

Overview of Research & Development in Science, Technology and Mathematics Education at HBCSE

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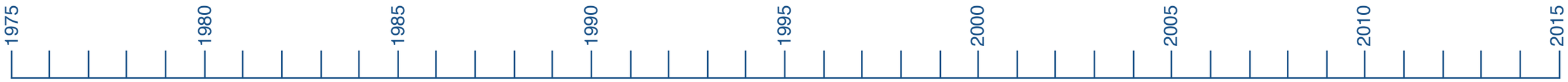
STME R&D over the years



STME Research

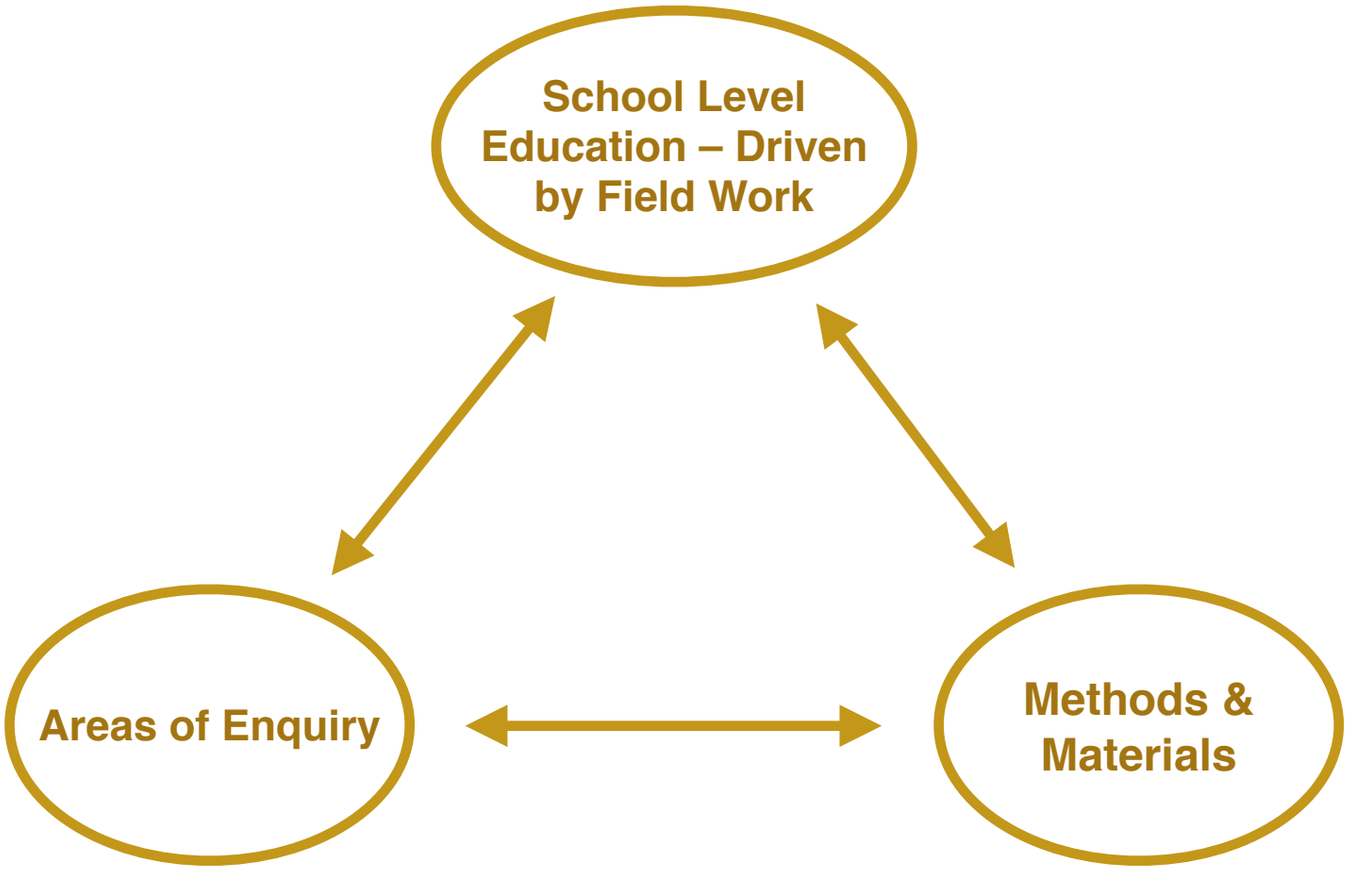
Early Years (70's - 1990's)	Discontinuity (1996 - 2001)	Fresh Start (2002…)	Future

