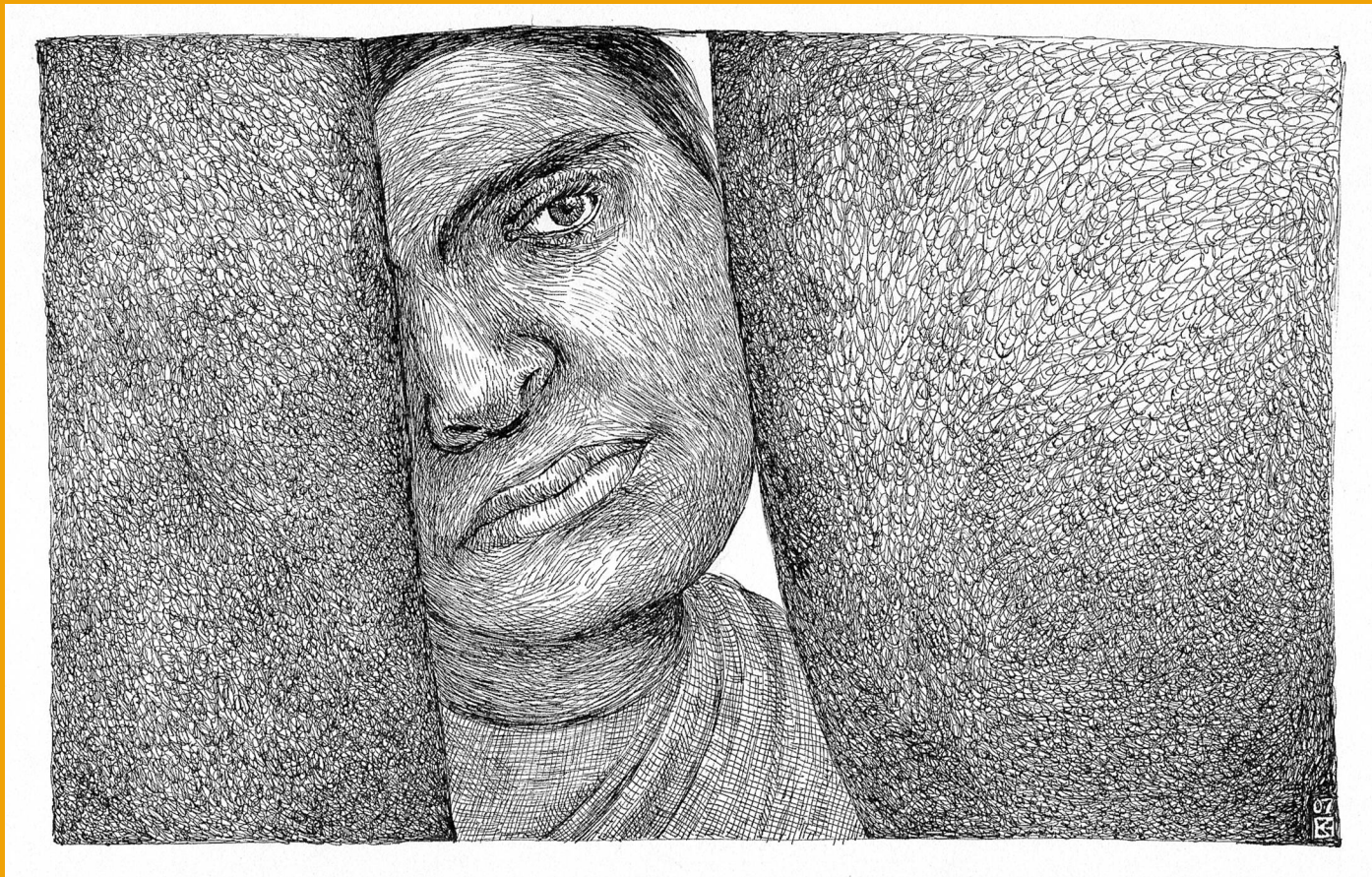


STEAM

VISION

Karen Haydock
Gurinder Singh
Himanshu Srivastava
Rosemary Varkey
Mahuya Sinha (PhD)
Kranti Patil
Asif Akhtar
Subir Kangsabanik
Nikhil Narkar

