

THE SCIENCE CHRONICLE

ISSUE
2026-2027

EXPLORING. LEARNING. INNOVATING.

SCIENCE TODAY,
SOLUTIONS
FOR TOMORROW.

INSIDE THIS ISSUE

Curious Minds
Ask Better Questions

The Next Frontier
Of Innovation

Teaching. Learning.
Transforming Lives

“

Science is not
just a subject,
it's a way of
thinking.



NATURE'S WISDOM
Learning from
the living world.



IDEAS THAT MATTER
Discoveries that
shape the future.



EDUCATION IN FOCUS
Empowering minds.
Building a better world.

FROM THE EDITORIAL Desk

Every idea you just explored began with a question.
Every breakthrough began with curiosity.
And every great mind began by daring to think differently.

In a world full of noise and assumptions,
may you always choose to question, to explore, and to understand.
Let science be your compass and wisdom your guide.
Let your thoughts be brave, your mind be open,
and your attitude be truly scientific.

This magazine is not just a collection of articles—
it is a reflection of young minds that are curious,
creative, and determined to create a better tomorrow.

Thank you for being a part of this journey.
Keep questioning. Keep exploring. Keep shining.

WITH GRATITUDE,

Amita , Sunidhi
Rhema , Vanessa
Angelina , Sera

Stay curious.
Stay kind.
Stay inspired.
♡

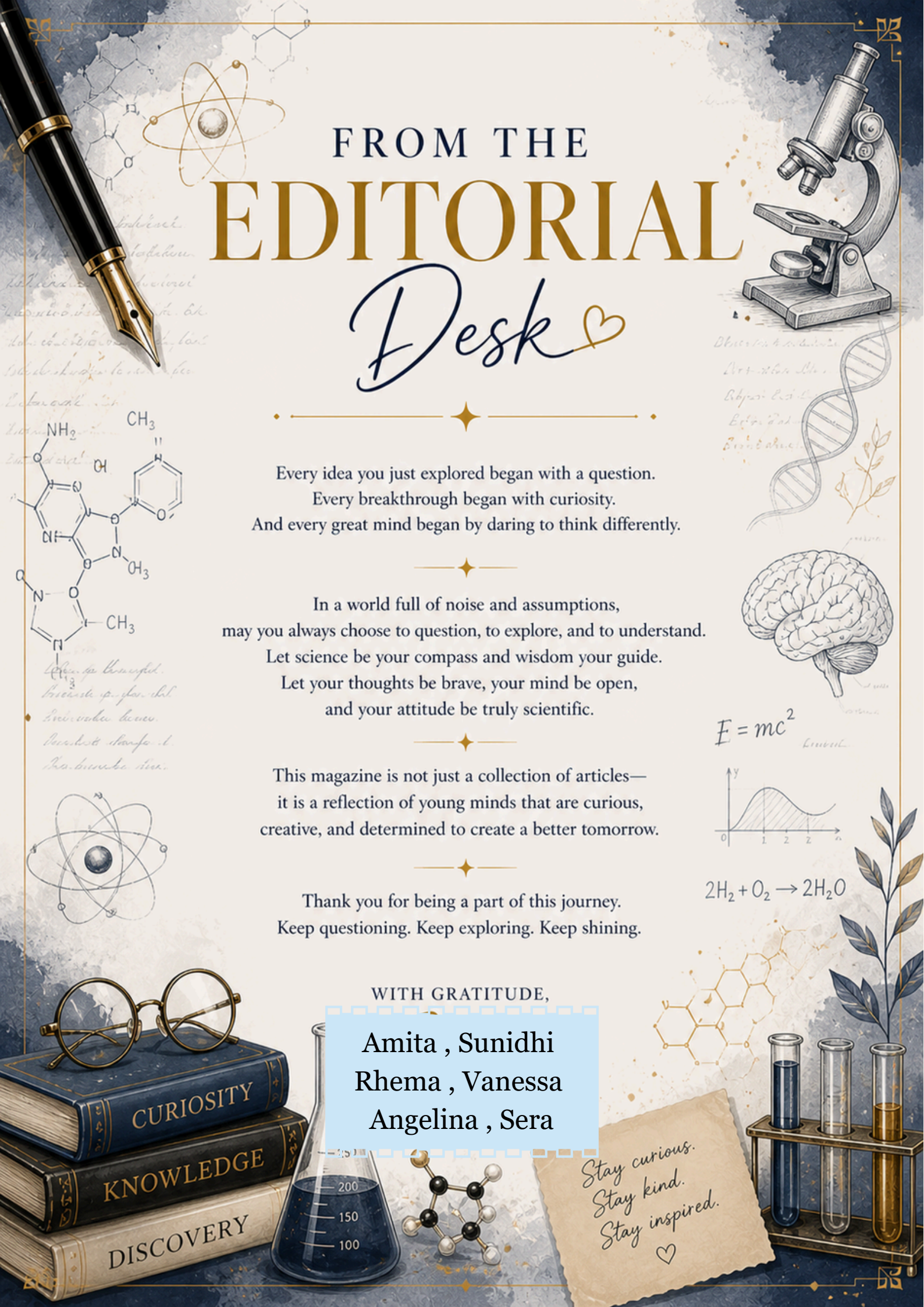


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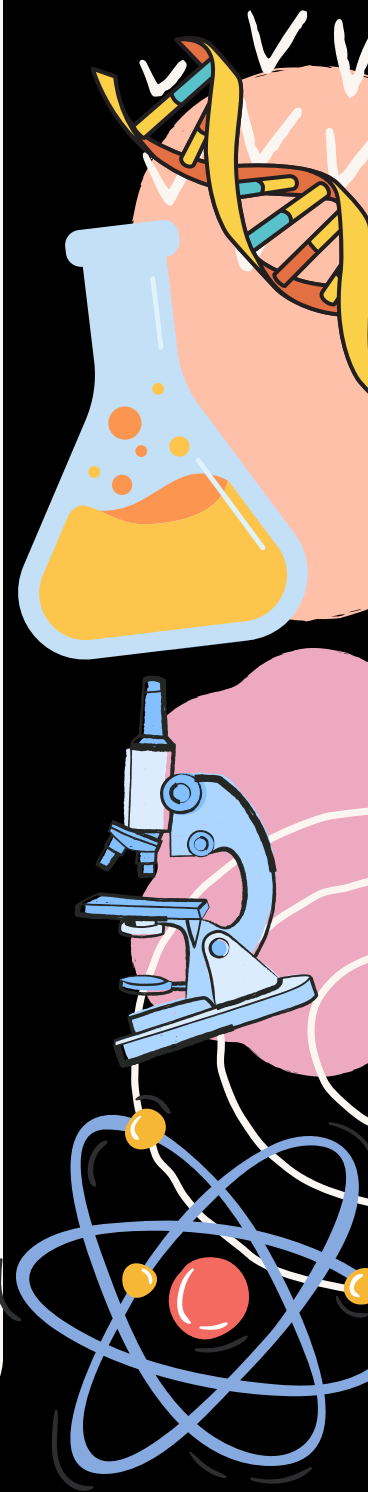
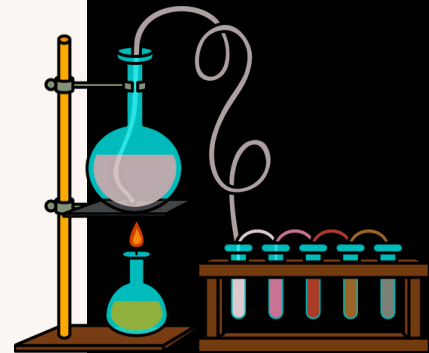


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1.INDIA BURNS

The science, scale, and the human cost of our rising temperatures



When the Thermometer refuses to stop

In April 2026, 95 of the world's hottest cities were in India. Temperatures crossed 46° before May. A "heat dome" sealed the Indo-Gangetic plains like a furnace lid. This is not just a weather report — it is a science lesson happening in real time.

- 46.9°C - Akola, Maharashtra briefly among the hottest cities on the earth
- +5°C - Above normal, Across NW, central & Peninsular India briefly among the hottest cities on the earth
- 256 GW Peak Power Demand
- India's Summer 2026- Earlier and hotter than ever
- Loss of green cover accelerates urban heat
- Heat dome traps air over the plains

Step outside in May 2026 and the air does not just feel warm — it hits like a wave from an open furnace. A heatwave is declared when temperatures exceed 4.5°C above the seasonal normal for two or more consecutive days. This summer, entire states crossed that threshold for weeks at a stretch. The main villain is a meteorological phenomenon called a Heat Dome. A high-pressure system traps hot air beneath it like a lid on a pressure cooker — the trapped air compresses, heats further, and cannot escape. Western disturbances that normally cool India through rain have become weak and infrequent, removing one of nature's own cooling valves.

The role of El Niño compounds the crisis further. Warming Pacific Ocean surface temperatures disrupt global weather patterns — intensifying Indian summer heat and weakening the monsoon that millions depend on for relief and agriculture. A "super El Niño" event raises these risks to dangerous levels.

The Human Cost

The numbers behind India's heat crisis are sobering. Between 2000 and 2020, over 10,000 people died from heatwave-related causes. In severe cases, heat stroke — when body temperature surpasses 40°C — causes organ failure within hours without treatment.

The most vulnerable are outdoor workers, farmers, the elderly, children, and those without access to cooling. In a country where millions earn daily wages under open skies, a heatwave is not an inconvenience — it is a matter of survival. The economic toll is equally severe. A United Nations study found that India is projected to lose 5.8% of its daily working hours by 2030 due to heat — concentrated in agriculture and construction. Delhi's peak power demand crossed 256 GW this summer, straining electricity infrastructure and triggering localised blackouts that switch off the fans and coolers that the poorest need most.

Crop yields shrink under prolonged heat stress, threatening food security for a nation of 1.4 billion. Wheat, rice, and pulses — staple crops in India — all suffer dramatically when temperatures spike during critical growth stages.

 City temperatures

Akola, MH 46.9°C
Sri Ganganagar, Rajasthan 44.5°C
Nagpur, Maharashtra 43.0°C

In April 2026, India set an unprecedented record - 95 of the world's 100 hottest cities were on Indian soil.



Key Causes



CLIMATE CHANGE

Rising CO₂ traps solar radiation, raising global temperatures year on year. Rising greenhouse gases trap solar radiation in the atmosphere, steadily pushing global average temperatures upward. India's geography makes it especially vulnerable.



URBAN HEAT ISLAND

Concrete cities absorb and retain heat 2-5°C above surrounding rural areas. Cities made of concrete and asphalt absorb and retain heat far more than forests or farmland. Reduced tree cover in cities amplifies local temperatures by 2-5°C.



El Niño

Pacific warming disrupts India's monsoon and amplifies summer heat extremes. Warming of Pacific Ocean surface temperatures disrupts global weather patterns. A potential "super El Niño" in 2026 could intensify India's heat and weaken the monsoon.



Deforestation

Trees cool through transpiration. Removing them raises local temperatures drastically. Loss of forests and wetlands removes natural cooling buffers. Trees release moisture through transpiration, acting like natural air conditioners for surrounding areas.

