A Prospect on Teaching Science through Process Skill Approach

Md. Babar Khan[1] & Dr. Vanaja. M[2]
[1]Assistant Professor, Faculty of Education, R M College, Saharsa, Bihar.
[2]Associate Professor, Dept. of Education & Training, MANUU, Hyderabad.

Received: February 01, 2019 Accepted: March 07, 2019

ABSTRACT: *Science bears its significance for all the learners not only for they are acquiring knowledge through it but for imbibing the process skills too. The science teachers are expected to play their role so as the students must get an opportunity of acquiring procedural knowledge by them. For a long time in description of science skills the terms like scientific thinking, critical thinking and scientific method have been extensively in use but now the commonly used term for this is 'science process skills' that has gained more popularity by the curriculum project, Science - A Process Approach (SAPA). Approaching SPS is must in teaching science as this is the key that makes teaching influential and soulful. The method that uses these skills in its fullest at teaching science we call process skill approach. This approach could make a learner practically sound and active doers of science as this type of science teaching involves hands-on, discovery and inquiry based approach. This paper is an attempt to prospect how process skill approach paves the way of teaching science.*

Key Words: : *Science, Process Skills, Science Process Skills (SPS), Process Skill Approach*

Introduction:

Science has basically three dimensions viz. content of science, science process and scientific attitude. Content of science simply talks about what scientific knowledge one has. A common man thinks first over this dimension. The second dimension covers the process of doing science that means what science process skills one has or what a scientist do in science. The third dimension is all about the curiosity of knowing new things happening all around in our nature. All these three dimensions have their own importance and no can be ignored in science as well as in our daily lives. Science bears its significance for all the young people not only for they are acquiring knowledge through it but for imbibing the process skills too. Hence the science teachers are expected to play their role so as the student must get an opportunity of acquiring procedural knowledge by them (NCERT Pedagogy of Science I, 2013). For the processes in science the terms like scientific method, scientific thinking and critical thinking have been used to express these but the phrase 'science process skills' has been more frequently used for the last two decades (Bybee & DeBoer, 1993). When investigations are conducted by scientists then Science Process Skills are used by them to discover scientific knowledge (Abruscato, 1995). Simply we can take Science Process Skills as the thinking skills that are used by scientists to construct knowledge for solving the problems and formulating result (Ozgelen, 2012).

Process Skills: A brief

Science process or its indicators that is distinguished and read in broader way today can be traced out in earlier literatures on science and its inquiry. One of its examples is Karl Pearson's scientific method that is comprised of various science processes. For the description of science skills the terms like scientific thinking, critical thinking and scientific method have been used at several points of time but now the commonly used term for this is "science process skills" that gained more popularity by the curriculum project, Science - A Process Approach (Padilla, M.J.). The importance of the process of knowledge and its acquisition as taken by Bruner (1962) is teaching a subject to someone does not mean to produce a little living library on that concerned subject but to teach so as to take part in the process that makes the establishment of knowledge possible. Simply Bruner says, acquiring knowledge is a process. UNESCO Sourcebook for Science in the Primary School: A Workshop Approach to Teacher Education (1992) has listed out the indicators of process skills, a glimpse on those are following:

Observing: This skill makes an individual capable of gathering information by using his senses. This could make an individual equipped in differentiating the objects that look similar or in recognizing the similarities that look different.

Raising Questions: This skill makes an individual proficient to raise questions enquire something. By this one can raise question that are based on hypothesis and even can identify the question that could be answered by his own investigation.

Hypothesizing: This skill makes an individual equipped in using his concepts over the thing in solving the problems in different set.

Predicting: This skill makes an individual capable of using his earlier knowledge and available evidences to imagine the new one. He could even justify about his prediction on what that is based upon.

Finding Patterns and Relationships: This skill makes an individual competent in examining the deduced association or relationship. This makes him equipped in drawing inferences by putting scattered pieces of information together.

Communicating Effectively: This skill makes an individual efficient and prompt in responding others as well as using oral and written language in an organized way

Designing and Making: This skill makes an individual capable of selecting appropriate materials to construct a model and to produce plan and design for solving a problem.

Devising and Planning Investigations: This makes an individual a minute observer and active while doing or planning an investigation.

Manipulating Materials & Equipment Effectively- This skill makes an individual proficient in handling tools and equipments. This also makes an individual capable of doing task with accuracy.

Measuring and Calculating: This skill makes an individual equipped in taking an adequate set of measurements for the task assigned to him.

Why Do We Need a Process Approach?

To make teaching science influential and successful a science teacher is supposed to have scientific attitude. A teacher having no much understanding over SPS lacks in positive attitude towards science (Cain, 2002). Also from the earlier done studies it could be found that science process skills must be properly understood and practised by science teachers. In a study entitled 'Primary School Teachers' Understanding of Science Process Skills in Relation to their Teaching Qualifications and Teaching Experience' Shahali et al (2015) explores that primary school teachers are efficient in operational knowledge but lacks in conceptual knowledge of SPS. NCERT (2006) in one of its Position Papers, National Focus Group on Teaching of Science puts in the document section bearing 'Curriculum at Different Stages: Objectives, Content, Pedagogy and Assessment' about what importance process skills have up to class X is that "the science curriculum up to Class X should be oriented more towards developing awareness among the learners about the interface of science, technology and society, sensitizing them, especially to the issues of environment and health, and enabling them to acquire practical knowledge and skills to enter the world of work. It should stress not only the content of science, but, more importantly, the process skills of science, that is, the methods and techniques of learning science." Science process skills make the learner able to go parallel with growing and ever changing field of science and technology. Process skill approach is the method of teaching science that tries to make child able of discovering science knowledge in the same way as the scientists do. By this approach a learner is allowed to experience the scientific activity. (Rowland, Stuessy & Vick, 1987).

