

**PROGRAMME FOR  
INTERNATIONAL  
STUDENT ASSESSMENT**

**PISA**  
DAY: 2  
SESSION:1

# DISCIPLINE OF SCIENCE



Science is the study of the nature and behaviour of natural things and the knowledge that we obtain about them.

Discipline is the field of study of a particular subject.

A seamless pattern of science and education icons. The design features a variety of symbols including human brains, light bulbs, DNA double helices, microscopes, test tubes, flasks, and the formula  $F=ma$ . The icons are rendered in a simple, cartoonish style with a limited color palette of orange, green, and grey on a white background. The pattern is dense and repeats across the entire surface.

Download from  
**Dreamstime.com**

This watermarked comp image is for previewing purposes only.

**ID** 111180197

Ekaterina Muzyka | Dreamstime.com

## **Why is teaching science so important?**

Science is a huge part of our daily lives, from technology to transportation to medicine to legal issues and government decisions.

The pace of research and discovery is quickly accelerating.

That makes it more important than ever to understand science, for in doing so, students can better understand the world.

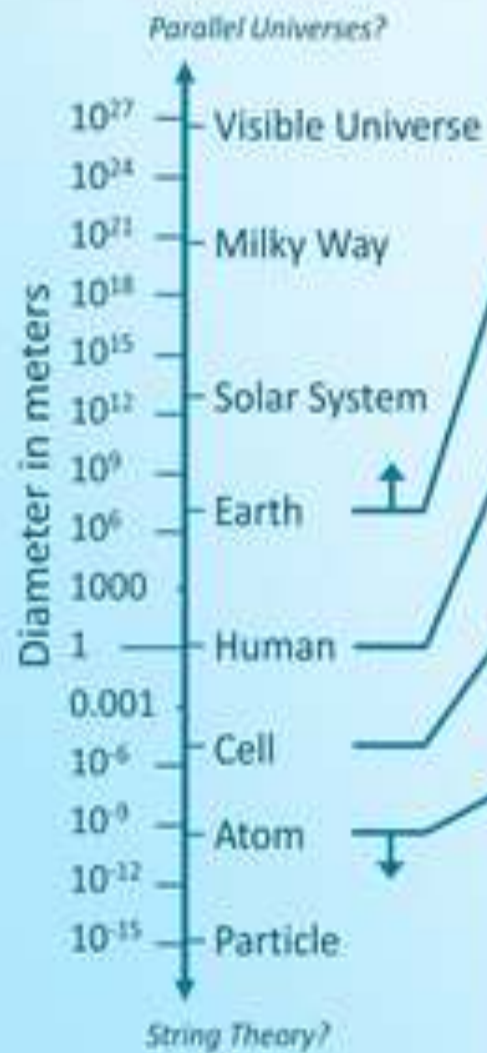
Teaching science requires critical thinking, effective communication, collaboration and creativity.

Real-life scenarios, peer-to-peer teaching, hands-on activities, science projects and field research journals are effective teaching techniques in the science curricula.

Instruction in science often can foster greater interpersonal skills and independent thought.