46.9°C Highest temp recorded Akola, Maharashtra — April 2026	10,000+ Lives lost to heatwaves in India, 2000– 2020	5.8% Working hours India will lose daily by 2030 due to heat (UN)
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2.Invisible Invaders: the microplastic crisis in your body



we banned plastic straws. But what if the real threat is already inside us — in our blood, our lungs, even our unborn children?

A. THE INVISIBLE HEARTBEAT OF A NEW CRISIS

Plastic: From Miracle Material to Silent Threat

Every week, without knowing it, each of us consumes approximately five grams of plastic — the equivalent of a credit card. It enters through our food, our water, even the air we breathe. And now, science tells us it has reached the innermost chambers of our hearts. When Leo Baekeland invented the first synthetic plastic in 1907, the world celebrated. Here was a material stronger than wood, lighter than metal, mouldable into any shape. Within decades, plastic became the skeleton of modern civilisation.

But comfort carries a hidden price. Today, microplastics — fragments smaller than 5 millimetres — are found in the remotest corners of Earth: the peak of Mount Everest, the Mariana Trench floor, Arctic snow, and now, in the human placenta, in mother’s breast milk, and in beating heart tissue.

B. THE SCIENCE: WHAT EXACTLY ARE MICROPLASTICS?

A Crisis Born of Chemistry

PRIMARY MICROPLASTICS

Manufactured at micro-size from the start — microbeads in cosmetics, face wash, industrial scrubbers. Designed small, they enter waterways directly.

SECONDARY MICROPLASTICS

Formed when larger plastics fragment under UV sunlight, wind, and waves over years. A single plastic bottle can produce millions of fragments.



NEW KNOWLEDGE — 2024 DISCOVERY

A landmark study in The New England Journal of Medicine (March 2024) found microplastics in the carotid artery plaque of 304 patients. Those with deposits were 4.5× more likely to suffer a heart attack or stroke within 34 months. First direct clinical evidence linking microplastics to cardiovascular disease.

THE NUMBERS THAT SHOULD CHANGE EVERYTHING

5 mm

Maximum size of
a microplastic
particle

5 Trillion

Plastic pieces
present in our
oceans

5 g

Plastic consumed
per person, per
week

800+

Marine species
affected by plastic

90%

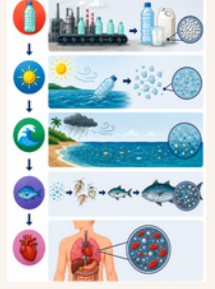
Global plastic
processing by China

4.5×

Higher heart attack
risk (NEJM 2024)



JOURNEY OF A MICROPLASTIC: FROM BOTTLE TO BODY



PRODUCTION

Get Crude oil refined into plastic polymers Crude oil refined into plastic polymers (PE, PET, PP). 400 million tonnes produced globally every year.



BREAKDOWN

UV radiation, wind & waves fragment plastics over years. One bottle → millions of invisible particles.



OCEAN ENTRY

Fragments enter waterways via runoff, storm drains & coastal winds. Accumulate in ocean gyres.



BIOMAGNIFY

Absorbed by plankton → eaten by fish → consumed by humans. Toxins concentrate at each step.



IN YOUR BODY

Found in human blood, lungs, placenta & heart tissue.
NEJM 2024: linked to 4.5× higher cardiovascular risk.

THE SCARS OF EXTRACTION: AN ETHICAL RECKONING

As a future science educator, I am struck by the geography of suffering. The communities most exposed to microplastic pollution are rarely those who produced it.

Fishing villages in coastal India, where children swim in plastic-laden water. Remote Indigenous communities in Canada, where seal and fish carry contamination. Agricultural communities where plastic-laden irrigation water is the only option.

A 2023 UNEP report estimated that over 800 marine species are affected. When these animals enter our food chain, the microplastics transfer upward — biomagnification — until the toxins reach your dinner plate.

The extraction of fossil fuels scars the Earth. The production of plastic releases greenhouse gases. The disposal pollutes land and sea. And now the ingestion scars our bodies. This is a civilisational moral failure.

"Nature distributes her gifts equitably; it is our systems of power that have concentrated them."

3. Science Is Not Just for Scientists: What Non-Science Teacher Trainees Really Think



A. The Question Nobody Thought to Ask

Walk into any B.Ed. classroom and a quiet assumption hangs in the air: science belongs to the science teachers. The English trainee, the History specialist — they arrived here through entirely different doors. Yet every one of them sat through years of science lessons as a student. Every one of them formed an opinion, a memory, and a feeling about the subject long before they ever considered becoming a teacher. A small survey conducted among four non-science B.Ed. teacher trainees set out to uncover those memories and feelings — and what emerged was a portrait of a subject that had been misunderstood, undersold, and quietly longed for in a different form. The four participants — all pursuing pedagogy specialisations in English and History — were asked to look honestly at their past experiences with science, their current perceptions of the subject, and what they believe needs to change. Their answers are frank, thoughtful, and, for anyone who cares about the future of teaching, impossible to ignore.

B. Childhood in the Science Classroom: A Subject That Never Quite Landed

When asked to rate how much they enjoyed science class as children, the responses spread themselves evenly and revealingly across the lower half of the scale. Each of the four rating levels from one through four received a single vote. No one — not one respondent — rated their enjoyment at the highest level. Science, across these four learners' formative years, never quite reached the threshold of genuine excitement. It was managed, endured, and sometimes appreciated, but it was never loved. The words participants reached for when asked what first comes to mind at the sound of the word 'Science' tell a similar story. 'Too much study' was one response — direct, unadorned, and painfully common among learners who experienced the subject as a burden rather than an invitation. Another offered the single word 'Practical,' suggesting a preference for the doing over the knowing. A third spoke of 'Experiment and new discoveries' — a flash of genuine curiosity buried beneath what the survey would soon reveal to be years of teaching that rarely made room for either.

The most layered response came from a participant who wrote that science makes her think of experiments and understanding how things work in the world, before adding honestly that she finds it challenging and not her favourite subject, yet knows it is important in daily life. In one breath, she captured what so many non-science learners carry quietly: an intellectual respect for the subject alongside a persistent sense of personal distance from it. Science is important — but important for the world, not necessarily for me.

C. The Memorisation Trap: When Facts Replace Wonder

The clearest and most troubling finding of the survey concerned how participants understood science as a discipline. Presented with the statement that science is only about memorising facts and diagrams, every single respondent agreed — three moderately, one strongly. Not one person pushed back. Not one person said: that has not been my experience.

This consensus is not a reflection of science itself. It is a reflection of how science was taught to these four learners. When asked why they found the subject difficult, participants identified difficult concepts, poor teaching method, and — most pointedly — too much memorisation as the causes. The very approach meant to transmit scientific knowledge had become the reason the subject felt foreign and forbidding. Rote learning had been applied to a discipline that is, by its very nature, built on inquiry, observation, and the courage to not yet know the answer.

The tragedy is not that science is hard. The tragedy is that it was made to feel hard in the wrong way — not the productive difficulty of a genuine question, but the deadening difficulty of a list of facts that must be reproduced perfectly and then forgotten.

D. Is Science for Everyone? The Answer That Depends on One Thing

When asked whether science is only for smart people or for everyone, the group split evenly. Half believed it is for everyone. The other half said it depends on the teaching method. What is striking about this result is not the division but the agreement beneath it: no one — not a single respondent — said science is only for the naturally gifted or the intellectually exceptional. Every participant, in their own way, sensed that the doors of science could be open wider than they had personally experienced them.

The half who answered that it depends on teaching method were, in effect, giving a conditional yes — yes, science can be for everyone, but only if the teacher makes it so. This is a finding that should sit uncomfortably with every educator. It means that the perceived exclusivity of science is not written into the subject but manufactured in the classroom. It means that every child who walks away from a science lesson believing the subject is not for people like them has, in some measure, been failed — not by their own capacity, but by a pedagogical choice.

E. How They Wanted to Learn: The Answer Was Always Experiments

Asked about their favourite ways to learn science, all four respondents chose performing experiments. Every single one. No other answer came close to that unanimity. Watching videos and animations was the second preference, chosen by half the group, while teacher-led lectures and group discussions each received only a single vote.

When asked to rate what actually helps them understand a science concept, the pattern sharpened further. Videos, animations, hands-on experiments, and the drawing and labelling of diagrams were consistently described as very helpful. A teacher explaining at the blackboard and the solving of textbook questions were, equally consistently, described as not helpful. The methods learners find most effective and the methods most commonly used to teach them are, it appears, almost entirely opposite to each other. This is not a puzzle. It is an indictment — and an invitation to do better.

F. If They Could Change One Thing: The Science Class They Were Never Given

The survey's final questions were its most human. When asked what single change they would make to the science period, participants did not hesitate:

"Make it into experiential learning."

"I would make science periods more interactive with simple experiments instead of only theory."

"I would make science periods more practical and activity-based instead of only theoretical. Including experiments, demonstrations, and real-life applications would make learning more interesting, engaging, and easier to understand for students."

And when asked what they would do if they were the science teacher for just one day, the answers were equally vivid and immediate:

"Give them activities and experiments to do on their own."

"Hands-on experience learning."

"I would conduct a hands-on experiment or activity instead of just lecturing, so students can learn by doing and better understand concepts."

One respondent reached for a cultural reference that speaks volumes. She wrote that she would make the class fun and engaging like in *Hichki* — the film in which a teacher transforms the lives of her students not through content delivery but through creativity, empathy, and an unshakeable belief in every learner's potential. The fact that a B.Ed. trainee, reflecting on what good science teaching could look like, reached not for a textbook example but for a cinematic one tells us something important: the imagination for better teaching already exists in this generation. It is waiting for a classroom to receive it.

G. What Every Teacher in Training Needs to Hear

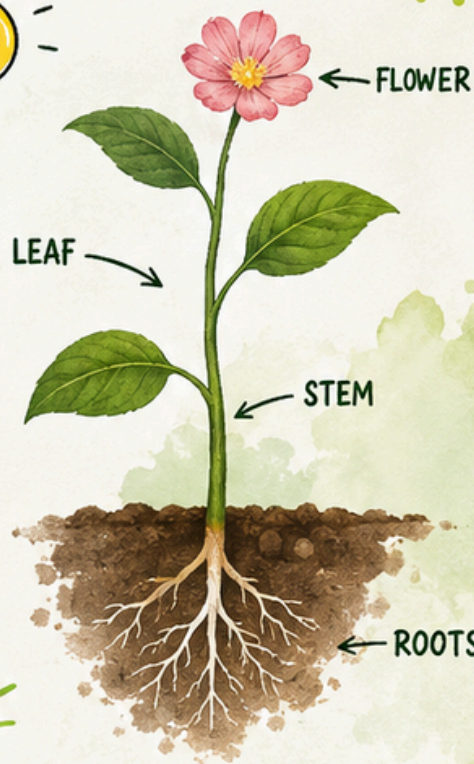
These respondents are not science teachers. They never will be. But they will stand in front of children — children who are, right now, forming their first impressions of what learning is, what intelligence looks like, and whether school is a place that belongs to them. The science anxiety these trainees carry, shaped by years of rote instruction and passive observation, will not dissolve the moment they step into their own classrooms. It will inform, however quietly, their instincts about difficulty, about rigour, and about which students deserve encouragement.