Advocacy towards Process Approach:

In one of the UNICEF aided projects during 1967-70 NCERT developed instructional material for teaching science at primary level and that was based on activity-based approach. In U.K the Warwick Process Science (Screen, 1986) emphasized process oriented curriculum which was developed to be used in secondary schools. The science curriculum that we see so rich today and are on track of being more richer in tomorrow's global arena, actually got the global attention after the year 1950 when teaching of science were started to be taken as of major concern. One of the earliest best- known courses of this type was Science- A Process Approach (SAPA) developed in early 1960s for employing in primary (or elementary) schools by American Association for the Advancement of Science (Livermore, 1964). A number of curricular innovations that advocated the development of process in science teaching could be seen so far. In this context the, The Science Curriculum Improvement Study (SCIS), Elementary Science Study (ESS) The Elementary School Science Project (ESSP), School Science Curriculum Project (SSCP), The Minnesota Mathematics and Science Teaching Project (MINNEMAST), Conceptually Oriented Program in Elementary Science (COPES) and many other such programmes brought the revolution throughout the world. While The National Council of Educational Research and Training was planning the integrated science curriculum for the middle school, recognized the process approach as one of its core elements and laid emphasis on understanding of the processes that is useful in scientific knowledge and in daily life as well (NCERT,1982). Further NCERT in its Position Paper, National Focus Group on Teaching of Science (2006) discusses 'Science Curriculum at the National Level: A Brief History' and led stress more on processes of science than the product.

Conclusion:

A science teacher well equipped with SPS could teach more based on enquiry that leads to a successful classroom interaction. It could be said that a science teacher without having conceptual and operational knowledge of SPS are just like a flower without fragrance. This approach could make a learner practically sound and active doers of science as this type of science teaching involves hands-on, discovery and inquiry based approach. (Rowland, Stuessy & Vick, 1987). Schooling has one of its important goals as to encourage thinking among students so around the world so this has been taken as one of the major concerns in curriculum planning. Subjects that are to be taught at schools are prepared in such a way that this goal could be achieved. Science contributes a lot as its nature is to promote enquiry and thinking. So the way we teach science must itself be scientific and the science process approach could pave this way.

References:

1. **Abruscato, J. (1995).** Teaching children science: A discovery approach. Boston: Allyn & Bacon.
2. **Bruner, J.S. (1962).** The conditions of creativity, In Gruber, H., Terrel, B. and Wetheimer, M. (Eds) Contemporary approaches to creative thinking. New Jersey E. Cliffs: Prentice Hall
3. **Bybee, R. W., & De Boer, C. E. (1993).** Research on goals for the science curriculum. In D. Gabel (Ed.), Handbook of research on science teaching and learning (pp. 357-387). New York: National Science Teachers Association.
4. **Harlen, W., & Elstgeest, J. (1992).** UNESCO Sourcebook for Science in the Primary School: A Workshop Approach Teacher Education. Retrieved from http://www.arvindguptatoys.com/arvindgupta/unescoprimary.pdf.
5. **Livermore, A.H. (1964).** The process approach of the AAAS commission on science education. Journal of Research in Science Teaching, 2(4), 271-282.
6. **Millar, R. (2015).** Process science. In R. Gunstone (Ed.), Encyclopaedia of Science Education (pp. 796-7). Dordrecht: Springer.
7. **NCERT. (2006).** Position Paper, National Focus Group on Teaching of Science, New Delhi: NCERT. Retrieved from http://www.ncert.nic.in/new_ncert/ncert/rightside /links/pdf/focus_group/science.pdf
8. **NCERT. (2013).** Pedagogy of Science Part1, New Delhi: NCERT. Retrieved from http://www.ncert.nic.in/departments/nie/desm/publication/pdf/phy_sci_partI.pdf
9. **Ozgelen, S. (2012)**. Students' Science Process Skills within a Cognitive Domain Framework. Eurasia Journal of Mathematics, Science & Technology Education, 8(4), 283-292. DOI:10.12973/eurasia.2012.846a
10. **Padilla, M.J. (1990).** The Science Process Skills. NARST Research Matters - to the Science Teacher. No. 9004. https://www.narst.org/publications/research/skill.cfm
11. **Rowland, P., Stuessy, C. L., & Vick, L. (1987).** Basic Science Process Skills. An In-service Workshop Kit: Workshop Manual. New Mexico State University., Las Cruces College of Education. Available at https://files.eric.ed.gov/fulltext/ED282773.pdf
12. **Screen, P. (1986).** The Warwick Process Science project. School Science Review, 67(242), 12- 16.
13. **Shahali, E. H. M., Halim, L., Treagust, D. F., Won, M., & Chandrasegaran, A. L. (2015).** Primary School Teachers' Understanding of Science Process Skills in Relation to Their Teaching Qualifications and Teaching Experience. *Research in Science Education*, 1-25. DOI: 10.1007/s11165-015-9500-z
14. **Vanaja, M. (2004).** Methods of Teaching Physical Science, Hyderabad: Neelkamal Publications.