haydock@gmail.com
www/khaydock.com



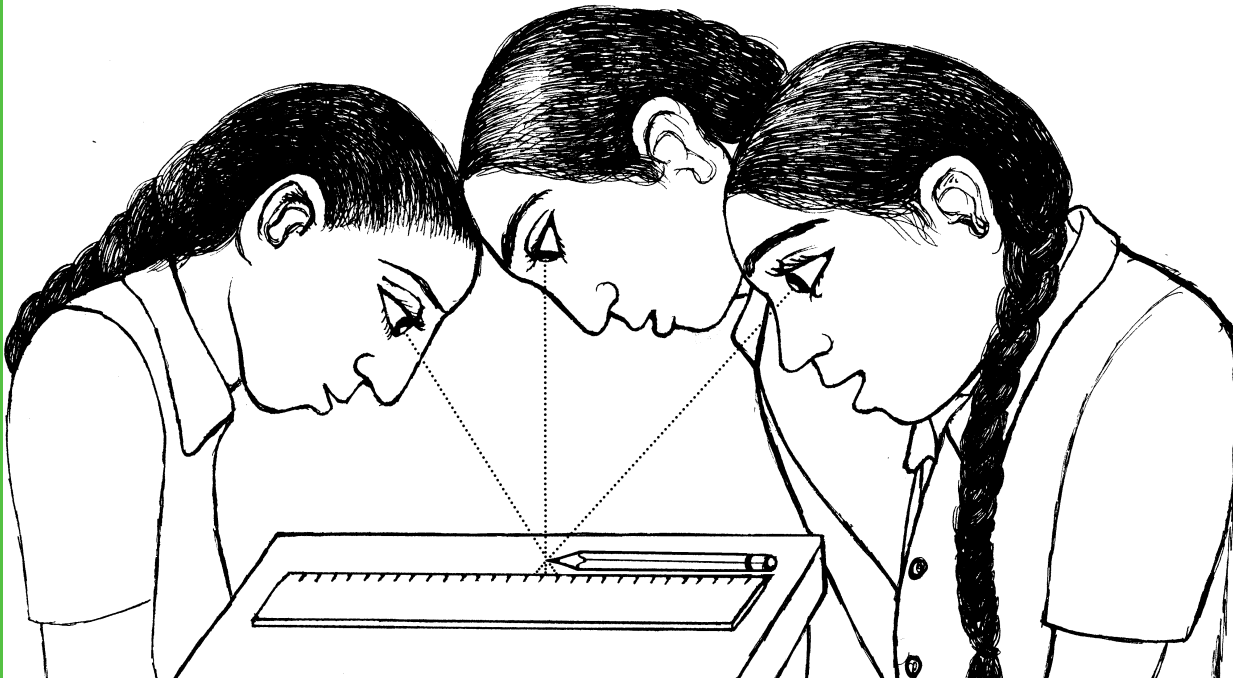
To define a vision, we need a framework

Define a framework based on:

What do we mean by SCIENCE?

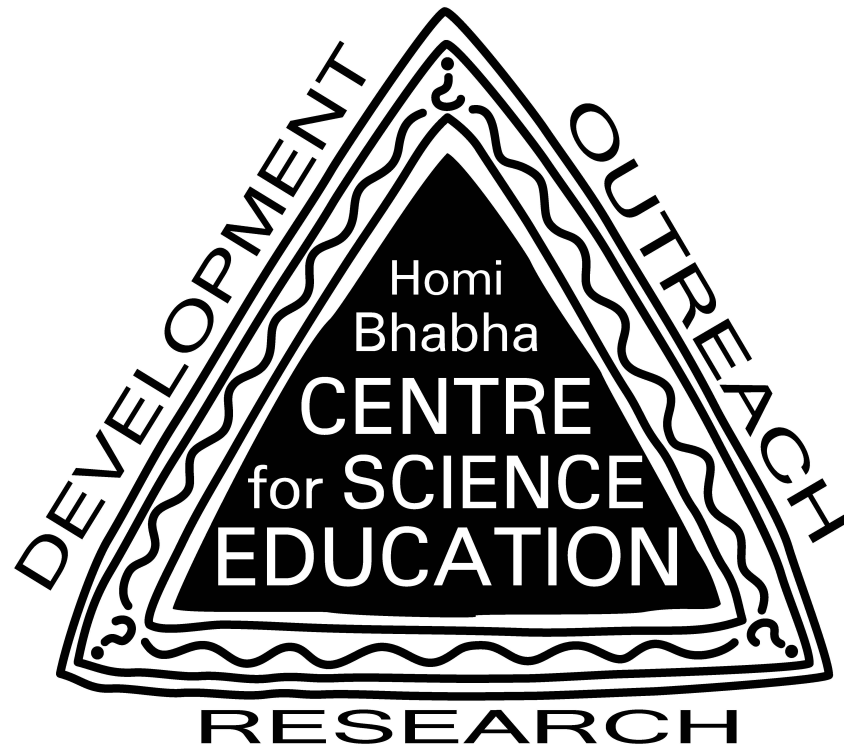
What do we mean by EDUCATION?

Do people need SCIENCE EDUCATION? If so why?



To define a vision, we need a framework

HBCSE is based on the synergy:



I try to combine all 3 aspects in my work



What is science?

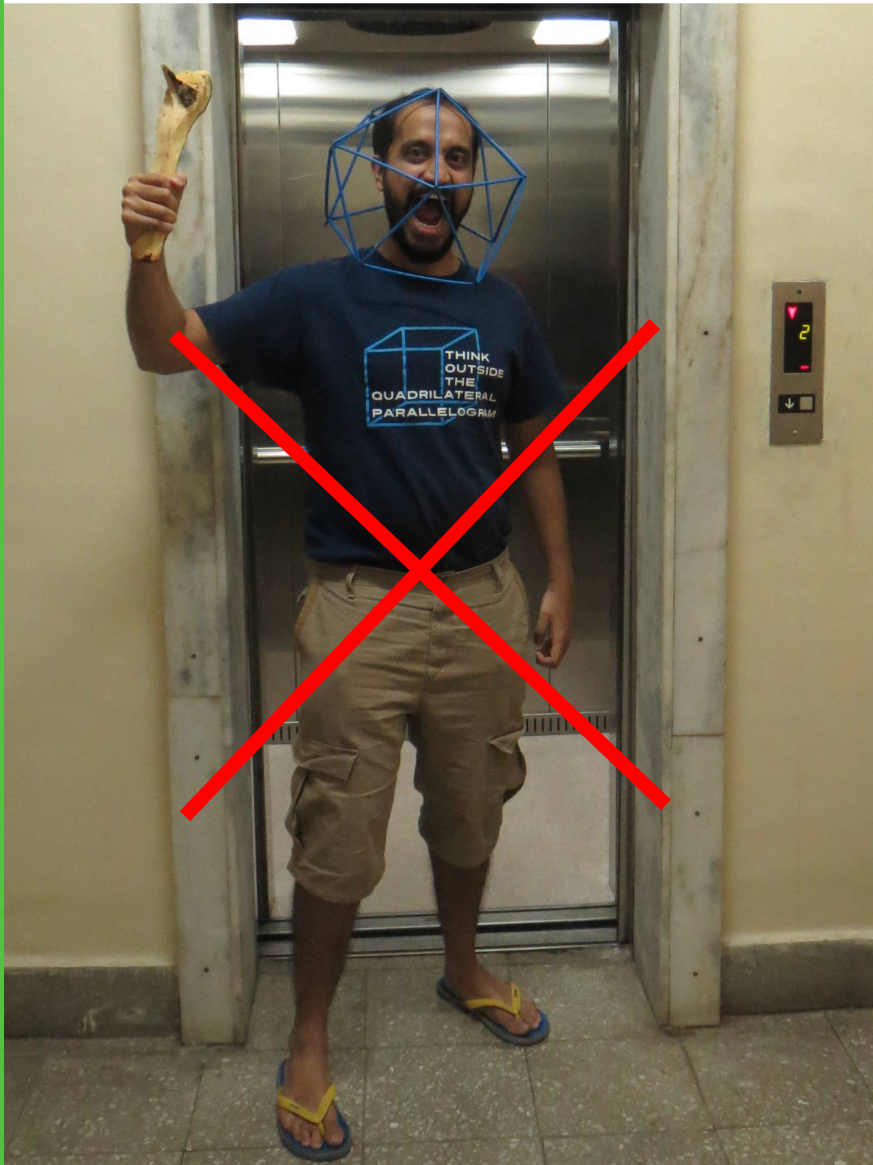
BODY OF KNOWLEDGE:



A

What is science?