This is why these findings matter beyond the science department. Poor pedagogy leaves marks that do not stay in the subject that inflicted them. A learner who was taught that knowledge is a thing to be memorised and regurgitated will, in time, risk teaching the same way — in English, in History, in whatever subject they stand before. The habits of a classroom travel forward.

But so does the hunger for something better. Every respondent in this survey — without exception — knew what good science teaching should feel like. They could describe it, quote it, picture it. They wanted experiments. They wanted real life. They wanted to be trusted to discover. None of them had been given that, not fully. But all of them still wanted it.

Science has never asked to belong only to scientists. It asks only for teachers curious enough to hand it, with open arms, to everyone in the room.

PARTS OF A PLANT



Every part has a purpose!

DID YOU KNOW?

Plants give us the air we breathe, the food we eat, and the world we call home.

COMPLETE THE CROSSWORD USING THE CLUES BELOW.



From tiny seeds to tall trees - every part matters!

Next time you see a plant, look closer... there's a wonder story in every part!

ACROSS

- [2] Plants drink this using their roots and need it to **survive**.
- [3] The parts of a plant that grow **underground**, taking in water and nutrients from the soil to help the plant grow.
- [7] A **living thing** that grows in soil, has roots, a stem, leaves, and often flowers.
- [8] Special stuff in soil/fertilizer that helps plants and animals stay **healthy and grow**.
- [9] Green parts of a plant that grow from the stem, usually where **photosynthesis** happens to make food for the plant.
- [10] The part of a plant that **supports** the leaves and flowers and carries water and nutrients from the roots to other parts of the plant.

DOWN

- [1] A process in plants where they use sunlight, carbon dioxide, and water to make food (glucose) and oxygen.
- [4] It comes from the sun and plants absorb it through their leaves for photosynthesis to occur.
- [5] The pretty part of a plant that often has colorful petals and makes seeds for new plants.
- [6] A small swelling on a plant that can grow into a flower, leaf, or new stem.



TIP

All the answers are hidden in what plants do and how they grow!

4. BREAKING THE BINDER

TEACHING SCIENCE BEYOND THE TEXTBOOK: INTEGRATING EXPERIENCE, INQUIRY AND COGNITION

FRAMEWORKS FOR CONCEPTUAL CHANGE IN THE SCIENCE CLASSROOM

In many classrooms, science continues to be reduced to the transmission of facts, definitions and formulae. The consequences are visible: students who perform adequately in examinations yet struggle to interpret scientific phenomena in everyday life. If science education is to remain meaningful in the twenty-first century, pedagogy must move beyond content delivery and toward a more integrated, research-informed framework. A synthesis of Experiential Learning, Inquiry-Based Learning, Cognitive Load Theory and Conceptual Change Theory offers such a direction. At its core, science is an empirical enterprise.



At its core, science is an empirical enterprise. The educational philosophy of **John Dewey** and the learning cycle proposed by **David Kolb** emphasize that knowledge emerges through experience, reflection and application. In the science classroom, this translates into learning environments where students engage directly with these phenomena through experiments,

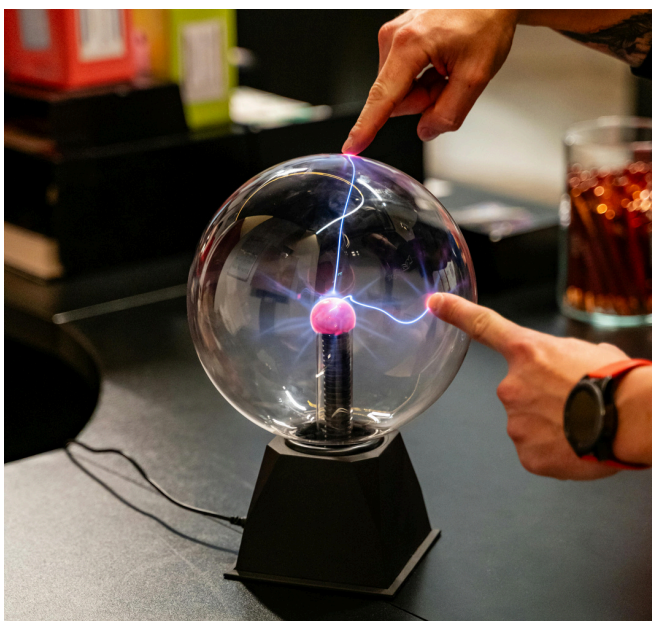
simulations, or real-life problem contexts. However, experience alone is insufficient unless it is structured. Without guided reflection and conceptual linking, practical work risks becoming procedural rather than intellectually meaningful.

This is where **inquiry-based learning** becomes indispensable. Science, by its very nature, advances through questioning, hypothesis formation and evidence-based reasoning. Inquiry-oriented pedagogy mirrors this process by positioning students as active investigators rather than passive recipients. When learners are encouraged to ask questions, design procedures, interpret results and justify their conclusions, they begin to internalize the epistemology of science itself. Principally, inquiry does not imply the absence of teacher guidance; rather, it demands a calibrated balance between autonomy and scaffolding, particularly for novice learners. A frequent oversight in progressive pedagogy is the cognitive demand placed on learners. **John Sweller, through Cognitive Load Theory**, cautions that the human working

memory has limited capacity. Poorly designed inquiry or activity-based lessons can inadvertently overwhelm students, leading to fragmented understanding. For instance, asking learners to independently construct explanations without sufficient prior schema may increase extraneous cognitive load. Effective teaching, therefore, requires careful sequencing, the use of multiple representations and **gradual** release of responsibility from teacher to learner.

Equally critical is the recognition that students do not enter classrooms as blank slates. They carry deeply held intuitive beliefs about the natural world, many of which contradict scientific explanations. **Conceptual Change Theory** highlights that meaningful learning requires restructuring these prior conceptions. Simply presenting correct information is rarely sufficient; learners must encounter cognitive conflict and engage with evidence that challenges their assumptions. In this respect, well-designed experiments and inquiry tasks become powerful tools for conceptual transformation rather than mere demonstration.

When these perspectives are integrated, a coherent pedagogical model emerges. **Experiential learning provides the context, inquiry-based learning offers the process, cognitive load theory ensures cognitive manageability and conceptual change theory drives deep restructuring of knowledge.**



The challenge for educators lies not in choosing one approach over another, but in orchestrating them thoughtfully within the constraints of real classrooms. This **integration** is particularly relevant in contexts marked by large class sizes, limited laboratory infrastructure, and time constraints. Resource limitations, while significant, need not preclude effective pedagogy. Micro-experiments, structured demonstrations, guided questioning, and the strategic use of everyday examples can collectively embody these principles without demanding extensive infrastructure.

Ultimately, the purpose of science education is not merely to produce examination success, but to cultivate individuals capable of reasoning, questioning, and applying knowledge in diverse contexts. Achieving this requires a shift from fragmented instructional practices to an integrated pedagogical vision—one that aligns classroom processes with both the nature of science and the cognitive realities of learners.

5. THE LUNGS OF THE COAST

AND THEIR COST

How necessary it is at
all times to watch
against the attempted
encroachment of
power and to prevent
its running to excess
---Thomas Paine



Mumbai mangroves

Between the Tides and the Skyscrapers there's this Navigation of ecological stress in Mumbai's Mangroves

Mangrove ecosystems along the Mumbai Metropolitan Region (MMR) represent a biogeochemically active interface between terrestrial and marine systems, yet they remain under persistent anthropogenic pressure. Distributed across estuarine networks such as **Thane Creek, Mahim Creek and Vasai Creek**, Mumbai's mangrove cover has been estimated at approximately 59–70 km² in recent decades,

depending on methodological variation in satellite-based assessments and classification thresholds. Remote sensing analyses indicate a decline from about **71.8 km²** in 1994 to roughly **69 km²** by the early 2020s, reflecting both direct land-use conversion and ecological degradation.

Botanically, these mangroves are characterized by low species richness relative to other Indo-

West Pacific regions, with fewer than 10 true mangrove species recorded. The assemblage is heavily dominated by Avicennia marina, a salt-excreting species with high tolerance for **hypersaline** and anoxic sediment conditions. Other species such as Rhizophora mucronata and Sonneratia apetala occur in limited patches. Structural parameters such as basal area, canopy height, and tree density are often reduced in comparison to less disturbed mangrove systems, indicating chronic stress. Sediment analyses show **high concentrations** of organic matter but also elevated levels of heavy metals such as **lead** (Pb), **cadmium** (Cd), and **mercury** (Hg), particularly near industrial effluent discharge zones.

From a functional perspective, Mumbai's mangroves perform critical ecosystem services with measurable biophysical outputs. Their complex aerial root systems attenuate **hydrodynamic** energy, reducing wave height by up to 60–70% over a 100-meter belt, thereby mitigating coastal erosion and storm surge impacts. Carbon sequestration rates in mangrove sediments are notably high, averaging **150–200 Mg C per hectare**, significantly exceeding those of terrestrial tropical forests. This “blue carbon” storage capacity positions mangroves as key components in climate change mitigation strategies. Additionally, these ecosystems function as nutrient sinks, removing **nitrogen** and **phosphorus** loads from urban runoff, thus improving coastal water quality.

The **socioeconomic** valuation of these services is substantial. Recent ecological economic assessments estimate that mangroves in the MMR contribute ecosystem services valued at approximately ₹1,500–₹1,700 crore annually. Fisheries productivity is directly linked to mangrove health, as these habitats serve as breeding and nursery grounds for commercially important species, including prawns and juvenile fish populations. Loss of mangrove area correlates with measurable declines in nearshore fish biomass and biodiversity indices.



Despite their ecological and economic importance, Mumbai's mangroves are increasingly fragmented. Urban expansion, infrastructure development—including coastal roads and real estate reclamation—and unregulated solid waste dumping have resulted in habitat loss and edge effects that compromise ecological integrity. Sewage inflows, estimated at over 2,000 million litres per day in the MMR, introduce high **biochemical oxygen demand** (BOD) loads, leading to hypoxic conditions that disrupt mangrove physiology and associated faunal communities.

Environmental conditions governing mangrove persistence include **tidal amplitude**, **salinity gradients** (typically 10–35 ppt), **sediment accretion rates** and **monsoonal precipitation** patterns averaging 2,000–2,500 mm annually. However, climate change-induced sea-level rise—projected at 3.3 mm per year globally—poses an additional threat by altering inundation regimes and sediment balance.

Mumbai's mangroves represent a scientifically significant yet vulnerable coastal system. Their degradation is not merely a loss of biodiversity but a quantifiable reduction in ecosystem functionality, with cascading impacts on climate resilience, coastal stability, and urban sustainability. Protecting and restoring these ecosystems must therefore be framed as a data-driven environmental priority rather than a peripheral conservation concern.

In quantitative terms, the loss of even a single hectare of mangrove cover represents not merely ecological degradation but a measurable decline in coastal resilience, carbon storage, and urban environmental stability.

