

# Ways and Means of Implementing Scientific Method in Teaching and Learning Process

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## ABSTRACT:

Scientific methodologies can be effectively applied to obtain desired outcomes in the teaching and learning processes. This paper defines "scientific approach" and the steps involved in executing a scientific approach, like those of watching, questioning, experimenting, associating, and communicating. The emphasis is on curriculum implementation in order to properly implement the scientific method. The core process of problem exploration, as well as the requirement for teachers to adopt methodical methods for teachers in implementing a scientific approach, are explored. Teaching methodologies and fundamental concepts of using a scientific approach are discussed. All of the steps to take for learning using a scientific approach are outlined.

Teachers must develop their capacity to implement observation and questioning, as well as other phases of scientific approaches that can boost students' learning abilities.

**Keywords:** scientific approach, teaching, learning, questioning, experimenting, associating, curriculum implementation, concepts, measures.

## I. INTRODUCTION:

A science based method is a form of teaching, and planning process that use a scientific approach to teaching a subject. It includes the basic aspect as "doing science," which allows teachers to awaken language learning by breaking it down into segments with explicit directions for practising pupil learning. The scientific approach, according to Tang et al. (2009), bears the characteristics of "doing science." Despite the fact that the scientific approach has achieved enormous achievements in improving teaching quality, instructors still face a number of problems. This study looks into the use of a scientific approach to teaching subjects, as well as the challenges surrounding teaching and learning.

## A Scientific Approach:

The science based method is a series of methodologies for researching topics, gathering new data, and refuting and assimilating previous information. It is considered as a systematic method of getting data that comprises perspectives through experiments and drawing conclusions depending on the outcome of assessment (Longman, 2014). To accomplish educational goals successfully, scientific approaches should be applied. The development of viewpoints, insight, and abilities are amongst the learning objectives. abilities in accordance with the curriculum's standard competency.

Acceptance, execution, respect, appreciation, and practise are all actions that inculcate attitudes. Remembering, comprehending, applying, evaluating, and producing are all actions that contribute to knowledge acquisition. Observing, asking, experimenting, thinking, serving, and producing are all activities that can help you learn new skills. Thus the entire process of teaching learning in a scientific method can be described as a way of watching, questioning, thinking, investigating, as well as formulating a network for all disciplines.

## Steps for applying the scientific approach

Implementing experimental methods in the course of teaching and learning necessitates the use of skills such as observation, inquiry, experimentation, association, and sharing. The activities associated with those steps are described in more detail below.

### a) Observing

Scientific observations require domain knowledge as well as quick thinking. Observation consists of two steps. First, teachers should provide students with a variety of opportunities to observe. Observation can be accomplished through the use of one's senses, such as in studying, hearing, or viewing the entity. The second phase

denotes professors facilitating pupils' interpretation & training them to notice crucial elements of the item. The observing process is divided into several stages: (1) choosing the element to really be recognised, (2) determining the purpose, (3) selecting a method of observation, (4) curbing the element, (5) meticulously performing the assessment, (6) documenting the outcome of the assessment, and (7) reporting a finding of the observation.

**b) Thirst for knowledge through questioning.**

The assessing process works to spark students to actively learn and adapt themselves; to raise students' skills in various domains, systematically using appropriate subject; to encourage students' participation in analysing, disputing, cultivating the intellect and reach inferences; or even to strengthen an open attitude to give and receive opinions or ideas, as well as to develop social tolerance.

**c) Experimenting**

The experimentation process includes training, effort, and adopt. Experimentation initiatives include (1) dividing students into small groups, (2) informing participants to communicate, (3) noting down all observations, (4) monitoring the instructional plan to make sure that almost all learners are actively engaging in the conversations, & (5) providing instruction to the group that needs it.

**d) Associating**

Associating the information is critical in one of the scientific method's processes. It examines the information gathered by the team. Associating is the method of assessing necessary data to discover the link among a piece of data along with another, and then examining the correlations and interrelationships of the wisdom to draw conclusions.

**e) Communicating**

Communication necessitates the capacity to draw conclusions from observed and tested facts. The following activities would be included in the communicating steps: (1) seeking students to read his/her task aloud to the lecture hall, (2) urging each group to pay attention carefully and provide more information of each group's work, (3) explaining just after group conversation concludes, and (5) organising tasks and generating opportunities for students to demonstrate attitude, abilities, and subject matter comprehension.

As a result of employing a scientific method in the teaching and learning process, students are

expected to participate actively in class activities by integrating skills, attitude, and knowledge.

Implementing science-based curriculum is required to make innovative ideas a reality.

**Curriculum Implementation:**

Several academics and researchers have expressed concerns about the scientific methodologies being used. Fullan (1991) defines implementation as the methodology of placing concept, programme, or series of actions for the individuals intending as well as supposed to improve. Modification in resources, pedagogical skills, and ideologies are required for the implementation of any latest programme or policy. Curriculum implementation, according to Print (1993), is a short-term phenomenon that aims to incorporate new curriculum into existing practise.

Thus, curriculum practice can be defined as the process of putting the new curriculum into classroom practise using a scientific approach to the teaching-learning process.

A teacher's desire to execute the curriculum, on the other hand, is governed by their understanding, attitudes, and drives to make curriculum modifications.

