and a few universities such as Delhi. Jawaharlal Nehru University. Poona. Banaras Hindu University. Yaranasi. Central University. Hyderabad: and Jadavpur.. have developed global reputation and attract increasingly large number of students from abroad.

Advance Centres for Science and Technology (ACST):

A few senior scientists and industrialists have proposed setting up advanced centers for science and technology. These are composite science and technology education and research centers. They seek to

integrate education and research, science and technology, pure and industrial research. These centres will provide a 5-year integrated programme leading to either an M.Sc. or M.Tech. degree.
Over the last forty years science, technology and mathematics education have emerged as lively new research areas. The research activity in these areas has been reflected in the launching of literally hundreds of new journals, in science education, mathematics education and, more recently, in design and technology education. Much of this research is carried out at the primary, middle and secondary levels of schooling.

Use of IT in Education:
The role of Information Technology (IT) as an instrument for progress and development has been acknowledged widely. The use of IT tools in teaching will make the learning process considerably simple and affordable. For a large and developing country like India, technology such as Distance Learning needs to be used in a major way to address the problem of limited educational material and resources. A number of projects have been sponsored in collaboration with leading institutions like IITs, IISc, Indira Gandhi National Open University (IGNOU), Nation Council for Science and Technology (NCST), and Birla Institute of Technology and Science (BITS), Pilani, with its long-term objective being promoting both IT

based general education and IT based education itself. IGNOU has several IT enabled courses and is further promoting this culture. National Council of Educational Research and Training (NCERT) has set up a National Centre for Computer-based Education to promote training and development of teachers and teacher-educators. The centre will eventually sustain development of school teachers with a culture of resistance to change and provide schools with ITbased inexpensive learning materials in support of the curriculum.

Exploratory - An Experiment in Learning by Doing Science
A unique institution called Exploratory has been developed at Pune by a few dedicated educators. Exploratory is neither a school or college laboratory nor a museum but is a place where school and college children can explore and experiment, invent and innovate and design and fabricate. There are no teachers in the exploratory but highly experienced guides who explore along with the students the basic concepts in science through carefully designed activities The purpose is to enable children to learn science by participating in the process of science. The exploratory promotes keen and careful observation, excites curiosity, encourages children to ask questions, question the answers and enables them to generalize and discover. Although the formal system of science education has not yet adopted the exploratory way of learning science, exploratory are being set up all over the country.

Navodaya Vidyalayas:
Navodaya Vidyalayas were conceived in 1986 by Rajiv Gandhi, former Prime Minister of India. The scheme aims at setting up well equipped well staffed schools in rural areas, almost one in every district to provide better quality science education to the talented children. These Navodaya Vidyalayas also serve as a resource centre and a pacesetter for the other schools in the region to follow. These Vidyalayas, 425 in number, also aim at promoting excellence and removing disparities.

NPE (1968)
"Science education should be an integral part of general education"
As a significant step in the history of education after independence, the Government of India announced National Policy on Education in 1968. The policy stressed the need for a radical reconstruction of the education system in the country. NPE 1968 ensures that Science education should be an integral part of general education.

Ishwarbhai Patel Committee (1977)
"Science as a tool for productive process"
In June 1977 a Review Committee under the Chairmanship of Sliri Isliwarbhai J. Patel. Vice-Chancellor. Gujarat University, consisting of 30 members was appointed. The committee report considered Science as a tool for productive process.

National policy on Education (1986)
"Science Education for all"
It has given much stress on science education and has recommended that science education should be designed to enable the learner to acquire problem solving and decision making kill as well as the ability to correlate science with health, agriculture, industry and other aspect of daily life. It has also been stressed that conceited effort be made to extend Science education to all those who had to remain outside the pale of formal education.

NPE (1992)
"Science as a subject at various levels of education"
Considering the reports of the two review committees (Ramamurthy review committee & Janardhana Reddy Committee CABE committee) NPE 1986 was revised in 1992. It considered Science to be an essential subject at various levels of education.

