



# Research in Science and Mathematics Education

S C Agarkar

DR VNBRIMS

Thane

# Establishment of HBCSE

- In the decade of 1970s some scientists at TIFR felt the need to conduct systematic research in science and mathematics education.
- There was no support from TIFR management. Hence Tata Trust was approached for financial support.
- Homi Bhabha Centre for Science Education (HBCSE) was formally inaugurated in July 1974 as a project of TIFR under the grant in aid from Sir Dorabji Tata Trust.

# Initial Project

- The first project undertaken in and around Khiroda in Jalgaon district of the state of Maharashtra focused its attention on the education of the rural students.
- This project enabled us to get insights into the felt needs of the students for whom there is no tradition of education at home (called first generation learners).
- It was seen that the language used in science textbooks and in classroom interaction created problems in understanding science concepts.

# Language Project

- A language project was undertaken at HBCSE in which language of science textbooks of grade 5, 6 and 7 was simplified.
- These simplified were tested in 30 schools managed by Brihanmumbai Municipal Corporation (BMC) schools.
- The project showed that language simplification leads to
  - Better teacher pupil interaction
  - Enhanced scholastic performance
  - Better conceptual understanding.

# Survey of Laboratory Facilities

- A survey was conducted in collaboration with the education department of the state government to find out laboratory facilities in the schools.
- Analysis of data revealed that primary schools in the state do not have laboratory facilities.
- Only a few secondary schools in the state have adequate laboratory facilities. Majority of them have only one laboratory.
- Material resources in most of the schools in the state were inadequate.

# Low Cost Laboratory Programme

- A project was undertaken to design a low cost laboratory programme where experiments were performed using easily available materials.
- Components of fun and open-endedness were introduced in these experiments. Moreover, a large number of concept based experiments were developed.
- These experiments were demonstrated on various platforms and also during the in-service training of teachers and teacher educators.

# Study of Learning Hurdles

- An article by Arthur Jensen in Harvard Educational Review triggered an important issue in educational research.
- In his long article on “How much can we boost IQ and scholastic achievement” he argued that IQ is hereditary and nothing much can be done to improve it.
- Based on the hypothesis that the performance of the disadvantaged is affected by the social deprivation they encounter, a project was undertaken to search and nurture talent among the underprivileged.

# Design of TNP Project

- Two equivalent groups (control and experimental) were chosen at the beginning of the project from BMC schools.
- The experimental group received treatment at HBCSE where control group did not. The performances of both the groups at school leaving stage were monitored.
- The project showed that the performance of the experimental group that received remedial inputs was significantly higher than the control group.



# Large Scale Expansion

- Projects were undertaken in tribal regions to test the suitability of Remedial Instructional Strategy on a large scale.
- Forty Ashram schools located in western Ghats were chosen for the study. The project included teacher preparation, capacity building of schools and enhancement of peer interaction.
- Three year work resulted into improvement in teacher pupil interaction in the classroom leading to enhancement in scholastic achievement at school leaving stage.

## Summary

- Research issues were obtained from field experiences, surveys and journal publications.
- Research questions were specified and an appropriate research design was planned.
- Findings were presented through conferences and published through peer reviewed journals.
- Training courses for teachers and teacher educators were conducted for large scale expansion of the findings.
- Print material has been developed and made available at low cost. It is also made available on the website as copy left material.



Thank you

Any question?