At the same time, the institute should be eager to execute curricular modifications, which are influenced by motivation, programme understanding, and implementation competence. Consequently, the effectiveness of curriculum implementation can only be determined based on one's own beliefs and abilities as a teacher or administrator.

As a result, the curriculum's implementation will indeed be ascertained by teachers' preparation to implement the curricula in the process of teaching and learning. Teachers who have completed training to include the curricula will be accountable for implementing it.

**Issues relevant to the Scientific Approach:**

Exploring problems as a part of a scientific approach is a fundamental process:

Its goal is to determine (1) how instructors use the science - based approach in subjects like explanatory, discourse, interpretation, & practical writings, and (2) the efficacy of using the scientific strategies in teaching the subjects mentioned above, narrative, explanation, and functional texts.

The need for a deliberate phase engaging teachers in order to comprehend the indicators of scientific approach:

An evidence-based strategy is characterised by the following characteristics: (1) observation (which involves both seeing and reading) (2) questioning, which includes asking factual and hypothetical questions, (3) experiencing, which includes

choosing on the important data, data source, and data collecting, (4) associating, which includes analysing and finding the relationship of data, summarising data analysis results, and (5) communicating

Thus, the scientific approach in the teaching and learning process includes critical elements such as: 1) observing 2) questioning 3) experimenting 4) associating and 5) communicating.

#### **The need for implementing the Scientific Method:**

The primary goal of determining the need for a scientific method is to encourage students to think critically about scientific issues, to become more methodical in their thoughts, or even to acknowledge themselves as autonomous individuals capable of organising and conducting their own research.

Teaching the scientific method, a style of thinking and learning about science, is one of the most effective approaches to achieve these objectives. The scientific process focuses on posing a compelling research question, eliciting ideas for correctly exploring the question, assessing results, and reaching conclusions. It allows students to put themselves in the shoes of scientists, who conceptualise and plan investigations.

#### **Teaching Strategies:**

The vital strategy for teachers is to devote a lesson to each activity or process involved in conducting an investigation. The processes stated below can be exceptionally important for young scientists. The following concepts highlight the scientific method and describe how it can be implemented for students.

#### **Raising Questions**

An important aspect of the scientific method is raising questions, and therefore, teachers should take a key role in teaching. On the other hand, students should ask open-ended questions about the content that they are really interested in discovering. Raising questions is an essential component of the research method; therefore, teachers should play an important role in teaching in order to effectively implement the scientific method.

#### **Use of Observations**

Observational techniques have to be adopted for successful implementation of scientific methods. Many questions and queries can be answered using observational data. The data collected can be utilised to provide relevant answers.

The scientific method is illustrated in the following topics, and how it might be applied to pupils is described.

#### **Scientific Methodology:**

a) The scientific method consists of the following features:

- 1) Is focused mostly on pupil.
  - 2) Using computational thinking competence to realise a concept, law, or principle.
  - 3) Have ability to assist students in developing their personalities.
- b) The primary aim of learning the methodological approach is:
- 1) To enhance students' erudition and analytical thinking.
  - 2) To help students develop their ability to solve problems in a systematic manner.
  - 3) To foster instructional environments where students believe that learning is essential.
  - 4) Obtaining outcomes from extensive learning.
  - 5) To assist students in developing their personalities.

#### **Learning principles with a scientific approach**

The scientific approach principles in learning activities are as follows:

- 1) Education with a focus on the students
- 2) Gaining knowledge from the students' self-concept
- 3) Students are able to comprehend and apply concepts, laws, and principles.
- 4) Improve students' learning abilities
- 5) Increase student motivation and the teacher's motivation to teach.

#### **Measures to be followed for learning with a scientific approach:**

Conceptual steps in the education process encompass inference, inquiring, and experimentation, followed by compiling the information and data, expressing the statistical information, and finally analysing, conceptual understanding, summarising, and inventing. A scientific method may not always be appropriate for the themes, materials, or conditions. In this case, the learning process must maintain conceptual values while avoiding non-scientific ones.

#### **The learning activities in the scientific approach**

Preliminary, core, and closing activities are the three most important parts of the learning process. Preliminary activities include gathering background information. The preliminary event's goal is to create an environment conducive to early learning so that students can closely monitor the educational process.

The primary goal of the preliminary exercises in the scientific method is to strengthen students' ability to grasp the ideas that mastered in relation to the source material that will be be

evaluated. The primary task is the most important activity in a student's learning process experience (learning experience).of students.The creation of the student's experience is a fundamental action in learning. The primary goals of cover activities are twofold. Students must first evaluate the proposition or legal principle that they have developed. Second, enrichment students understand the subject well.

Closing Activities Examples:1) Instructors in Natural Sciences encourage their children to demonstrate an idea, rationale, or hypothesis.2)Teachers Natural Sciences can challenge students to broaden their conceptual understanding, standards, or concepts covered in relevant curricula or from other sources. The professor could suggest websites on the internet that are related to the concepts, principles, or theories that the learners acquire, and then instruct the students to visit these websites.

## II. CONCLUSION:

Teachers can efficiently use a scientific method. The steps of observation and inquiry, among the four stages of scientific approach implementation, are still challenging for teachers to implement. Experimenting and socialising are

regarded as adequate, whereas communicating is regarded as well-executed. Teachers must increase their abilities to execute observation and questioning stages, as well as activities that will help pupils learn more effectively.

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