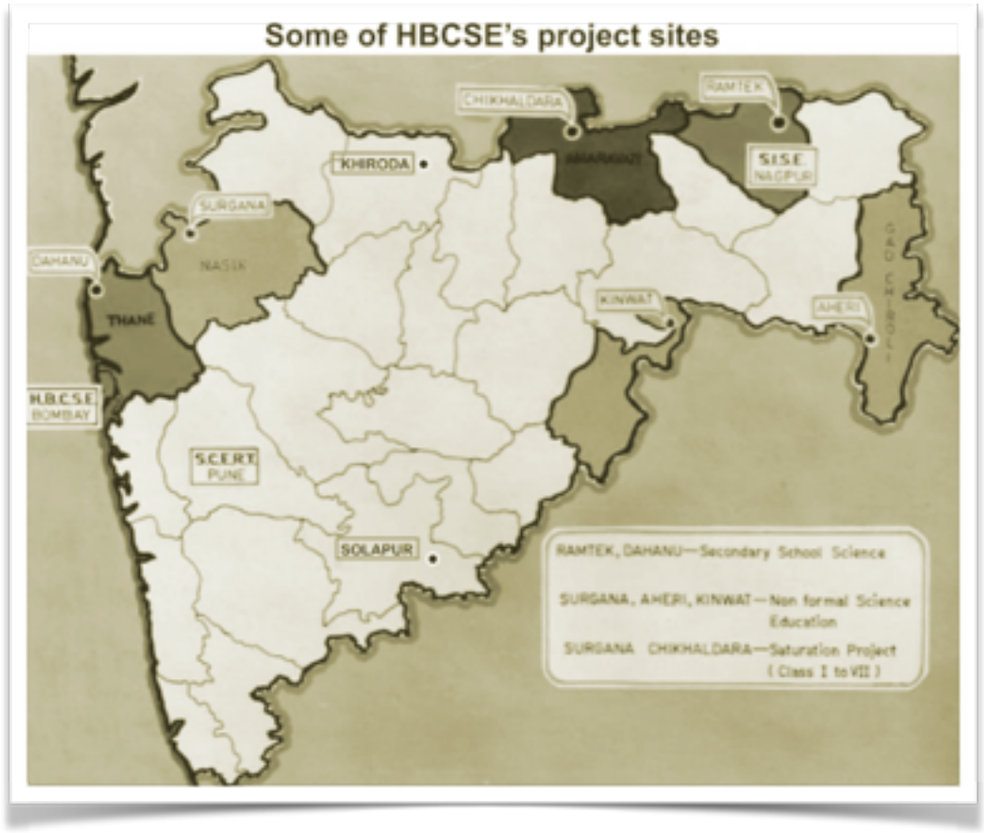
Materials Development

Early Years (70's - 1990's)	Discontinuity (1996 - 2001)	Fresh Start (2002…)	Future
Books Kits	Books Kits Posters Exhibitions HB Curricula	Books Kits Posters HB Curricula Research Reviews Web Resources Collaboration Platforms Open Educational Resources	?

Early Years (70's to 90's)

Govt. schools, socio-economically deprived backgrounds





Khiroda (Jalgaon), Pabal (Pune), Surgana (Nashik) Chikhaldara (Amravati), Ashram schools of Thane, Pune and Raigad... and others

A few scientific staff and research scholars led by 2 senior faculty

Areas of Enquiry

- Language and science
- Alternative conceptions (physics, chemistry, biology), learning hurdles in mathematics (school and undergraduate)
- Career aspirations of underprivileged students
- Mathematical modelling of educational processes
- Non-formal education

Methods & Materials...

- Remedial education for socio-economically disadvantaged school students
  - active learning, language development, boosting self image
- Teacher development to address first generation learners

Methods & Materials...

- Books in Marathi, English + other languages
  - Linguistically simplified school textbooks
  - Co-curricular and science popularisation books
  - Books on science experiments and mathematics activities

Sensitive to socio-cultural aspects

Discontinuity (1996 - 2000)

- Policy: Focus on materials, Olympiad labs
- Academic courses, workshops (IWCBL) and conferences (HPS-SE, ICSTME)
- Review of HBCSE (1997, Yash Pal)
- Foundation Curriculum (STS)
- Homi Bhabha Curriculum
  - For Primary Science (Small Science)
  - For Primary Mathematics (Maths for Every Child)
- Exhibitions
  - History of Science
  - Gender and Science

Revival of STME Research

- TIFR Deemed University in 2002, Science Education a Ph.D. subject
- Graduate school program
  - Pre-Ph.D. courses on cognitive science, developmental psychology, history & philosophy of science, socio-cultural aspects of science & education, and field projects
- 2004 – epiSTEME – conference series
  - Links to international research community
  - Links to national educational groups - initiate theoretically informed, practice-based educational research

Materials Development

Variety

Media

- Print
- Posters
- Panels (portable, static exhibitions)
- Electronic – CD's
- Web-based

Purposes

- Curricula
- Co-curricular and Popularisation
- Reports (Research, Technical Reports)
- Conference Proceedings,
- epiSTEME Review Volumes

Langauges

- English, Hindi, Marathi, + others
- some in 15 languages

Development and Outreach

- Collaborative engagement modes & platforms
  - Study socio-cultural and cognitive aspects
  - Develop open educational resources
- Support to institutions (NCERT, IGNOU, YCMOU)
- Shaping policy, advocacy
- Teacher development workshops
  - Need to thematise, annual schedule
- Teaching learning resources
  - Need to strengthen dissemination

Current Research

Students' conceptions

Model-based reasoning

Mathematical understanding

Out-of-school learning

Concept inventories

Testing and assessment

Concept mapping

Socio-scientific, ethical, moral issues

Design and technology

Affective outcomes, student engagement

Visuo-spatial and embodied modes of reasoning

Learner-centred practices, collaboration, diversity

Future of STME R&D at HBCSE

- Enhance synergy between
  - Research areas at HBCSE
  - Research, development and advocacy
- Sustain research in an area & make an impact through
  - Permanent research groups, with adequate faculty strength, scientific staff
  - Collaborations