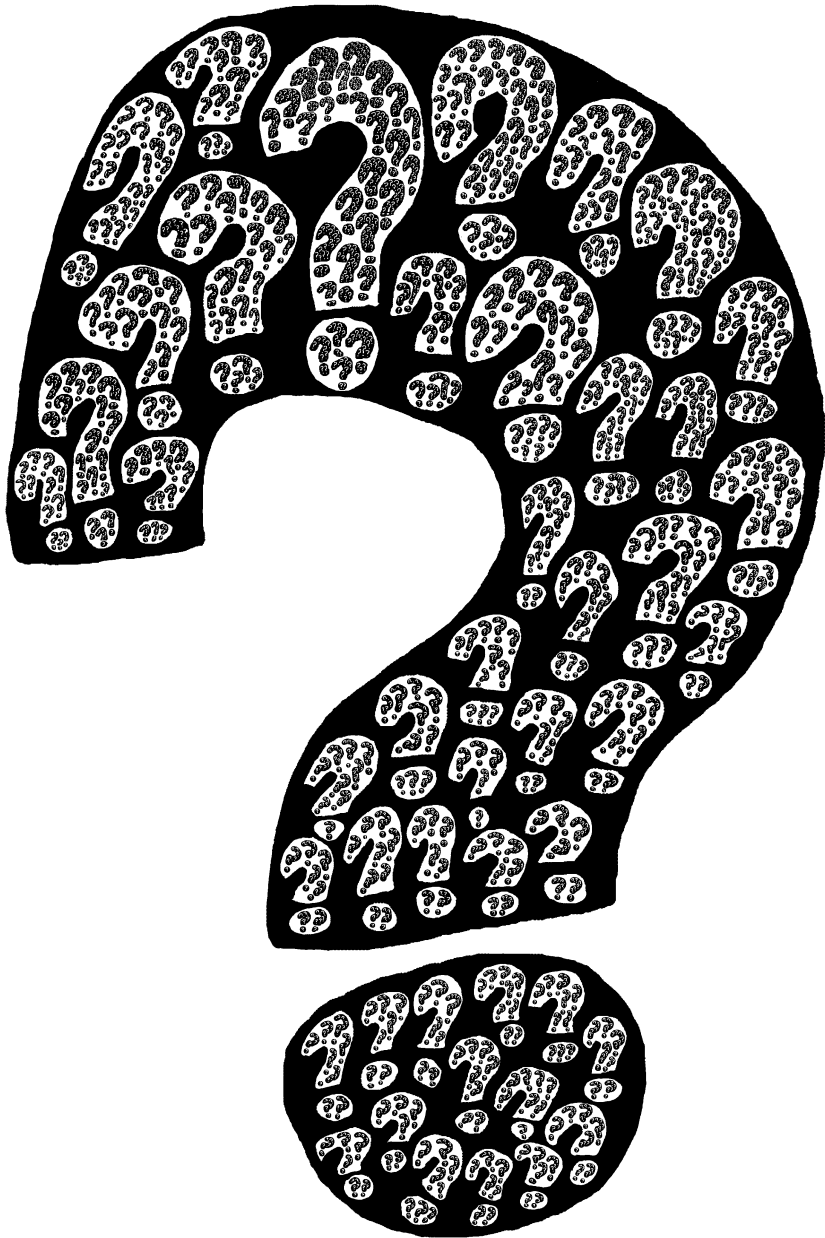
BODY OF KNOWLEDGE:



A

Science is NOT just a 'body of knowledge'

SCIENCE:



A

Science is is a continuous and progressive process of asking questions and searching for answers by observing, hypothesizing, modelling, testing, analysing, comparing, communicating, reasoning, questioning ... etc. (with variations in order, etc)

