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AN AGENDA FOR (MATHEMATICS) EDUCATION RESEARCH

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TRENDS IN MATHEMATICS EDUCATION RESEARCH

- Mathematics education as a research domain is little known in the country
- Research studies carried out in the country can be divided into two categories
  - Traditional research
    - Largely following the psychometric model of data collection and analysis
  - New trends in mathematics education research
    - Exploratory studies of issues
    - New methodologies

TRADITIONAL RESEARCH IN MATHEMATICS EDUCATION IN INDIA

- Designing diagnostic tests and identifying learning difficulties in the area of mathematics
  - Leading to remedial teaching
  - No insights into the problems students have in learning or into the process of remediation
- Exploratory studies to understand the factors responsible for poor achievement or failure in mathematics
  - Use of standardized scales/ tests followed by statistical analysis to find possible correlates/ factors

NEW TRENDS IN MATHEMATICS EDUCATION RESEARCH

- Intervention studies at the primary and the middle school level : designing alternative routes of learning, highlighting students' understanding of the concepts within the teaching-learning situations
  - Place value and understanding of numbers, word problems, angles, fractions, algebra
- Exploratory studies on children's understanding of numbers and basic operations

OVERALL TRENDS

- Content related issues in the elementary and some areas of secondary level addressed
  - The recent studies report on students' reasoning and thinking within the situation of learning and illustrate the ways in which a particular teaching-learning situation impacts their learning, highlighting both the positive aspects and the challenges
  - Possible to use this data and the insights in designing curriculum

GAPS IN RESEARCH

- Large gap in research in the secondary, higher secondary and tertiary levels
  - Students' difficulties in learning a new concept
  - Designing computer intensive environments for teaching abstract concepts
- Research in teacher education almost absent
  - What makes a "good" teacher?
  - Daily lives and practices of teachers

GAPS (CONTD.)

- Too few research studies to impact policy or practice of mathematics in a country of the size and diversity as of India
  - Statistical significances arrived through psychometric design does not give enough insights into the nature of the problem
    - How socio-economic factors or language or reasoning influence teaching and learning of mathematics?
    - What kinds of teacher actions, curriculum materials or classroom environment are responsible for discrimination against certain sections of society and leads to students' losing interest in the subject or dropping out of school?
  - The newer studies often lack methodological rigour

GAPS (CONTD.)

- The research studies often lack strong theoretical framework
  - Result of separating education from social sciences and making it like a set of skills
- Need to engage with deeper issues of teaching and learning of mathematics at all levels
  - Meaning, symbols, language, reasoning, argumentation and communication, use of technology, understanding classroom environments, access and equity issues etc.

ISSUES AND CHALLENGES

- Systemic issues
  - University departments and colleges of education have failed to provide space and support for establishing traditions of good subject specific research
    - Follow largely the traditional psychometric design of studies
    - Some changes seen in the recent years, newer areas and new methodologies
  - Isolation of education departments from departments of subject disciplines
    - Not much inputs on the content aspect of the study
    - Masters students do not get enough opportunities to do research in mathematics education, despite motivation and interest

ISSUES (CONTD.)

- Acute shortage of experienced faculty/ researchers in the country of billions
- Vicious cycle – the fact that there are few researchers in the area makes it difficult to establish departments specific to mathematics education which can conduct research studies in the area and the lack of such departments makes it impossible to produce more researchers

ISSUES (CONTD.)

- Issues due to diversity and complexity of the subject matter
  - In the diverse cultural context of the people and uneven distribution of resources, questions of meaning, symbols, classroom environment, technology and access to quality education are very important
    - ‘What is meaningful’ keeps changing due to different socio-political-historical-economic situations

ISSUES (CONTD.)

- Research needs to address issues like,
  - What types of activities can be considered to be meaningful, what cannot be meaningful, positioning and sequencing of these activities
  - Resolution of the idea of “meaning” is intricately linked with issues of access and equity
    - What is the impact of emphasizing relevance or context in the learning of mathematics as a discipline?
    - What must be the expectation from students and avenues open to those who have learnt mathematics till grades 8, 10 or 12?
    - When is it advisable to provide different kinds of mathematics education to different kinds of students?

WAYS AHEAD

- Some directions or answers to the above questions are important to make policy decision and designing of curriculum
- Need to develop multiple theoretical frameworks and sufficient empirical basis to study and intervene in the problems of mathematics education

Thank You !