6. SCIENCE TEACHING IN TRANSITION

Insights from Emerging Educators that aim to Redefine Science Teaching in Contemporary Classrooms

Teacher Development in Science Education: A Pedagogical Analysis of Teacher Perceptions

ABSTRACT

Teacher development in science education is essential for fostering inquiry-based learning, conceptual clarity, and scientific temperament among students. Science teaching, when effectively implemented, contributes significantly to the development of analytical thinking and problem-solving abilities. The present study analyzes responses collected through a Google Forms survey to examine perceptions regarding science teaching, its goals, associated challenges, and professional development needs. The findings indicate a strong emphasis on practical learning, student-centred approaches, and experiential pedagogy. However, systemic constraints such as large class sizes and limited instructional time hinder effective implementation. The study highlights the need for targeted teacher training, infrastructural support, and pedagogical reform to strengthen science education practices.

INTRODUCTION

Science education plays a pivotal role in shaping learners' cognitive abilities and fostering a scientific attitude necessary

for engaging with contemporary societal and technological challenges. Within this framework, teacher development emerges as a crucial determinant of instructional effectiveness. Modern pedagogical discourse emphasizes experiential, inquiry-based, and student-centred approaches as essential for meaningful learning; however, the translation of these theoretical perspectives into classroom practice often remains inconsistent. This study seeks to explore teacher perceptions of science teaching and identify key areas requiring professional development, thereby contributing to ongoing discussions in science pedagogy.

METHODOLOGY

The study employed a survey-based research design using Google Forms to collect data from five participants with diverse academic backgrounds. The questionnaire consisted of both structured and open-ended items focusing on teaching experience, objectives of science education, pedagogical approaches, challenges encountered in classroom practice, and training requirements. The data were analyzed using descriptive statistical

methods, primarily percentages, along with qualitative interpretation of open-ended responses to provide a comprehensive understanding of participant perspectives.

RESULTS AND ANALYSIS

The analysis reveals that the respondents represented varied disciplinary backgrounds, with 60% from language studies and 20% each from social science and science disciplines. Despite this diversity, 80% reported having prior experience in teaching science, indicating interdisciplinary engagement. With regard to the goals of science education, a majority of respondents (60%) identified practical application as the primary objective, while 40% emphasized conceptual understanding. Notably, none of the participants prioritized examination performance, suggesting a shift toward competency-based and application-oriented learning. Perceptions of the nature of science teaching were varied, with 20% viewing it as primarily practical, 20% as concept-driven, 20% as activity-based, and 40% considering it comparable to other subjects, thereby reflecting the multidimensional character of science pedagogy.

A strong consensus emerged regarding the importance of student-centred approaches, with all respondents (100%) rating them as highly significant. Factors contributing to effective science teaching included the use of experiments, clarity in explanation, incorporation of real-life examples and

active student participation, each identified by 80% of respondents, while 60% emphasized the role of teaching aids. These findings underscore the importance of experiential and interactive teaching strategies. In terms of professional development, respondents highlighted the need for enhanced skills in conducting experiments (100%), explaining abstract concepts (60%) and engaging students (40%), indicating a gap between theoretical understanding and practical pedagogical application. Furthermore, significant challenges were identified, including large class sizes (100%), time constraints (80%), inadequate laboratory facilities and resources (60%), and student disinterest (40%). Interestingly, no respondents reported difficulty in explaining concepts, suggesting that the primary barriers to effective teaching are structural rather than cognitive.

DISCUSSION

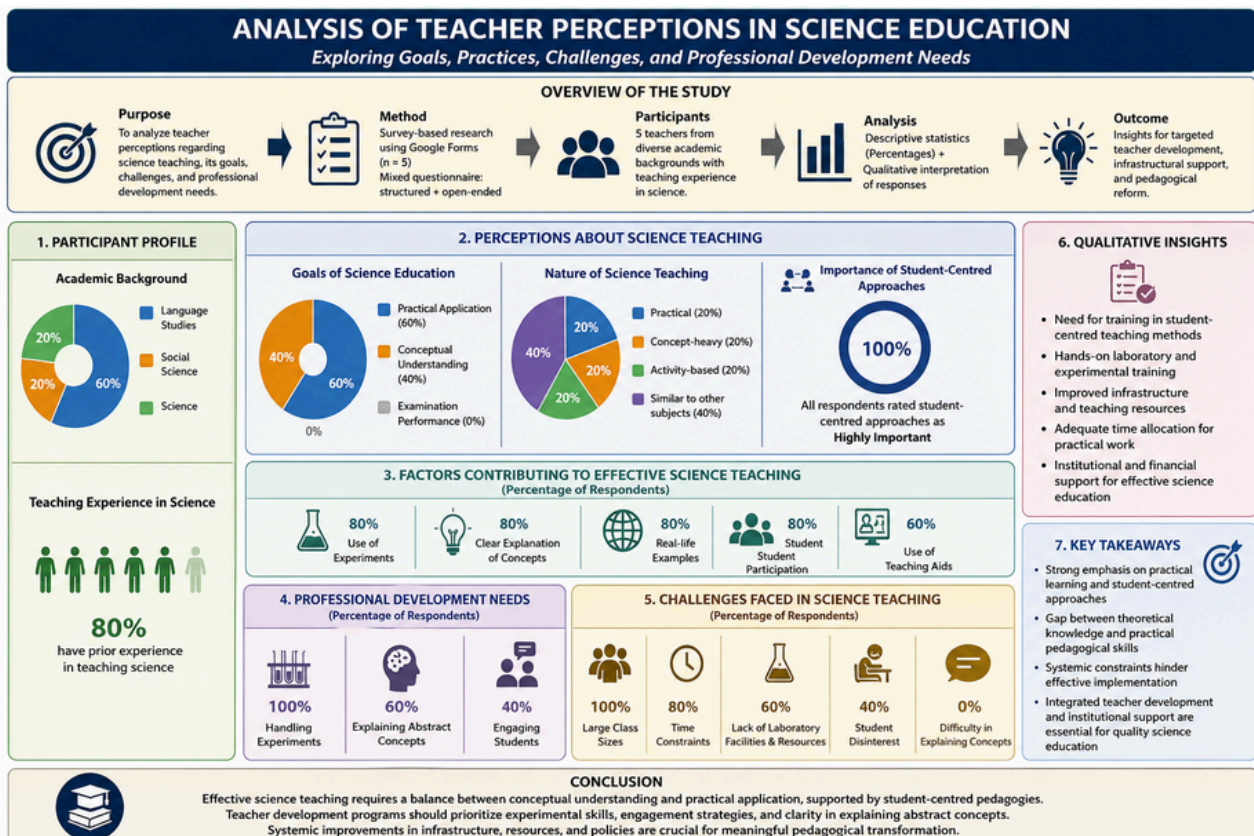
The findings of the study align with contemporary pedagogical frameworks, particularly constructivist and inquiry-based approaches, which emphasize active engagement and contextual learning. The strong preference for practical and student-centred methods reflects an awareness among educators of the need to move beyond traditional didactic teaching. However, the persistence of systemic challenges such as overcrowded classrooms and limited resources highlights the gap between pedagogical ideals and classroom realities. The identified need for training

in handling experiments further indicates that teacher development programs must prioritize experiential competencies alongside theoretical knowledge. These insights suggest that improving science education requires not only individual teacher development but also institutional and infrastructural support.

CONCLUSION

The study concludes that effective science teaching necessitates a balanced integration of conceptual understanding and practical application, supported by student-centred pedagogical approaches.

Teacher development initiatives should focus on enhancing competencies in experimental pedagogy, classroom engagement, and the communication of abstract concepts. Simultaneously, systemic improvements in infrastructure, resource availability, and policy implementation are essential to enable meaningful pedagogical transformation. Although limited by a small sample size, the study provides valuable insights into teacher perceptions and underscores the importance of integrated, practice-oriented professional development in advancing the quality of science education.



7. A SIMPLE BLOOD TEST THAT COULD CHANGE CANCER DETECTION FOREVER

Imagine walking into a clinic for a routine checkup and walking out with a life saving information, diagnosis of a disease before even a single symptom appears. This possibility is closer to reality than ever before.

A clinical trial in the UK has introduced an innovative AI-powered blood test that is capable of detecting more than 50 types of cancer in their early stages. This is a new category of test known as multi-cancer early detection tests (MCED tests) and it is changing the way people think of diagnosis of a particular disease.

Traditionally, cancer detection depended on symptoms and imaging techniques. However, this new method takes a completely different approach, it looks directly into the bloodstream. Our blood does more than just carry oxygen and nutrients, it also transports tiny fragments of DNA released by cells. When cancer develops, abnormal cells release altered DNA, known as circulating tumor DNA (ctDNA) into the blood.

This is where artificial intelligence plays a powerful role. AI systems are trained to recognise patterns within this DNA and distinguish between healthy and cancerous signals. What makes this technology even more remarkable is its ability not just to detect cancer, but also to predict where in the body it may have started. This allows doctors to respond faster and more accurately.



For students, this beautifully connects classroom concepts to real life. Topics like cell biology and transport systems are no longer just theories. Blood, often studied as a medium for carrying substances, is now understood as a messenger carrying important biological information. Scientists are learning how to read these hidden signals.

A SIMPLE BLOOD TEST THAT COULD CHANGE CANCER DETECTION FOREVER

Cancer begins when normal cells lose control over their growth due to genetic mutations. These cells multiply rapidly and disrupt the body's natural balance. Detecting these changes early before a tumour even forms can make an huge difference leading to less aggressive treatments and significantly higher survival rates.

The UK trial, which involved thousands of participants, showed highly promising results. It successfully detected cancers that are typically difficult to diagnose early, such as pancreatic and ovarian cancer. In many cases, the disease was identified before any symptoms appeared.

However, like all new technologies, this test is still evolving. Scientists are working to improve its accuracy and reduce the chances of false results. Experts also emphasise that it is not meant to replace existing diagnostic tools, but to work with them as an early warning system.

This development shows a shift in modern medicine from reacting to illness to anticipating it. It also highlights how biology, technology, and data science come together to solve some of the world's biggest challenges.

This simple blood test is more than just a medical advancement, it is a glimpse into the future of healthcare. A future where diseases can be detected early, treated effectively, and, perhaps one day, prevented altogether.

THE JOURNEY FROM BLOOD TO DETECTION



“ Detecting cancer early is not just about technology—it’s about hope, time, and saving lives. ”

8. IT'S NOT JUST ABOUT REMEMBERING: MAKING SCIENCE MAKE SENSE



In many classrooms today, science is still taught in a way that focuses heavily on completing the syllabus and preparing for exams. Students often learn definitions, formulas, and explanations, but not always the meaning behind them. As a result, while they may perform well in tests, they sometimes struggle to explain concepts in their own words or apply them in real-life situations.

This is where Concept-Based Teaching can make a meaningful difference. Instead of treating science as a collection of facts to be memorised, concept-based teaching focuses on helping students understand the “why” behind what they

learn. The goal is not just to cover content, but to build clear and lasting understanding. For example, rather than asking students to memorise the definition of force, a teacher might begin by discussing everyday experiences like pushing a door or lifting a bag and then gradually connect these observations to the scientific concept.

This approach helps students see that science is not separate from their daily lives. It exists in the small, familiar experiences they encounter every day. When students understand a concept deeply, they are more likely to remember it, explain it, and apply it when needed.

IT'S NOT JUST ABOUT REMEMBERING: MAKING SCIENCE MAKE SENSE

One of the key strengths of concept-based teaching is that it encourages thinking over memorisation. Students are given time to discuss ideas, ask questions, and make connections between different topics. Instead of simply writing down notes, they engage with the concept, which makes learning more meaningful.