Yash Pal Committee (1993)
"Problem of curriculum load and science education"
In order to study about the concerns regarding academic burden of students a committee headed by Prof.Yash Pal was appointed by Govt of India. The committee gave its recommendations in July 1993. The report was entitled as "Learning without Burden . The committee recommended life oriented science topics more important than abstract science concepts.

NCF2005

NCERT has come up with three different National Curriculum Frame works during the years 1986. 2000 & 2005. This documents currently provides the frame work for making syllabus, text books and teaching practices within the school education programmes in India.
Main Features of NCF 2005
The document is divided into 5 areas
i Perspective
ii. Learning and Knowledge
iii Curriculum areas, school stages and assessment
iv School and classroom environment
v Systemic Reforms
Positive Features of NCF 2005
• Brings a fresh outlook in curriculum making
• Tries to breakdown the information overload in children.
• Focus creativity and overall development of children.
Guiding Principles of NCF 2005
• Connecting Knowledge life to outside school
• Learning-away from rote
• Enriching curriculum
• Overall development of children
• Not text book centric
• Reduces exam stress

• Curriculum from the context of Universal elementary Education

Aims of Science Education
Science Education should enable the learner to
● Know the facts and principles of Science and its applications, consistent with the stage of cognitive development.
● Acquire the skills and understand the methods of science
● Develop a historical and developmental perspective and to view science as a social enterprise
● Acquire the theoretical & practical knowledge for work
● Relate to the environment, local as well as global issues at the interface of Science and technology.
● Nurture natural curiosity, aesthetic sense and creativity to science and technology
● Imbibe the values of science.
● Cultivate scientific attitude.

Features of Science Curriculum in NCF 2005
1. Proposed child centered education
2. Brings a fresh outlook in curriculum making
3. Tries to breakdown the information overload m children.
4. Focus in creativity and overall development of children.
5. Avoid content dominated curriculum
6. Importance to creative expressions of students.
7. Activity based learning
8. Utilization of ICT in Science Education

NATIONALCURRICULUM FRAMEWORK 2005

National Curriculum Framework (NCF) 2005 owes its present shape and form to the flurry of ideas generated through a series of intensive deliberations by eminent scholars from different disciplines, principals, teachers and parents, representatives of NGOs, NCERT faculty, and several other stakeholders at various levels.
SCIENCE
One important human response to the wonder and awe of nature from the earliest times has been to observe the physical and biological environment carefully, look for any meaningful patterns and relations, make and use new tools to interact with nature, and build conceptual models to understand the world. This human endeavor has led to modern science. Broadly speaking, the scientific method involves several interconnected steps: observation, looking for regularities and patterns, making hypotheses, devising qualitative or mathematical models, deducing their consequences, verification or falsification of theories through observations and controlled experiments, and thus arriving at the principles, theories and laws governing the natural world.
Good science education is true to the child, true to life and true to science. This simple observation leads to the following basic criteria of validity of a science curriculum:
1.Cognitive validity requires that the content, process, language and pedagogical practices of the curriculum are age appropriate, and within the cognitive reach of the child.
2. Content validity requires that the curriculum must convey significant and correct scientific information. Simplification of content, which is necessary for adapting the curriculum to the cognitive level of the learner, must not be so trivialized as to convey something basically flawed and/or meaningless.
3. Process validity requires that the curriculum should engage the learner in acquiring the methods and processes that lead to the generation and validation of scientific knowledge and nurture the natural curiosity and creativity of the child in science. Process validity is an important criterion since it helps the student in 'learning to learn' science.
4. Historical validity requires that the science curriculum be informed by a historical perspective, enabling the learner to appreciate how the concepts of science evolve over time. It also helps the learner to view science as a social enterprise and to understand how social factors influence the development of science.
5. Environmental validity requires that science be placed in the wider context of the learner's environment, local and global, enabling him/her to appreciate the issues at the interface of science, technology and society, and equipping him/her with the requisite knowledge and skills to enter the world of work.
6. Ethical validity requires that the curriculum promote the values of honesty, objectivity, cooperation, and freedom from fear and prejudice, and inculcate in the learner a concern for life and preservation of the environment.
The Curriculum at different Stages
At the primary stage, the child should be engaged in joyfully exploring the world around and harmonizing with it. The objectives at this stage are to nurture the curiosity of the child about the world (natural environment, artifacts and people), to have the child engage in exploratory and hands-on activities for acquiring the basic cognitive and psychomotor skills through observation, classification, inference, etc.; to emphasise design and fabrication, estimation and measurement as a prelude to the development of technological and quantitative skills at later stages; and to develop basic language skills: speaking, reading and writing not only for science but also through science.
Science and social science should be integrated as 'environmental studies' as at present, with health as an important component. Throughout the primary stage, there should be no formal periodic tests, no awarding of grades or marks, and no detention.
At the upper primary stage, the child should be engaged in learning the principles of science through familiar experiences, working with hands to design simple technological units and modules (e.g. designing and making a working model of a windmill to lift weights) and continuing to learn more about the environment and health, including reproductive and sexual health, through activities and surveys. Scientific concepts are to be arrived at mainly from activities and experiments. Science content at this stage is not to be regarded as a diluted version of secondary school science. Group activities, discussions with peers and teachers, surveys, organisation of data and their display through exhibitions, etc. in schools and the neighborhood should be important components of pedagogy. There should be continuous as well as periodic assessment (unit tests, term-end tests). The system of 'direct' grades should be adopted. There should be no detention. Every child who attends eight years of school should be eligible to enter Class IX.

