

PRIMARY STAGE OF MATHEMATICS AND SCIENCE LEARNING

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Abstract

Primary and basic Mathematics and Science education has to be a phase of joyful learning for the child with ample opportunities for exploration of the environment, to interact with it and to talk about it. The main objectives at this stage are to arouse curiosity about the world (natural environment, artifacts and people) and have the child engage in exploratory and hands-on activities that lead to the development of basic cognitive and psychomotor skills through language, observation, recording, differentiation, classification, inference, drawing, illustrations, design and fabrication, estimation and measurement. The curriculum should also help the child internalize the values of cleanliness, honesty, co-operation, concern for life and environment. At the primary stage, children are actively developing their language skills – speaking, reading and writing, which is important to articulate their thoughts and develop the framework for observing the world. This is the stage, therefore, to emphasize on simple concepts.

Key Words: *Primary Stage (Classes I to V), Upper Primary Stage (Classes VI to VIII)*



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Introduction:

Primary and basic Mathematics and Science education has to be a phase of joyful learning for the child with ample opportunities for exploration of the environment, to interact with it and to talk about it. The main objectives at this stage are to arouse curiosity about the world (natural environment, artifacts and people) and have the child engage in exploratory and hands-on activities that lead to the development of basic cognitive and psychomotor skills through language, observation, recording, differentiation, classification, inference, drawing, illustrations, design and fabrication, estimation and measurement. The curriculum should also help the child internalize the values of cleanliness, honesty, co-operation, concern for life and environment. At the primary stage, children are actively developing their

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Primary Stage (Classes I to V)

Language development through language learning and for science and Mathematics learning, learning through local language / mother tongue is the most natural; but even while teaching in the local language care should be taken not to adopt a ‘purist’ approach, and not to load the child with terms and words that mean nothing to the child. The criteria for identifying the content at the primary stage are relevance, meaningfulness and interest to the child. The content should provide opportunities to deal with the real and concrete world of the children, rather than a formal abstract world. The present practice of introducing ideas and concepts pertaining to science and social science as Environmental Studies should be continued and further strengthened, with health education as an important component. It is, therefore, essential for the curriculum, syllabus and text book developers of both the ‘sciences’ and ‘social studies’ groups to work together. The pedagogy should essentially be based on activities in and out of classroom, as well as other methods such as stories, poems, plays and other kinds of group activities. Primary school students particularly in rural areas have rich interactive experience of the natural world and the curriculum should nurture and sustain this interest. Activities should allow free exploration, seeing patterns, making comparisons and understanding the web of relationships. This would enable the child to appreciate the similarities and the differences in nature, in the sounds, the colors, the sights, the shapes, etc. Concern for environment and inculcation of related values can be promoted through activities (planting of seeds, protecting trees, not wasting water, etc.) and practices relating to health, hygiene and social interactions are best taught by example rather than through recitations from a text book. The atmosphere in the classroom should not stress the child to perform, but allow learning to take place at individual pace and permit free interaction among children and the teacher.

The teaching-learning process should essentially be unstructured i.e. it should not follow a predetermined sequence of content or activities. The teacher should be free to devise his/her teaching learning sequence to accomplish the overall objectives

of environmental studies for this stage. There should be no formal assessment. The teachers' own observations of the child should form the assessment that is shared with the child's guardians. The progress card of the child should indicate only general observations on interests, abilities, skills, status of health and other aspects of the child. For Classes III to V, the teaching-learning process may be more structured, but should still continue to be based on continuous assessment. The assessment should aim at gaining greater insight into various aspects of the child's learning: language comprehension, reading ability, articulation, ability to work with hands and in groups, skills of observation, classification, drawing, and the other skills which constitute learning at this stage. Throughout the primary stage, there should be no formal periodic tests, no awarding of grades or marks, no pass or fail criterion and, therefore, no detention. Merit ordering of students at the primary stage should be dispensed with entirely. The class teacher should be empowered to carry out continuous assessment as per well laid out guidelines.

Upper Primary Stage (Classes VI to VIII)

At the upper primary stage the children are getting their first exposure to 'Mathematics and science'; this then is the time to bring home the right perspective of what it means to 'do Mathematics & science'. Mathematics and Science education at this stage should provide a gradual transition from environmental studies of the primary stage to elements of science and technology/scientific concepts to be taught at this stage should be chosen so as to make sense of everyday experiences. Though most concepts should be arrived at from activities/experiments, a rigidly inductive approach is not necessary. It is important to ensure that a majority of activities and experiments are inexpensive and use readily available materials, so that this core component of science curriculum can be implemented in all schools including those with inadequate infrastructure. Experience has shown that experiment-based science teaching is possible and viable under diverse conditions and with a very reasonable demand on resources. Science content at the upper primary stage should not be governed by disciplinary approach and is not to be regarded as a diluted version of secondary stage science curriculum.

Technology component of Mathematics and science curriculum could include design and fabrication of simple models, practical knowledge about common

mechanical and electrical devices and local specific technologies. It is necessary to recognize that there is a lot of diversity in the nature of technology that children from different areas of the country deal with. These differences in exposure and interest should be addressed through specific contextualized projects. Apart from simple experiments and hands on experiences, an important pedagogic practice at this stage is to engage the students (in groups) in meaningful investigations -particularly of the problems they perceive to be significant and important. This may be done through discussions in the class with the teacher, peer interactions, gathering information from newspapers, talking to knowledgeable persons in the neighborhood, collecting data from easily available sources and carrying out simple investigations in the design of which the students have a major role to play. Organizing information and displaying it in the classroom, in the school or in the neighborhood, or through skits and plays are an important part of the pedagogy to ensure larger participation and sharing of learning outcomes.

Biographical narratives of scientists and inventors are a useful practice to inspire students at this stage. The emphasis on the process skills of science should continue through the upper primary stage to enable children learn how to learn for themselves so that they could carry on learning to even beyond school. There should be continuous and periodic assessment (unit tests, term end tests), with much less weightage to the annual examination. At the upper primary stage, assessment should be completely internal with no external Board examination. Direct grading system should be adopted. The report card should show these grades for various components of assessment, but there should be no pass/fail grade and no detention. Every child who attends eight years of school should be eligible to enter Class IX. Merit ordering of students should be strongly discouraged. The periodic tests should have both a written and an experimental component, with the practicing teachers setting the question papers. Introducing open book examination is one way to ensure moving away from mere information seeking questions in examinations.

The examinations should assess the child's practical and problem solving skills, ability to analyze data; application of knowledge learnt; understanding of concepts; understanding, reading and making graphical representations; and solving simple numerical exercises. During the upper primary stage, children enter adolescence and

are likely to try to be free of the confines of home and parental care and assert their independence, sometimes by experimenting with smoking, drugs and sex. We need to be sensitive to their explorations of their self and body, as well as the outside world. While science textbooks provide factual information on the human body, reproduction, safe sex, drugs, smoking, etc., this is not enough. The classroom does not provide enough scope for wider and participative discussions on sex and related matters. The school should set aside some time every week for interactions in which students can share and seek information, discuss and clarify their doubts, with teachers and, if possible, counselors.

Conclusion

Mathematics and science education for the primary stage has very much importance because it is the base for understanding abstract as well as concrete concepts. It is the stage through which teacher can increase the interest among the students with the joyful learning of these subjects.

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