For example, while learning about electricity, students can relate it to how appliances work at home. Similarly, concepts like acids and bases can be connected to food and household substances. These connections help bridge the gap between theory and real-life application something many students often struggle with.

At the same time, this approach does not require drastic changes or expensive resources. Even simple classroom practices like asking “why” and “how” questions, encouraging students to explain answers in their own words, or linking lessons to daily experiences can gradually shift the focus from memorisation to understanding.

Of course, few challenges will still remain. Teachers often work within time constraints and exam-oriented systems, which can make it difficult to explore concepts in depth. However, even small efforts towards concept-based teaching can create a noticeable difference in how students learn.

In the larger picture, science education is not just about covering chapters it is about helping students make sense of the world around them. Concept-based teaching supports this goal by making learning clearer, more connected, and more relevant.

When students begin to truly understand science, rather than just memorise it, learning becomes not only easier but also far more meaningful.

9. STUDENTS SPEAK: IS SCIENCE LEARNING MEANINGFUL OR JUST MEMORISED?

One clear finding from the survey is the preference for practical learning. Almost all respondents agreed that experiments and real-life examples make science easier to understand. These methods help students connect theory to everyday experiences, making learning more meaningful.

However, students also pointed out that such approaches are not always consistently used in classrooms. Many reported that real-life connections are made only occasionally, limiting opportunities for deeper understanding.

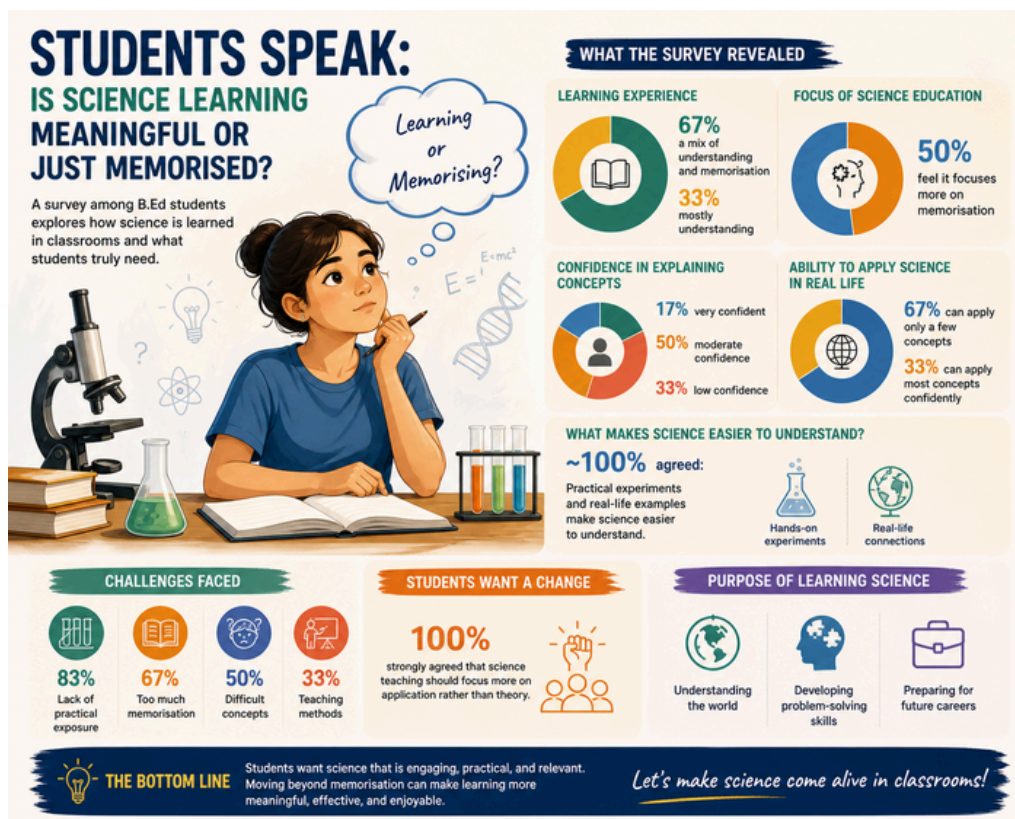
The survey also revealed a strong demand for change. All participants agreed that science teaching should focus more on application rather than just theory. This reflects a growing awareness among students about the need for meaningful learning.

Participants identified challenges such as lack of practical exposure and excessive memorisation. These issues suggest that the problem lies not just in the subject, but in how it is taught.

Interestingly, when asked about the purpose of learning science, students highlighted goals like understanding the world, developing problem-solving skills, and preparing for future careers.

In conclusion, the survey sends a clear message students want science to be engaging, practical, and relevant. Moving beyond memorisation and focusing on real-life application can make science learning more effective and enjoyable.

STUDENTS SPEAK: IS SCIENCE LEARNING MEANINGFUL OR JUST MEMORISED?



Science is meant to help us understand the world from everyday experiences to complex technologies. However, a recent survey among B.Ed students was conducted through google forms which suggests that science learning in classrooms does not always achieve this goal.

The survey, though conducted with a small group of six participants, provides valuable insights into how students perceive science education. Most respondents described their learning experience as a mix of understanding and memorisation. However, many also felt that memorisation still dominates classroom learning.

This becomes more evident when looking at confidence levels. Only a small number of students felt fully confident explaining scientific concepts in their own words. Others reported moderate or low confidence, indicating that while they may remember information, they struggle to express or apply it.

The gap between theory and real-life application is another concern. While students recognise that science exists in everyday life, not all feel confident applying what they have learned. Many can relate to only a few concepts, highlighting a disconnect between knowledge and practical use.

DID YOU KNOW?

FASCINATING FACTS



SATURN CAN FLOAT!

Saturn is the only planet in our solar system less dense than water. If you could find a giant enough bathtub, it would float!



CHAMELEONS DON'T CHANGE COLOR TO BLEND IN!

They change color mainly to communicate, regulate body temperature, and express their mood.



HONEY NEVER SPOILS!

Archaeologists have found pots of honey in ancient Egyptian tombs that are over 3,000 years old and still perfectly edible!



YOUR BRAIN IS INCREDIBLE!

The human brain generates enough electricity to power a small LED light bulb!



ANTARCTICA IS A DESERT!

It may be covered in ice, but Antarctica receives very little precipitation, making it the largest desert on Earth!



NANO BYTES

- 1 A day on Venus is longer than a year on Venus!
- 2 A single bolt of lightning can heat the air around it to about 30,000°C – five times hotter than the surface of the Sun!
- 3 Octopuses have three hearts and blue blood!
- 4 Bananas are berries, but strawberries aren't!
- 5 There are more stars in the universe than grains of sand on all the beaches on Earth!

SCIENCE QUIZ

Test your knowledge!

- 1 Which planet is known as the Red Planet?

A. Earth
B. Mars
C. Jupiter
D. Venus



- 2 Which gas do plants absorb from the atmosphere?

A. Oxygen
B. Carbon dioxide
C. Nitrogen
D. Hydrogen



- 3 What is the powerhouse of the cell?

A. Nucleus
B. Mitochondria
C. Ribosome
D. Golgi Apparatus



- 4 What part of the human body is responsible for pumping blood?

A. Brain
B. Lungs
C. Heart
D. Liver



- 5 Which of these is a renewable source of energy?

A. Coal
B. Natural Gas
C. Solar
D. Petroleum



THINK!

I speak without a mouth and hear without ears.
I have no body, but I come alive with wind.
What am I?



FUN CHALLENGE!

Find three examples of simple machines in your home and write how they make work easier!



(Answer on the next page!)

10. ALIENS OF THE OCEAN: the fascinating biology of salpa



If someone told you that alien-like creatures drift silently through our oceans transparent, glowing, and forming long chains like something out of a sci-fi movie you might imagine a distant planet. But the truth is far stranger: they exist right here on Earth. Meet the salps.

Salps are gelatinous, barrel-shaped marine organisms that float freely in the open ocean. At first glance, they resemble jellyfish, but don't be fooled—they are actually more closely related to humans than jellyfish are.

That alone is enough to make you pause. What makes salps truly fascinating is not just how they look, but how they live. Imagine drifting through the ocean as part of a long, glowing chain of identical beings, all connected, all moving together. Salps can form these chains through a process of asexual reproduction, where one individual creates a whole series of clones. These chains can grow impressively long, sometimes stretching several meters, pulsing rhythmically through the water like a living conveyor belt.

But the story doesn't end there. Each salp in the chain eventually develops into a sexual organism. Even more strangely, they begin life as males and later transform into females a phenomenon known as protandrous hermaphroditism. It's a reproductive strategy that sounds almost too unusual to be real, yet it works efficiently in the vast and unpredictable ocean environment.

Beyond their bizarre life cycle, salps play a surprisingly important role in our planet's health. They are voracious filter feeders, constantly pumping water through their bodies and consuming tiny phytoplankton. In doing so, they capture carbon from the atmosphere that has been absorbed by these microscopic plants. When salps produce waste or die, this carbon sinks deep into the ocean, effectively removing it from the atmosphere. Scientists believe this process contributes significantly to carbon sequestration, making salps unlikely allies in the fight against climate change.



ALIENS OF THE OCEAN: the fascinating biology of salpa



In fact marine scientists and oceanographers have become increasingly interested in salps over the past few decades. Using deep-sea cameras, research vessels, and satellite data, they study sudden “salp blooms” to understand how these organisms respond to changing ocean conditions. Some researchers even suggest that as oceans warm, salp populations may increase, potentially altering marine food chains and carbon cycles on a global scale. Despite this , much about salps they remain a mystery , scientists are still trying to fully

understand their behavior life cycles, and long term ecological impact. Their transparency is another remarkable adaptation. Nearly invisible in water, salps can evade predators with ease. Watching them drift is like watching living glass, delicate, ghostly, and almost unreal. Divers often describe encountering salp blooms as surreal experiences, as if they have entered a different world . Under the right conditions, salp populations can explode . dramatically, filling entire stretches of ocean in what scientists call “blooms.” These sudden appearances can reshape local ecosystems, influencing food chains and nutrient cycles in ways researchers are still trying to fully understand. In many ways salps challenge our understanding of life itself.

They are simple, yet complex; fragile, yet incredibly effective.

They remind us that some of the most extraordinary life forms on Earth are not found in distant galaxies, but drifting quietly beneath the ocean’s surface.

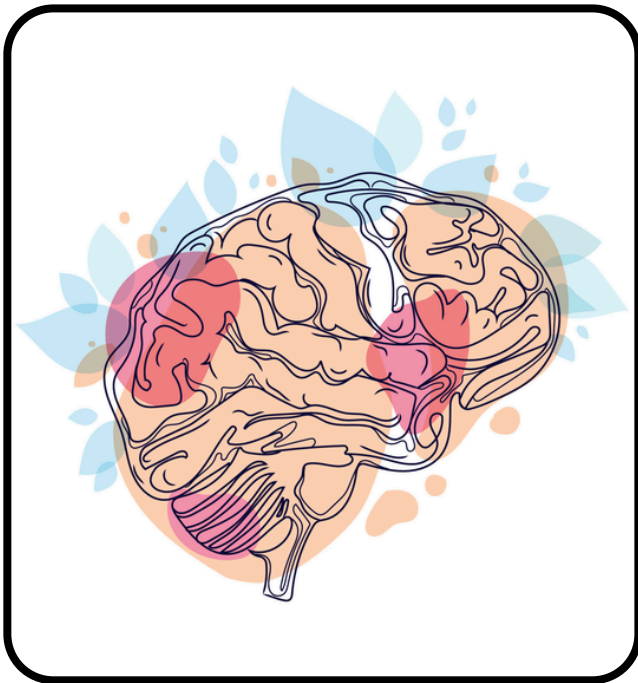
So the next time you think about aliens, you might not need to look to the stars. Just look a little deeper into the sea.