At the secondary stage, students should be engaged in learning science as a composite discipline, in working with hands and tools to design more advanced technological modules than at the upper primary stage, and in activities and analyses on issues concerning the environment and health, including reproductive and sexual health. Systematic experimentation as a tool to discover/verify theoretical principles, and working on locally significant projects involving science and technology, are to be important parts of the curriculum at this stage.

At the higher secondary stage, science should be introduced as separate disciplines, with emphasis on experiments/technology and problem solving. The current two streams, academic and vocational, being pursued as per NPE-1986, may require a fresh look in the present scenario. Students may be given the option of choosing the subjects of their interest freely, though it may not be feasible to offer all the different subjects in every school. The curriculum load should be rationalised to avoid the steep gradient between secondary and higher secondary syllabi. At this stage, the core topics of a discipline, taking into account recent advances in the field, should be identified carefully and treated with appropriate rigour and depth. The tendency to cover a large number of topics of the discipline superficially should be avoided.

Outlook of Science Education-NCF 2005

Looking at the science education in India, three issues stand out clearly.

• Science education is still far from achieving the goal of equity mentioned in our Constitution.
• Science education in India develops competence, but does not encourage inventiveness and creativity.
• The overpowering examination system.

How to overcome these problems? (OR)

How to increase quality of Indian Science Education?

The science curriculum must be used as an instrument for achieving social change in order to reduce the divide based on economic class, gender, caste, religion and region. We must use textbooks as one of the primary instruments for equity, since for a great majority of school-going children, as also for their teachers, it is the only accessible and affordable resource for education.

We must encourage alternative textbook writing m the country within the broad guidelines laid down by the National Curriculum Framework. These textbooks should incorporate activities, observation and experimentation, and encourage an active approach to science, connecting it with the world around the child, rather than information-based learning.

Additionally, materials such as workbooks, co curricular and popular science books, and children's encyclopedia would enhance children's access to information and ideas that need not go into the textbook, loading it further, but would enrich learning At present there is a lack of such materials in regional languages.

The development of science corners and providing access to science experimentation kits and laboratories, in rural areas are also important ways of equitably provisioning for science learning.

Information and Communication Technology (IC-T) is an important tool for bridging social divides.

ICT should be used in such a way that it becomes an opportunity equaliser by providing information, communication and computing resources in remote areas. ICT if used for connecting children and teachers with scientists working in universities and research institutions would also help the students to know clearly about scientists and their work.