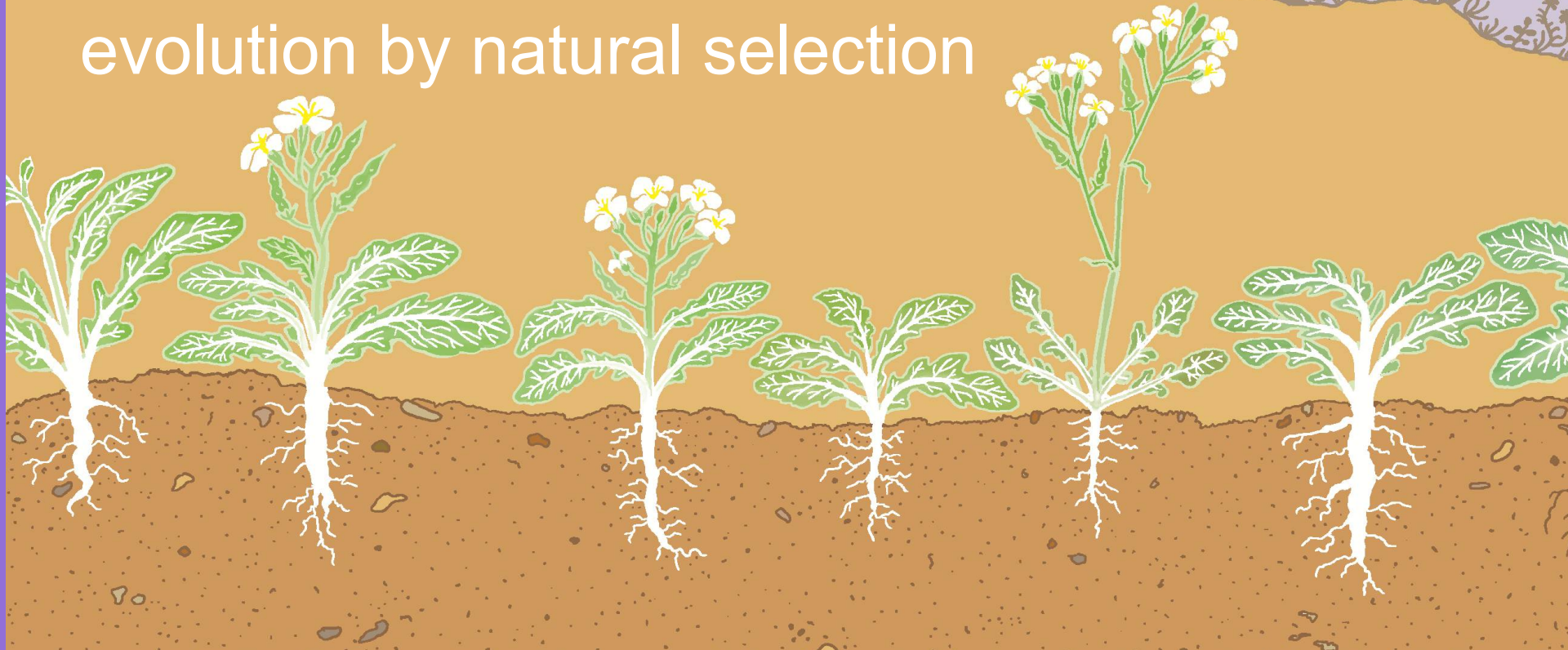
Main areas of work in the STEAM Lab:

- (1) Art & science: Visual learning & teaching
- (2) Using contradictions in teaching
- (3) [The cultivation of cultivation]
- (4) Teacher education
- (5) Formative assessment in constructivist teaching
- (6) Learning / teaching about evolution by natural selection
- (7) Development and environmental issues in higher secondary science teaching
- (8) Open-beginninged science explorations

Is this farmer a
scientist?



LEARNING / TEACHING about
evolution by natural selection

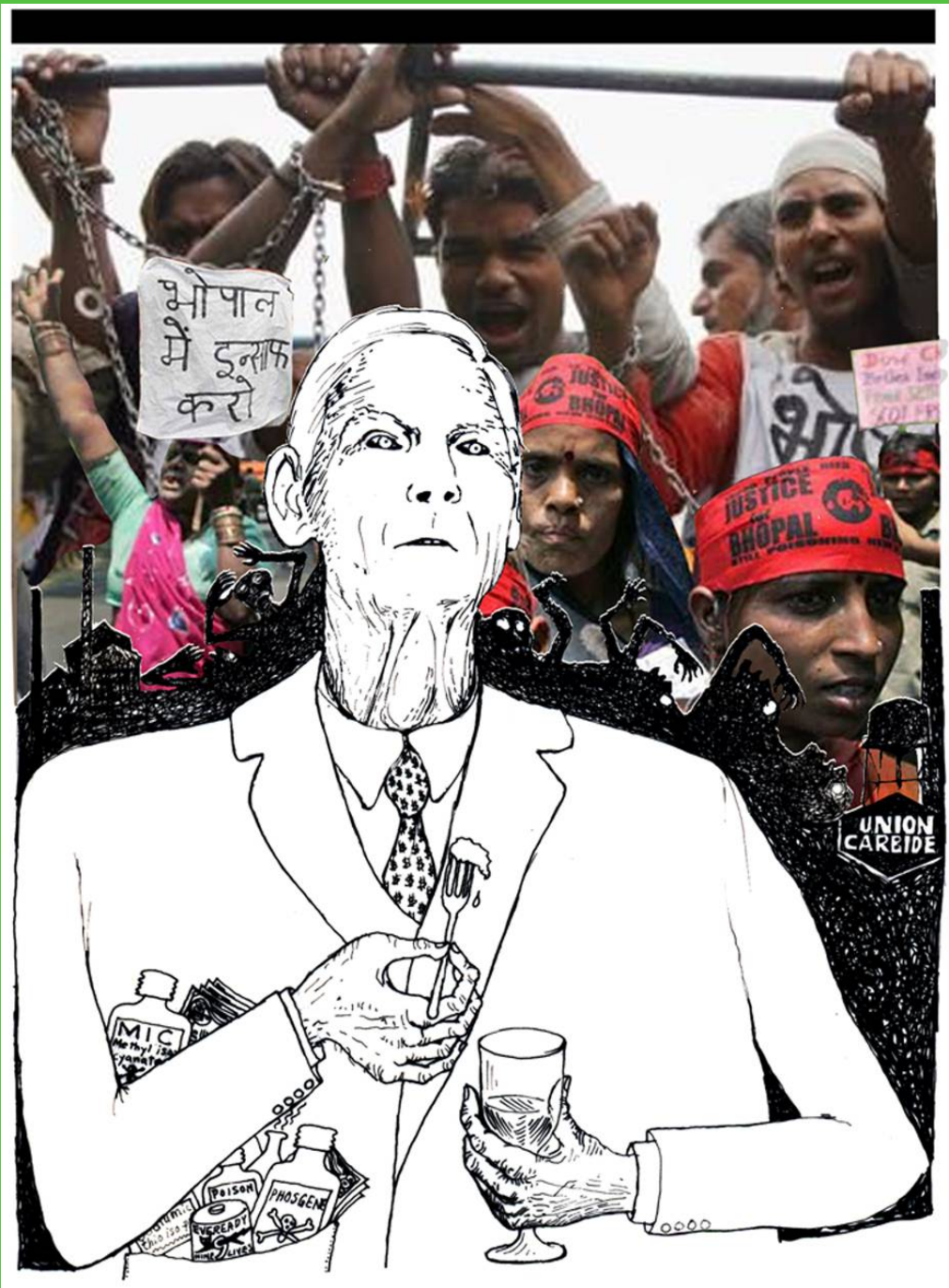


LEARNING / TEACHING about evolution by natural selection

Why?
It is central to biology.