DID YOU KNOW!!!!

**Octopuses have three hearts
and blue blood**

11. THE PSYCHOLOGY BEHIND THE FEAR OF SCIENCE



For many students, science is not just another subject it's something that quietly creates anxiety, hesitation, and sometimes even fear. While science is meant to explain the world around us, for some learners, it becomes a source of stress instead of curiosity.

To understand this better, a small survey was conducted among students. Interestingly, 100% of the respondents said they find science subjects difficult to understand. This clearly shows that fear of science is not rare it is something many students experience.

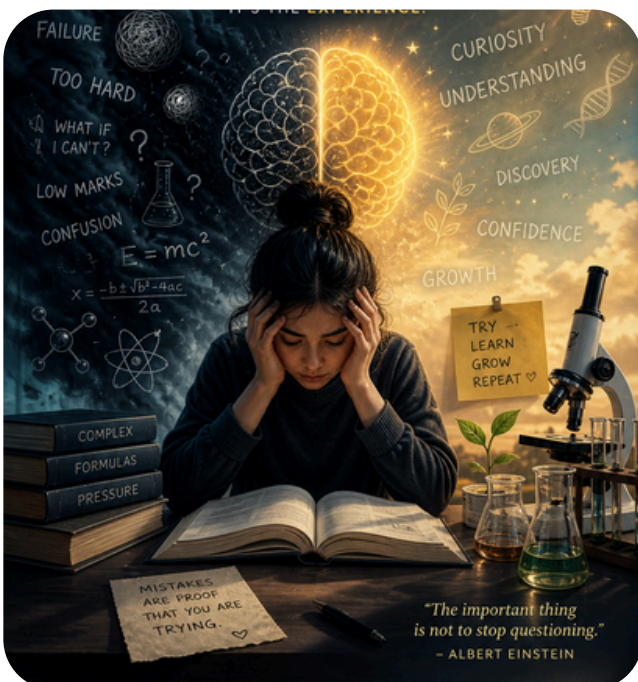
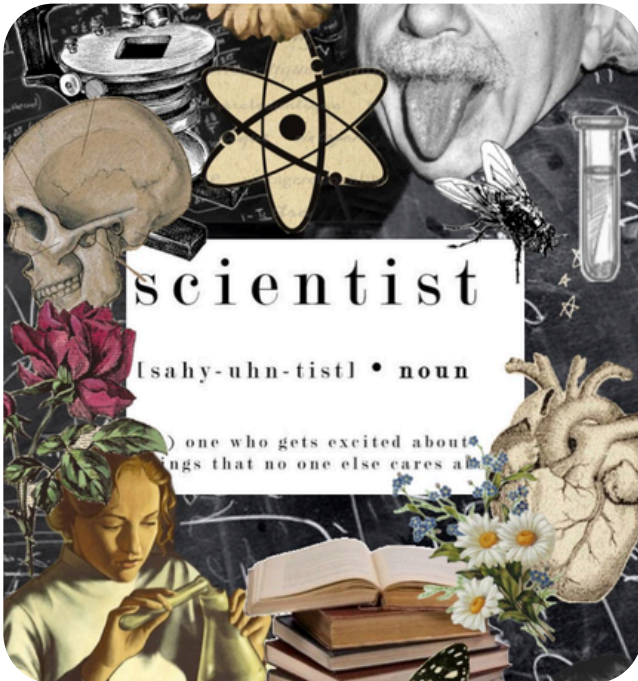
When asked which subject creates the most anxiety, 75% of students chose Chemistry, while 25% selected Physics. Subjects that involve formulas, reactions, and abstract thinking often feel more overwhelming. It is not always the subject itself, but how students experience it.

The survey also revealed that 75% of students believe the main reason for fear is complex formulas and concepts, while 25% pointed to fear of failure or low marks. This tells us that confusion and lack of understanding play a bigger role than pressure alone. When students repeatedly struggle, they begin to feel that science is simply "not for them."

But the most interesting finding came next.

When asked whether practical or activity-based learning helps, 75% of students strongly agreed that it makes science easier and more interesting. This suggests that the problem may not be science itself but the way it is taught. When learning becomes visual, hands-on, and engaging, fear slowly turns into interest. The final question allowed students to share their thoughts freely. Their responses were simple yet powerful:

- gentle and multisensory teaching methods
- simpler ways of understanding formulas and experiments
- a supportive and mistake-friendly classroom environment



Educational psychologists have studied this fear for years. Research by Carol Dweck shows that students who believe intelligence is fixed are more likely to avoid challenging subjects like science. In contrast, students with a “growth mindset” see difficulty as part of learning and are less afraid to try.



Further studies on science anxiety show that fear is often linked to classroom experiences rather than actual ability. When students feel judged or afraid of making mistakes, their brain goes into a stress mode, making it harder to concentrate or remember concepts. Over time, this creates a cycle fear leads to avoidance, and avoidance increases fear.

This idea connects with the thoughts of Albert Einstein, who once said,

“The important thing is not to stop questioning.”

His words remind us that science is built on curiosity, not perfection. The findings of this survey clearly suggest that fear of science can be reduced. When teachers use practical methods, simplify concepts, and create a supportive environment, students begin to feel more confident. Encouraging questions and accepting mistakes as part of learning can make a big difference.

In the end, science is not meant to be feared it is meant to be explored. Sometimes, all it takes is the right approach to turn fear into fascination. When classrooms shift from being places of pressure to spaces of curiosity, students begin to see science differently not as a subject they have to “survive,” but as something they can actually enjoy. Small changes like encouraging questions, celebrating effort instead of just correct answers, and connecting concepts to real-life situations can slowly rebuild confidence. Over time, students who once felt anxious may begin to participate more, ask questions without hesitation, and even develop a genuine interest in the subject. Fear does not disappear overnight, but with patience, support, and the right teaching methods, it can gradually be replaced by curiosity and that is where true learning begins



Change is scary, but change is growth.

DID YOU KNOW?

Multitasking actually reduces productivity because the brain switches between tasks rather than doing them simultaneously.

12. Science or superstitions: Blind beliefs or hidden science

We've all heard them growing up, Don't walk under a ladder, A black cat crossing your path is bad luck, Don't cut nails at night. They sound mysterious, sometimes even scary but are they really? Or are they just misunderstood ideas wrapped in culture?

Superstitions are beliefs followed without clear scientific proof, often passed down through generations. Science, on the other hand, is built on observation, evidence, and reasoning. At first glance, these two seem completely opposite but in reality, they sometimes overlap in surprising ways.

Take the belief of not cutting nails at night. In earlier times, without electricity, poor lighting made it risky. What began as a safety measure slowly turned into a superstition. Similarly, not sweeping at night may have helped prevent losing small valuables. These examples show that some superstitions may have practical origins.



But many beliefs are shaped more by the human mind than by reality. Our brain naturally looks for patterns, even when none exist. This tendency is explained by.

1. Pattern Recognition

Where we connect unrelated events to make sense of the world.

2. Placebo Effect

Sometimes, belief itself creates an effect. If a person believes something will bring good luck, their confidence increases, which may actually improve their performance. It's not magic it's psychology.

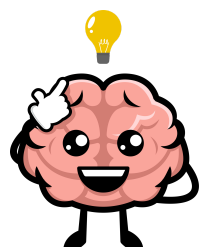
3. Confirmation Bias

Believing only what matches your existing ideas.



DID YOU KNOW

Your brain is constantly predicting the future even for simple things like catching a ball.



Science or superstitions: Blind beliefs or hidden science



A strong scientific attitude pushes us to ask:

- Why do we believe this?
- Is there any evidence?
- Can this be tested or explained logically?

But when they question, explore, and analyze, they begin to truly understand. This does not mean rejecting all traditions. Instead, it means examining them thoughtfully. Some beliefs may reveal hidden logic, while others may simply remain cultural practices without scientific backing. When students are encouraged to ask questions, perform experiments, and connect ideas to real life, science becomes less intimidating and more meaningful.

However, this is where the idea of 'SCIENTIFIC TEMPER' becomes important. Scientific temper is not just about knowing science it is about thinking scientifically. It means questioning, observing, and seeking logical explanations instead of accepting things blindly. It encourages curiosity over fear and understanding over assumption. Developing this mindset is especially important in today's world. When students rely only on memorization or blindly follow beliefs, they limit their ability to think critically.



Fear reduces, and confidence grows. In the end, science and superstition are not just about facts and beliefs they are about how we think. Blind belief keeps us limited, but a scientific attitude opens the door to discovery. So the next time you come across a superstition, don't just follow it question it. Because the moment you ask why, you are no longer just believing... you are thinking. And that is the true beginning of science.



WHAT IS SCIENTIFIC TEMPER TO YOU?

—RESEARCH ARTICLE—

13. Science Beyond Classrooms

A Survey on Scientific Temper & Awareness Among Educators

Survey: May 2026 | n = 11 Educators | Method: Structured Questionnaire | Mixed Methods

BY VANESSA RASQUINHA

Abstract

This study explores the awareness & understanding of scientific temper among 11 future educators (F.Y.B.Ed, Other than science & Maths Pedagogy) through a survey conducted in May 2026.

Inspired by **Jawaharlal Nehru's** vision of **scientific temper** as essential for national progress and education, the research examines how student teachers define scientific temper, identify science in everyday life, rank the institutions responsible for developing it, and value curiosity in relation to correctness.

The findings show that respondents strongly associate scientific temper with questioning, reasoning, and evidence-based thinking.

They widely recognise science beyond classrooms in areas such as health, technology, environment, and daily experiences, while emphasizing schools, family, and personal life as key contributors to scientific development.

The study also reveals that future educators overwhelmingly value curiosity over simply being correct.

Overall, the **results** suggest that student teachers possess substantial awareness of scientific temper, though continued educational and institutional support is necessary to strengthen inquiry-based teaching and rational thought.

"It is science alone that can solve the problems of hunger and poverty, of insanitation and illiteracy, of superstition and deadening custom and tradition."

— Jawaharlal Nehru



Introduction

India's **National Policy on Education** positions scientific temper as a fundamental civic duty. Yet **a persistent gap exists** between formal science instruction and how science is lived outside institutions. This survey probes that gap through the lens of educators — the very community responsible for cultivating scientific thinking in the next generation.

RESEARCH

Objectives



- To assess student teachers' understanding of scientific temper.
- To identify domains where science is recognized in daily life and educational application.
- To determine which institutions are perceived as most important in developing scientific temper.
- To evaluate attitudes toward curiosity versus correctness.
- To understand perceptions of science beyond formal laboratory settings.
- To gather qualitative examples of science in everyday life.