For any qualitative change from the present situation, science education in India must undergo some changes.

• Rote learning should be discouraged.
• Inquiry skills should be supported and strengthened by language, design and quantitative skills.
• Schools should place much greater emphasis on co-curricular and extra-curricular activities aimed at improving investigative ability, inventiveness and creativity. There should be a massive expansion of such activities along the lines of the Children's Science Congress, being held successfully at present.
• A large-scale science and technology fair at the national level (with feeder fairs at cluster district state levels) may be organised to encourage schools and teachers to participate in this movement.
• Examination reform should be initiated as a national mission, supported by adequate funding and high-quality human resources. The mission should bring teachers, educationists and scientists on a common platfonn; launch new ways of testing students that would reduce the high level of examination-related stress: reduces the multiplicity of entrance examinations: and undertake research on ways of testing multiple abilities other than formal scholastic competence.

These reforms, however, fundamentally need the overarching reform of teacher empowerment. No reform, however well motivated and well planned, can succeed unless a majority of teachers feel empowered to put it in practice. With active teacher participation, the reforms suggested above could have a cascadmg effect on all stages of science teaching in our schools.

KERALA CURRICULUM FRAMEWORK – 2007

The curriculum revision programme in Kerala is launched as part of an endeavour to strengthen the Primary, Secondary and Higher Secondary school education in Kerala. The curriculum revision programme in Kerala was conceptualised on the basis of the recommendations of the National Curriculum Framework (N.C.F-2005). The curriculum revision initiated in 1996 in Kerala had a strong influence in the formation of National Curriculum Framework. Kerala could display the active working model of a learning process that has its foundation in the principles of Constructivism and a learner-centered, activity-based and process-oriented pedagogy.

Science Education in Kerala and in the country is facing myriad challenges. Perhaps it is an area that has been widely criticized for its content and pedagogic treatment. The criticism, to a certain extent, appears justified as we are not able to device a suitable approach for the learning of science and to accommodate latest development and trends in the field.

Three pillars of KCF

- Critical Pedagogy-Social dimension of constructivism learner centered and process oriented classroom.
- Issue based curriculum (Issue based critical pedagogy) - sensitizes the learner on social issues and instills in them a need to react to these issues. Process of transforming the society by constructing knowledge.
- Social constructivism- Learning as a process of constructing knowledge in groups.

Major criticisms

The major criticisms levelled against the prevailing science education may include:

• There is a notion that the aim of science education is to transmit knowledge that has already been gathered
• The learning process is neither process-oriented nor learner-centred, thus the learners do not have the opportunity to engage in learning activities and construct knowledge
• There is a tendency to promote rote learning of concepts in science to excel in examination
• the innate curiosity and scientific temperament of the learner are yet to find space
• examination centric textbooks and learning process
• incongruence between the content, and the level of the learner
• scientific temperament and science literacy are not addressed adequately
• learning of science fails to become interesting and challenging to the learner
• construction of knowledge has not been duly recognised
• science education has yet to become life related
• mechanisms for empowering learners in the pedagogic practices are yet to be strengthened
• the assessment of effectiveness of teaching science is completely neglected

Aims Of Science Education

The aims of science education include:
1. Development of scientific temperament and its application in daily life
2. Engagement in scientific methods like observation, experimentation, data collection, interpretation of data, analysis, theorizing, examining for construction of knowledge
3. Nurturing the ability to examine scientifically the problems of daily life as well as social issues and seeking logical solutions
4. Recognizing and developing one's own interests and abilities in technical and vocational fields
5. Encouraging the development of logical thinking
6. Imbibing a humanistic outlook and developing a world view based on it
7. Eecognizing the importance of understanding historical development of ideas
8. Nurturing lateral thinking ability for enabling the learners to look at things from different perspectives and to seek new solutions
9. Developing scientific literacy that provides for building awareness of scientific process.

8 MAJOR ISSUES LISTED KCF : VIEW

Posted by REJI at 00:37

No comments:

Post a Comment

Newer Post Home Older Post