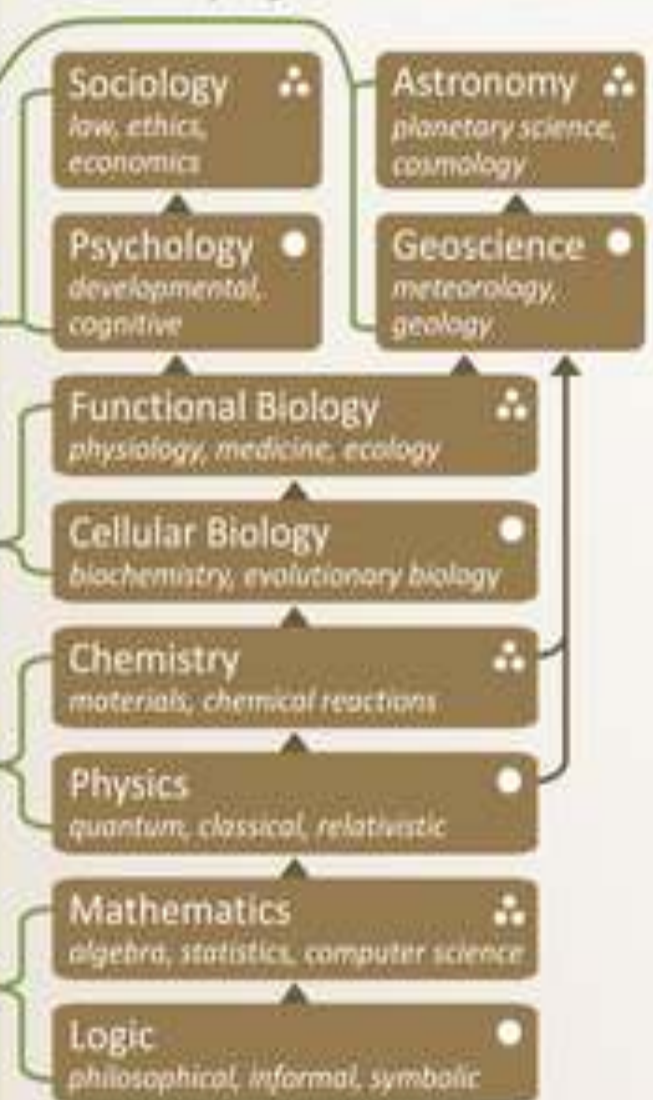
## Scale of the Universe



## Branches of Science



## Hierarchy of the Sciences





- **Formal sciences**: the study of mathematics, logic, and statistics,
- **Natural sciences**: the study of natural phenomena
  - (including cosmological, geological, physical, chemical, and biological factors of the universe).
  - Natural science can be divided into two main branches:

- **physical science** and **life science** (or biological science).

- **Social sciences**: the study of human behaviour and societies

Natural and Social sciences are empirical sciences, Meaning that the knowledge must be based on observable phenomena and must be capable of being verified by other researchers, working under the same conditions

# Evolution of a scientific discipline

**Stage 1.** The introduction of new objects / phenomena, with an accompanying language to adequately describe such phenomena.

**Stage 2.** Development of a 'tool-box' of methods /techniques to probe the objects /phenomena; with advancements in methodologies helping to identify and understand the degree to which other phenomena fall into the realm of this new science

**Stage 3.** The stage at which most of the specific knowledge is generated, with the majority of research publications being published, often focusing on the application of new research methods to objects / phenomena.

Scientists may re-describe their subject matter using refinements from stage 2,

Contd.



Contd.

in the same way that with the advent of molecular biology, biologists might re-describe old subject matter from this new context; thus creating new insights, new answers and new questions.

**Stage 4.** A seeming steady-state for a discipline, where the knowledge gained from earlier stages is maintained and passed on, often with practical application; often with new means generated to present the information. Whilst ground-breaking new discoveries are not necessarily made, this does not preclude crucial revisions to the role of this discipline within scientific environment.

# Five Teaching techniques

- ❖ Real-life scenarios that involve case studies
- ❖ Ways of analyzing current problems
- ❖ Peer-to-peer teaching, which involves students in their own education
- ❖ Hands-on activities that engage students beyond the lecture
- ❖ Teach useful scientific concepts

## 1. Curriculum Institute

All teachers participate as learners.

## 2. On-Site Support

Inquiry walks, classroom coaching, and co-teaching.

## 4. Student Work Study

Describing student writing, trends, and determining next instructional steps.

## 3. Peer Learning Labs

Focused group observations marked by careful note taking, discussion, and debriefing.