Methodology

Sample	11 students
Method	Structured Google Form Survey
Period	May 2026
Questions	6 (MCQ, Ranking, Likert Scale, Open-ended)
Analysis	Quantitative + Qualitative

Q1 – Defining Scientific Temper

100%

Shared a single unified definition

"A mindset of questioning, reasoning, and verifying facts through evidence."

The fact that all 11 respondents agreed shows that future educators share a strong common understanding of scientific temper, which can help create teaching environments that promote scientific thinking, curiosity, and rational learning.

Q2 – Science in Daily Life



Health & Medicine, Technology, and Environment emerged as the top three domains where educators see science most clearly.

SCIENCE DOMAINS – % OF RESPONDENTS

- Health & Medicine - 91%
- Technology / AI - 82%
- Environment & Climate - 73%
- Food & Agriculture - 73%
- Transportation - 64%

Qualitatively, respondents cited cooking chemistry, GPS navigation, and smartphone physics – demonstrating spontaneous recognition of science in lived experience.



Q3 – Influences on Scientific Temper

Three areas tied at the top, each rated Most Important by 73%:

-  Schools & Colleges— 73%
-  Family Upbringing— 73%
-  Daily Experiences— 73%
-  Government Policy— 55%
-  Social Media— 45%

Scientific temper is nurtured equally at home, in school, and in lived experience — not just in laboratories.

Q5 – Science Beyond the Lab

82%

Science is NOT limited to labs or textbooks

Only 1 respondent felt science is "mostly in laboratories"; 1 was unsure.

The qualitative consensus was vivid: science is present from the shape of a water bottle to dismantling health myths using ChatGPT and Google.

Q6 – Lived Science Examples

Open responses revealed three themes in everyday scientific practice:

Physical Science: Cooking thermodynamics, heat transfer, optics (spectacles)

Digital Science: GPS satellites, mobile communication, AI fact-checking

Social Science: Debunking myths on bed bugs, protein supplements, quackery

Science is the tool which helps identify the truth and delete the falsehood.

Q4 – Curiosity vs. Correctness

91%

Disagree curiosity is less important correctness

0%

Agreed correctness is more important

On a 1–5 Likert scale,

6 scored 1 (Strongly Disagree)

4 scored 2 (Disagree).

Only 1 was neutral.
Zero agreed.

Educators enshrine the spirit of inquiry above the pressure of being right.

Search

Discussion

The data reveals educators who already embody scientific temper in daily life but may not always translate it into classroom practice.

The equal weighting of schools, family, and experience as incubators suggests that pedagogy must bridge home and school, actively inviting students' lived contexts into inquiry.

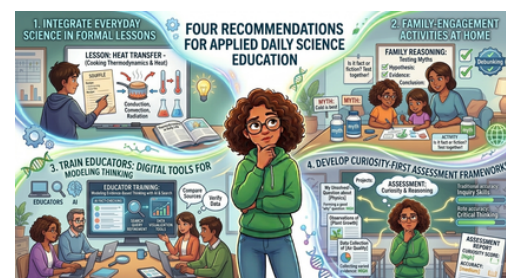


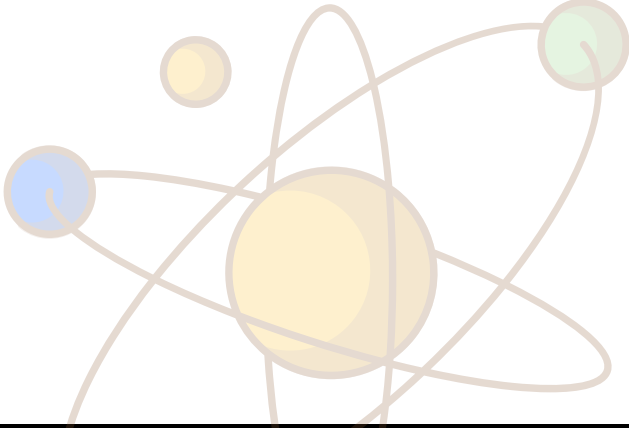
Conclusion

Educators demonstrate a consistent understanding of scientific temper and its everyday presence.

Their near-unanimous preference for **curiosity over correctness** makes them natural champions of **inquiry-based learning**.

This challenge is **systemic** as traditionally we have been taught to give more importance to being correct





Limitations

- The study was conducted with a **small number of participants** (11 respondents).
- The findings are based on responses from **trainees** and **may not represent all future educators**.
- Data was **collected at a single point in time** and **do not show changes over time**.
- The study was **limited to a specific educational context** and may not apply to all institutions.
- Responses reflected participants' views and experiences rather than their actual teaching practices.

Recommendations

1. Integrate **everyday science examples** into formal lesson plans
2. Design **family-engagement activities** that reinforce scientific reasoning at home
3. **Train educators** to use digital tools (AI, search) to model evidence-based thinking
4. Develop **curiosity-driven assessment frameworks** that value inquiry alongside accuracy

Keywords:

Scientific Temper • Science Education • Inquiry-Based Learning • Everyday Science • Curiosity • Evidence-Based Thinking • Educator Perceptions • Survey Research

Future Scope

- Conduct similar studies with a larger and more diverse group of future educators. (**expands the sample**)
- Track changes in scientific temper and teaching practices over time. (**longitudinal study tracking**)
- Compare the views of educators and students on scientific temper and science awareness. (**student-parallel survey**)





14. The Science of Staying Cool: How Our Body Beats The Summer Heat



Sweat, rehydration, and the ancient wisdom behind India's favourite summer drinks – explained simply.

Why Summer Heat Affects Us

On a scorching Indian summer day, our body temperature can rise dangerously.

The human body works hard to stay at a safe **37°C (98.6°F)** – its **ideal internal temperature**.

When the air around us gets hotter than our skin, the body's primary cooling tool kicks in: sweating.

Sweat glands release water onto the skin's surface.

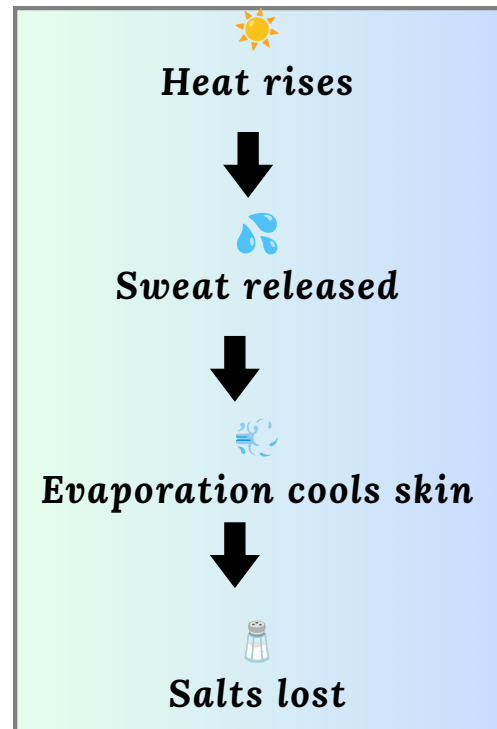
As this water evaporates, it carries heat away from the body – just like a natural air conditioner. **This is the chemistry of cooling – evaporation literally absorbs heat from your skin.**

But this comes at a cost: we lose water, sodium, potassium, and other vital minerals called electrolytes every time we sweat.

Why ORS Works – The Science of Rehydration

When you're dehydrated, drinking plain water isn't always enough. Your body needs help absorbing that water quickly.

This is where **Oral Rehydration Solution (ORS)** comes in – a scientifically designed mix of water, salt, and sugar.



How ORS Works in Your Intestine

–The intestine uses a **special protein called sodium-glucose cotransporter (SGLT1)**.

Sodium and glucose are absorbed together – and water follows automatically!

This means the glucose in ORS isn't just for energy – it unlocks sodium absorption, which pulls water into your bloodstream rapidly.

Homemade ORS Recipe: 1 litre clean water · 6 level teaspoons of sugar · ½ teaspoon of salt. Stir well and sip slowly throughout the day.

Did You Know?

The **WHO's ORS formula** has been called "the most important medical advance of the 20th century" by The Lancet journal. It has saved millions of lives, especially children in tropical countries, from severe dehydration.

On a very hot day, a person can lose up to 2–3 litres of sweat per hour during physical activity!



Did You Know?
Sabja seeds can absorb up to 45 times their own weight in water! That is why soaked sabja seeds feel so plump and jelly-like.



Did You Know?

A study on construction workers in tropical India found that **regular consumption of buttermilk helped reduce heat cramps and fatigue compared to those drinking plain water.**

The natural sodium and potassium in buttermilk acts almost like a natural sports drink!



Beat the Heat the Smart Way

Summer survival is a science — and our ancestors understood it better than we realised.

Whether it is **the sodium-glucose chemistry of ORS**, the **hydrocolloid magic of gond katira**, or the **probiotic richness of buttermilk**, India's traditional cooling drinks are not just folklore. They are evidence-based nutrition in a glass.

This summer, stay hydrated, respect your body's **thermoregulation**, and trust the wisdom of your grandmother's kitchen — backed by modern science.





Sattu

Made from **roasted gram (chana)**, sattu is rich in protein, complex carbohydrates, and electrolytes like potassium and magnesium.

It releases energy slowly, keeping you going through the heat without a sugar crash.

Mix with water, lemon, and a pinch of salt for the perfect summer drink.

⚡ **Slow-release energy + electrolytes**



Gond Katira

This natural tree resin (from *Astragalus* species) is a **hydrocolloid** — it swells in water and creates a thick, gel-like substance.

It acts as a slow-release water source inside the body, keeping you hydrated for longer.

It also has a natural cooling effect described in Ayurveda.

🧊 **Slow-release hydration**

Traditional Indian Cooling Drinks — and Their Science

Indian families have been consuming these traditional drinks for centuries — and modern science confirms why they work so well.

Buttermilk (Chaas)

A powerhouse of water, sodium, potassium, and probiotics (good gut bacteria).

It replenishes electrolytes lost through sweating, supports gut health, and research suggests it may help reduce heat strain in workers doing outdoor physical activity in hot climates.

🦠 **Electrolytes + gut health**

Sabja Seeds (Tukmaria)

These tiny seeds from sweet basil **expand dramatically when soaked in water**, forming a gel-like coating. This **gel is made of mucilage fibre** — it slows digestion, reduces body heat, and helps retain hydration in the body longer.

They are also rich in **omega-3 fatty acids**.

💧 **Hydration + cooling gel**

🍹 iced drinks 🍹

15. When the Slides Stopped, Science Started

Three lessons, one faulty smartboard, a Jurassic Park clip, and the slow learnings of a first-time teacher

BY VANESSA RASQUINHA



LESSON 1 • CLASS 5

Dinosaurs, walnuts, and a student who did bending exercises

I didn't begin with definitions but with a short clip of Jurassic Park — a dinosaur. A good **Set Induction** creates a spark of curiosity before you actually start teaching the lesson. I later said, "Touch your head. Tap it. What is that hard thing?" — "Skull!" This is **activating prior knowledge**: begin with what students already carry.

"The walnut did in five seconds what my diagram hadn't done in five minutes."