It addresses conflicts between science and society

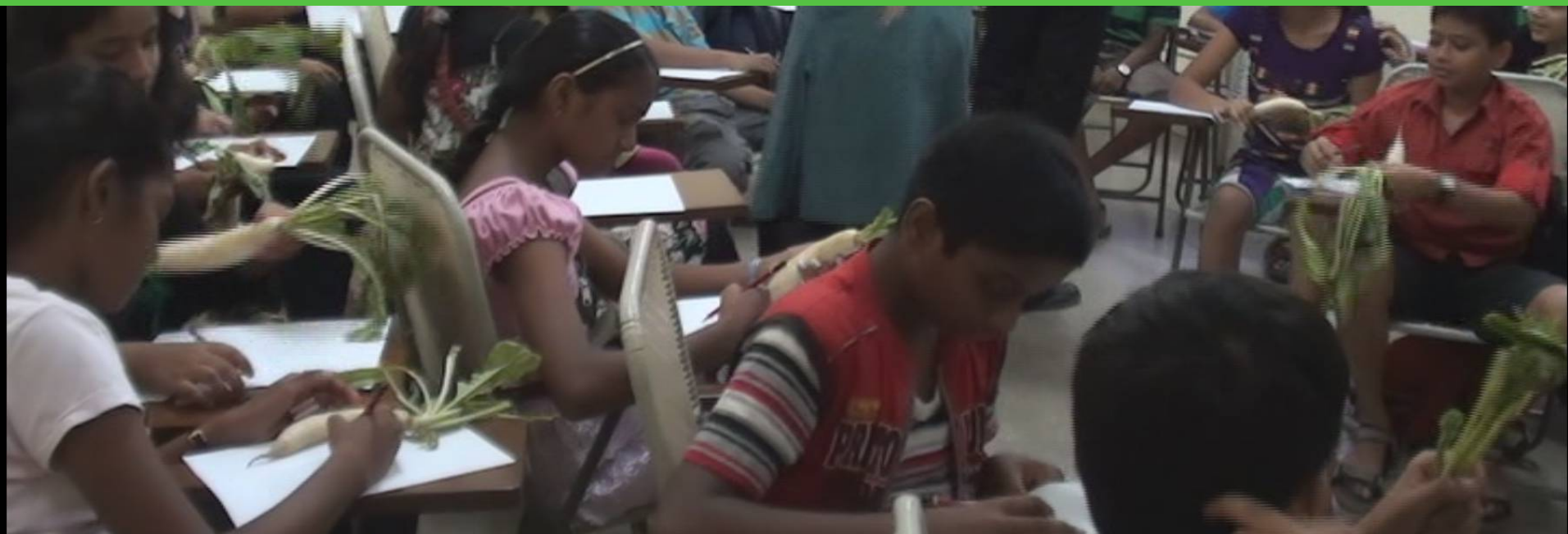


B

Science has the potential of being used for human progress, agriculture, peace, and to help prevent ecological problems, rather than for militarisation, corporate profit, or fascism.



Education must draw on activity-based, enquiry-based, and/or constructivist, methods of teaching and learning, rather than rote memorisation or pedantic teaching methods



LEARNING / TEACHING about evolution by natural selection

SUGGESTIONS for HBCSE:

- Encourage more creative, innovative work in areas which are not supported by run-of-the mill ('world-class') institutions
- Since only 5% of Indians speak english, encourage more publications in other languages
- Develop more and better quality ways to publish articles on research & pedagogy - and create 2-way communication with our real peers - teachers



SUGGESTIONS for HBCSE:

- Write in wikipedia



WIKIPEDIA
The Free Encyclopedia

Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikimedia Shop

Interaction

Help
About Wikipedia
Community portal
Recent changes
Contact page

Tools

What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item
Cite this page

Print/export

Create a book

Article

Talk

Read

Edit

View history

Search



Natural selection

From Wikipedia, the free encyclopedia

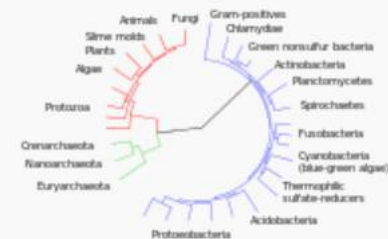
For other uses, see [Natural Selection \(disambiguation\)](#).

Natural selection is the gradual process by which **biological traits** become either more or less common in a **population** as a function of the effect of inherited traits on the differential **reproductive success** of organisms interacting with their environment. It is a key mechanism of **evolution**. The term "natural selection" was popularized by **Charles Darwin**, who intended it to be compared with artificial selection, now more commonly referred to as **selective breeding**.

Variation exists within all populations of organisms. This occurs partly because random mutations occur in the genome of an individual organism, and these mutations can be passed to offspring. Throughout the individuals' lives, their genomes interact with their environments to cause variations in traits. (The environment of a genome includes the molecular biology in the cell, other cells, other individuals, populations, species, as well as the abiotic environment.) Individuals with certain variants of the trait may survive and reproduce more than individuals with other, less successful, variants. Therefore the population evolves. Factors that affect reproductive success are also important, an issue that Charles Darwin developed in his ideas on sexual selection, for example.

Create account Log in

Part of a series on **Evolutionary biology**



Diagrammatic representation of the divergence of modern taxonomic groups from their common ancestor.

Key topics [\[show\]](#)

Processes and outcomes [\[show\]](#)

Natural history [\[show\]](#)

History of evolutionary theory [\[show\]](#)

Fields and applications [\[show\]](#)

Social implications [\[show\]](#)

Evolutionary biology portal · [Category](#) · [Book](#) · [Related topics](#)



D

Education for all is needed in order to create a “sovereign socialist secular democratic republic”, in accordance with the Constitution of India. Science education also includes efforts to help students understand their rights and responsibilities in all these areas.