# **Scientific Discovery, Computational Models of Scientific Discovery**

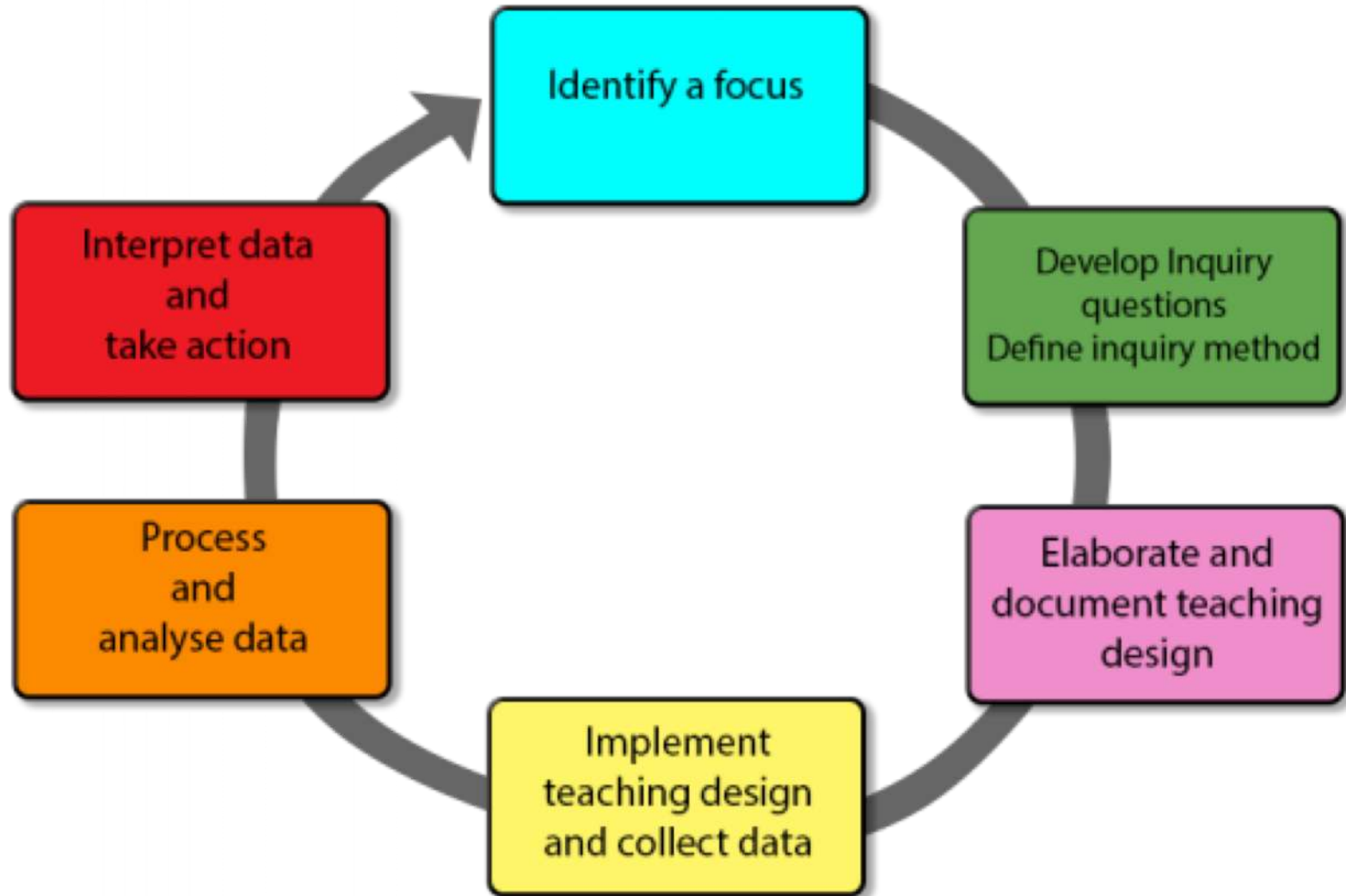
Scientific discovery is the process by which novel, empirically valid, general, and rational knowledge about phenomena is created.

Computational models of scientific discovery are computer programs that make discoveries

Science projects, which teach the scientific methods of inquiry and experiment.

Field research journals





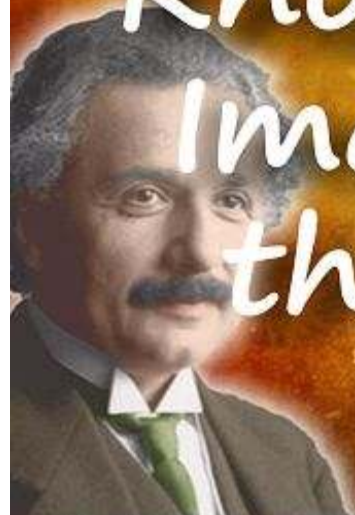
Model discoveries from  
the history of science or  
simulate the behaviour  
of participants/Students  
solving scientific  
problems

The success of these models provides some insights into the nature of human cognitive processes in scientific discovery and addresses some interesting issues about the nature of scientific discovery itself

Imagination is  
more important  
than knowledge.



Knowledge is limited.  
Imagination encircles  
the world.



*Albert Einstein*

**THANKS**