Hard shell: skull. Protects inside: brain. This is where I tried to use **Analogy-based learning**. I called a student to the front.



DID YOU KNOW?

The word **vertebra** comes from Latin meaning "to turn" — exactly what your flexible backbone lets you do!

Bend forward. Now back. If the backbone were one rod, could she? No — the spine is small bones stacked, each moving a little so the whole moves a lot. One student demonstrated vertebral articulation better than any diagram.

Only then: "reed ki haddi." Not translation — **multilingual correlation**. The Hindi carries what English doesn't: backbone as resolve, the thing that holds you upright in every sense.

LESSON 2 • CLASS 8

The silence that I didn't learn to read
Transpiration.

Videos, animations, **stomata** at cellular level. Blank faces — not confusion, more like polite absence.

I had caused cognitive overload: too much, too fast. But deeper: I was watching the clock, not students. Teaching to finish, not to reach. This is face reading — no lesson plan teaches it.



"Pause the video. Ask: what did you just notice?"

One question converts passive watching to active observation. The vertical correlation missed: stomata → transpiration → rainfall → deforestation. That leaf connects to the monsoon.

CONNECTION TO NCF 2023

NCF emphasises **experiential learning** and connecting science to daily life — exactly what these lessons demonstrate

LESSON 3 • CLASS 6 • MOST CHALLENGING

Broken smartboard, Dettol, and the best lesson I never planned

The evening before, I found out the smartboard wasn't working. My PPT was useless. So I rebuilt around objects instead of slides.

On the table: cooking oil. Salt. Dolo. Dettol. No context, no title. The class leaned in — exactly what you want. This is **inquiry-based learning**: let the question form before the answer arrives.



When I moved to vaccination the glazing began. I stopped. Made a decision: "You — body. You — germs. I'm the doctor. You — antibodies." With vaccine: blocked. Without: germs walked through. The student playing germs committed fully.

Everyone understood — not memorised, but lived. This is **experiential learning**: knowledge rehearsed through the body stays. The broken smartboard had forced the best lesson of three. Constraints are a pedagogy tool too.

DID YOU KNOW?

Boric acid — the white powder on a carrom board — is also used in eye drops and as a mild antiseptic. Chemistry was in your game cupboard all along.

ASSIGNMENTS • HORIZONTAL CORRELATIONS

Slouched or straight?

Skeletal structure, muscle load, spinal health — test it in your chair right now.

What chemical is used on a carrom board? Boric acid — lubrication, friction, and chemistry in the game cupboard.

Phone battery vs remote battery.

Different voltages, chemistries, discharge profiles. Same concept, different scales.

NCF 2023 • COMPETENCY LINK

NCF 2023 calls for moving from rote to **competency-based, experiential approaches**. The roleplay, object-based induction, and life-correlation assignments directly embody these principles.

PERIODIC TABLE



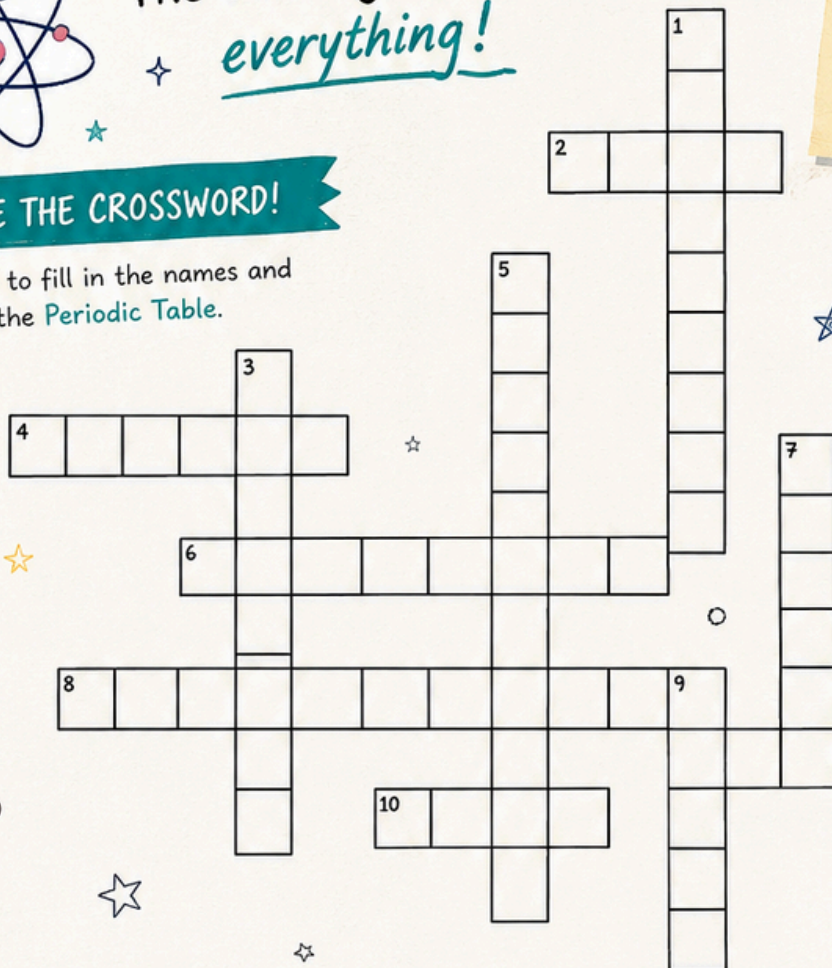
The building blocks of everything!

DID YOU KNOW?

Hydrogen, the first element on the periodic table, makes up about **75%** of the mass of the universe!

COMPLETE THE CROSSWORD!

Use the clues to fill in the names and facts about the **Periodic Table**.



> FUN FACT <

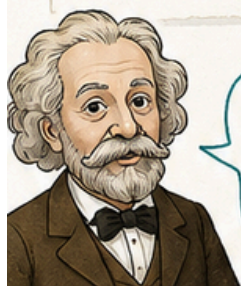
The periodic table has **118** elements arranged in **7** periods (rows) and **18** groups (columns)!

ACROSS

- [2] They are in the middle, they are shiny, conductors, and malleable
- [4] The name of the rows on the periodic table
- [6] They make the dotted star step. They have the characteristics and metals and nonmetals.
- [8] The number of an element that shows the number of protons and electrons
- [10] The most basic component of all matter. Includes protons, a nucleus, neutrons, and electrons.

DOWN

- [1] The name of the columns on the periodic table.
- [3] They are on the right, dull, not conductors, and brittle.
- [5] Where elements are written as symbols and shown in a chart
- [7] Two or more kinds of atoms that chemically bond and separate in chemical reaction
- [9] They are pure substances that can't be separated in a simpler substance by physical or chemical change



“The periodic table is not just a table, it's a **map to understand the universe.**

– Dmitri Mendeleev

CHALLENGE YOURSELF!

Pick any element from the periodic table and write 3 interesting facts about it!



16. The Dual Architecture of Science

Science is often perceived as a collection of facts – periodic tables, laws of motion, taxonomic classifications. But this view captures only half the picture. Science is equally a process: a disciplined, creative method of inquiry that generates new understanding through observation, experimentation, and reasoning.

"Science is not just about answers it is about the disciplined, creative journey of discovery."

As a **PRODUCT**, science gives us verified knowledge – theories, models, and data that explain natural phenomena. The structure of DNA, the behaviour of light, the mechanics of plate tectonics – these represent humanity's accumulated understanding of the universe.

As a **PROCESS**, science is dynamic and iterative. It involves asking questions, forming hypotheses, designing experiments, collecting data, and drawing conclusions. This cycle of inquiry is what makes science self-correcting and ever-evolving.

Understanding this duality is essential for science education. When students see science only as facts to memorize, they miss the excitement of discovery. When they engage in the process – designing experiments, analyzing results, debating interpretations – they develop critical thinking skills that extend far beyond the laboratory.

Classroom Insight

Hands-on laboratory work bridges the gap between science as product and science as process. When students conduct experiments, they don't just verify known facts – they experience the uncertainty, creativity, and rigour that define authentic scientific inquiry. Encourage students to design their own investigations, not just follow prescribed procedures.

OBSERVE

Observation & data
collection

HYPOTHESIZE

Form testable predictions

EXPERIMENT

Design & test rigorously



The Dual Architecture of Science



Madam Curie work gave us both new knowledge and a new way of thinking. She was not just adding the product side of science. She also added process by asking questions, experimenting tirelessly which gave rise to the new structure of atom.

The word "science" comes from the Latin scire, meaning "to know." But the ancient Greeks called it philosophia — the love of wisdom. Science was never just about facts; it was always about the joy of wondering!



Instead of just explaining reactions of acids and bases to middle school students, if the students are allowed to experiment firsthand, they would discover the answers and they would remember and that's unforgettable.

The Interdependence:

The relationship between product and process is not linear but cyclical:

- Inquiry (Process) leads to new knowledge (Product)
- Existing knowledge (Product) inspires further investigation (Process)
- This ongoing interaction is what drives scientific progress.
- If teaching focuses only on content, students may memorize without understanding.
- If it focuses only on activity, learning may lack direction.
- Effective science education lies in balancing both, allowing students to understand not just scientific conclusions, but the journey behind them.

Research

A study in Science Education Review highlights that students who learn through inquiry-based labs retain concepts 30% longer than those taught only through lectures.

Science is not a static collection of facts; it is a living, evolving discipline shaped by inquiry and evidence. When teaching reflects the integration of product and process, students are better prepared for real-world challenges.

They do not just learn answers; they learn how to think, question, and explore.



17.The Blue Button Mystery

in Mumbai



In early 2026, Mumbai’s beaches experienced a striking natural event thousands of vivid blue, disc-shaped organisms washed ashore. At first, many assumed it was a jellyfish invasion. However, scientists clarified that these creatures were Blue Buttons (*Porpita porpita*), colonial hydrozoans often mistaken for jellyfish but belonging to a different group altogether.

What Are Blue Buttons?

Although they resemble jellyfish, Blue Buttons are not true jellyfish. They are colonies made up of many specialized units called zooids, which function together as a single organism. Each colony features a small central disc, usually 2–3 cm wide, that serves as a buoy. Around this disc extend delicate tentacles equipped with stinging cells to capture food. Their sting is mild and typically harmless to people, though it can sometimes cause minor skin irritation.

Strong onshore winds and shifting ocean currents pushed surface-dwelling organisms toward the coast. Seasonal upwelling where cold, nutrient-rich water rises also plays a role, bringing deep-sea organisms closer to shore. This is a natural oceanographic event, not pollution-related.

Best Advice from Marine Biologists

- Do not touch with bare hands mild stings can irritate sensitive skin
- Do not consume they are not edible and may carry toxins
- Keep children and pets away from beached specimens
- Report mass strandings to local marine authorities

Ecological Significance

Blue Buttons are part of the ocean's surface ecosystem (neuston). They feed on plankton and are prey for sea slugs and ocean sunfish. Their appearance on beaches indicates healthy ocean currents and biodiversity not ecological damage.

"Nature is dynamic what seems unusual or alarming is often a scientific story waiting to be understood."

2-3 cm

Average disc size

NOT Jellyfish

Colonial hydrozoan

Mild Sting

Generally harmless