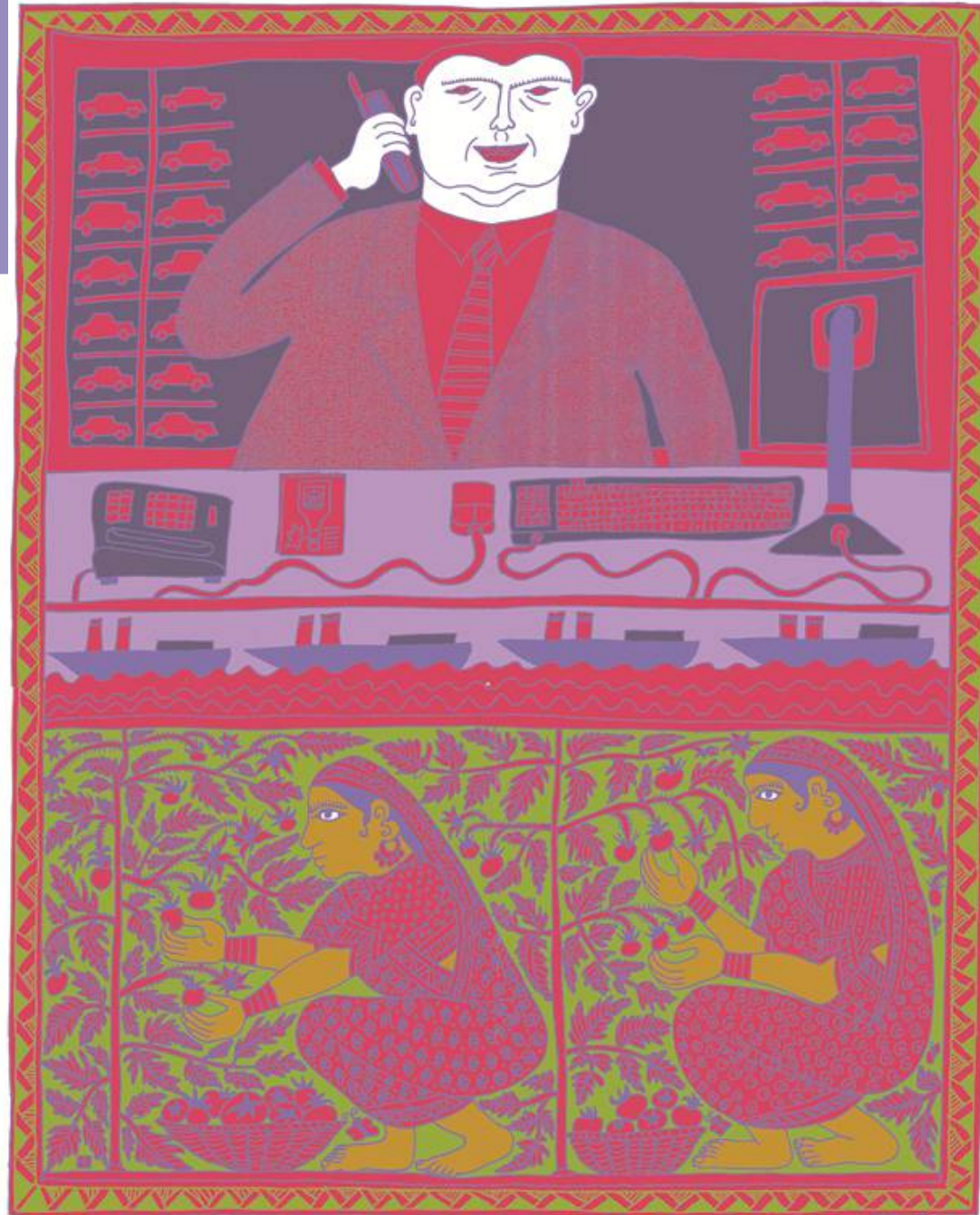
Education is needed not to maintain the status-quo, but to learn how to play an active, creative part in transforming the world - for social justice, liberty, and equality

Development and Environmental Issues in Higher Secondary Science Teaching

What perspectives are taken towards the conflict between ecology and economy (definition, cause & solution):

- in policy statements?
- in science textbooks?
- by 3 teachers in Indore, as shown through interviews & classroom observations?

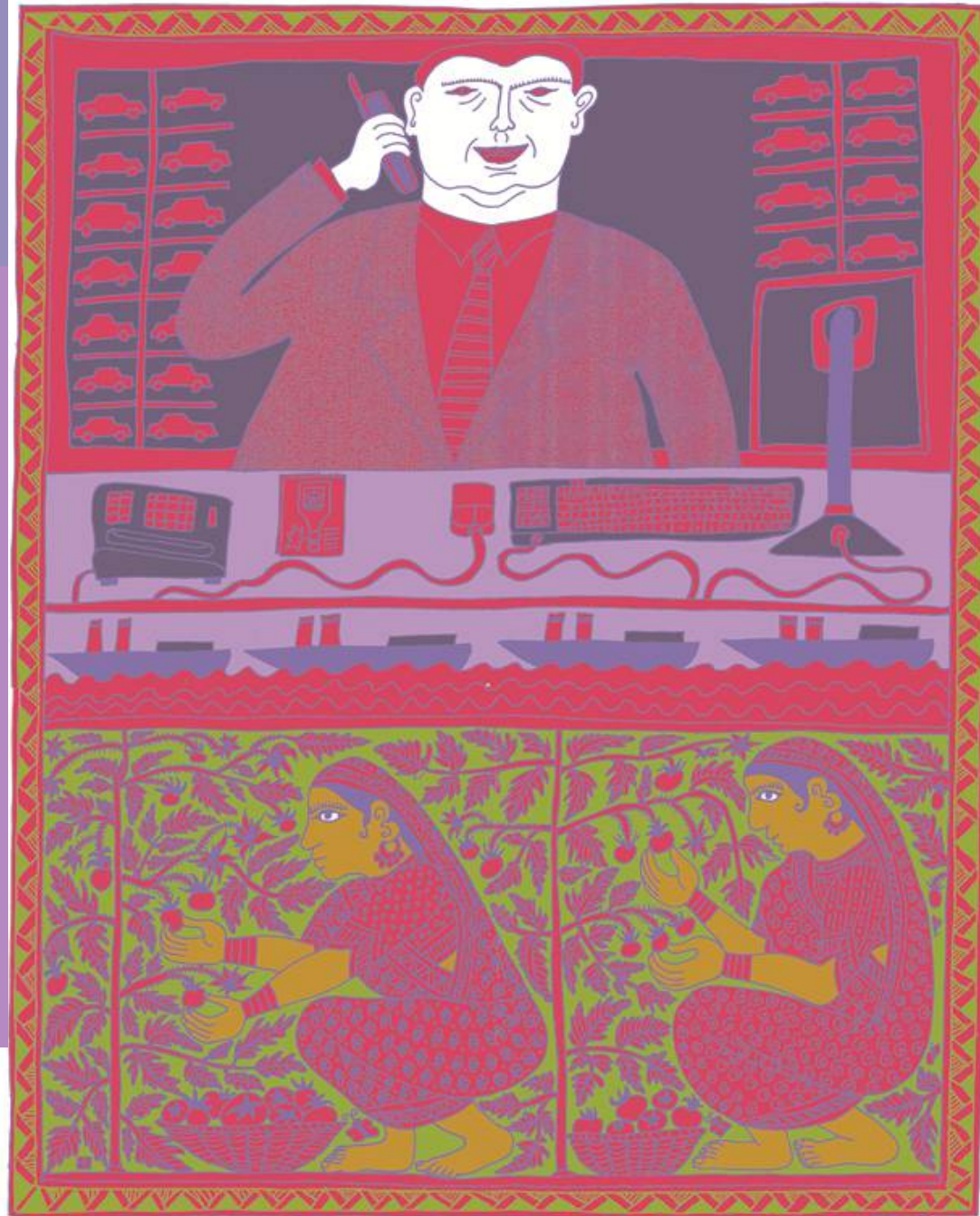
Himanshu Srivastava
(fieldwork project)



Development and Environmental Issues in Higher Secondary Science Teaching

CRITIQUE & IMPACT:

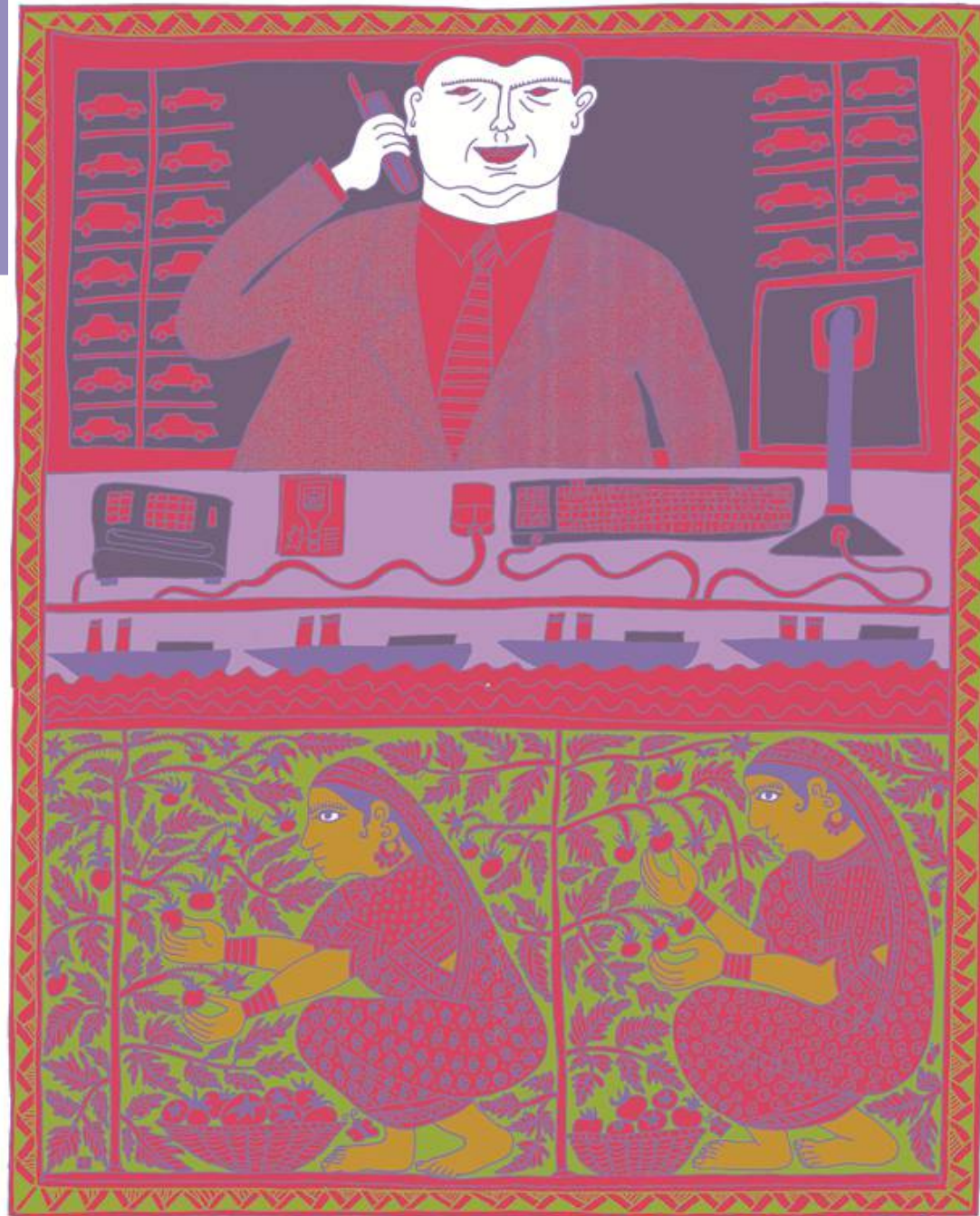
- Only 3 case studies
- More follow-up of interviews required
- Consider social science textbooks also?
- Article being written,
- Presentation at CESI



Development and Environmental Issues in Higher Secondary Science Teaching

SUGGESTIONS for HBCSE:

- Do more research, development, & outreach in social sciences
- Do more analysis of policy
- Do more advocacy for science education





Education must draw on activity-based, enquiry-based, and/or constructivist, methods of teaching and learning, rather than rote memorisation or pedantic teaching methods





F

In order to stand for education for all, we need to stand against the stratification, commodification, and privatisation of education -

We need to work for national policies and government schools which are in the interests of the unprivileged and against the maintenance of privilege and ableism.

G

Science education is necessary for the development of scientific temper - for “...the refusal to accept anything without testing and trial, the capacity to change previous conclusions in the face of new evidence, the reliance on observed fact and not on pre-conceived theory, the hard discipline of the mind—all this is necessary, not merely for the application of science but for life itself and the solution of its many problems.” (Nehru)



Open-beginninged science explorations

Problem: students are not DOING science...

- Can middle school students learn science by defining their own questions, and areas of exploration?
- Can students construct a scientific method of answering their own questions?
- What role should teachers play?
- How can open-beginninged science be assessed?

Gurinder Singh & KK Mishra



Open-beginninged science explorations

CRITIQUE & IMPACT:

- Work in home area is good idea
- Research will include outreach (teaching)
- Development of material and methods is good idea



Open-beginninged science explorations

SUGGESTIONS for HBCSE:

- All members should do more teaching & varied teaching, especially with the most oppressed students
- More hands-on work to define research projects
- more collaboration between WILLING faculty



What is to be learnt?

Books on
Research Methodology
in HBCSE Library



What is to be learnt?



PHILOSOPHY,
METHODOLOGY AND
QUALITATIVE RESEARCH

QUALITATIVE
INTERVIEWING
A Text for Improving Questionnaire Design

001.433
961
19848

WILEY

Design, Evaluation, and

Handbook of
Feminist
Research
Theory and Praxis

001.434
960
19849

Oxford University Press

Patrick White
Developing
Research
Questions

A GUIDE
FOR SOCIAL
SCIENTISTS

METHODS FOR
TESTING AND

Key No. 244

WILEY

300.723
841546
19825

SERIES IN SURVEY METHODOLOGY

Planning, Implementing and Interpreting

001.434
960
21415

001.434
960
19850

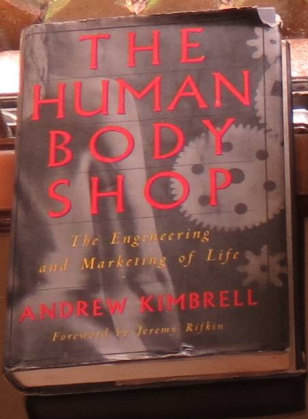
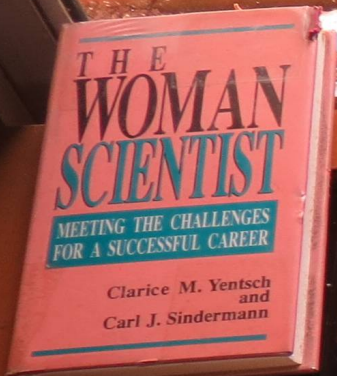
J.B. Evans

What is to be learnt?

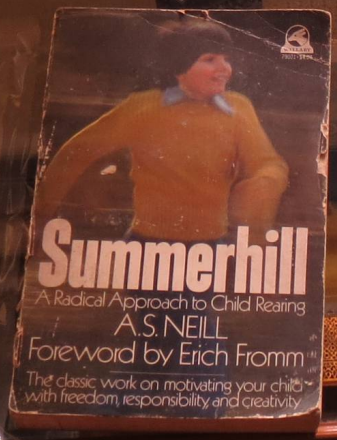
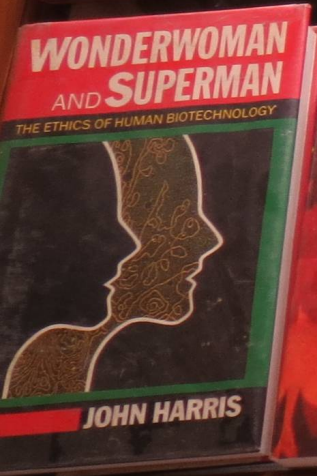
Handbook of
Feminist
Research
and Praxis

Key No. 244

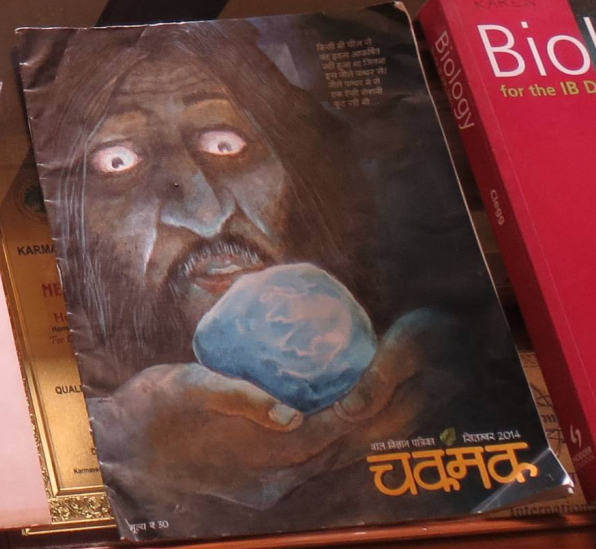




LOOK AT THE BOOKS
BUT DO NOT TAKE
If you want to borrow,
ask in Room 215.



HOW
CHILDREN
FAIL
John Holt







LOOK AT THE BOOKS
BUT DO NOT TAKE
If you want to borrow,
ask in Room 215.

HOW
CHILDREN
FAIL
John Holt

What is to be learnt?