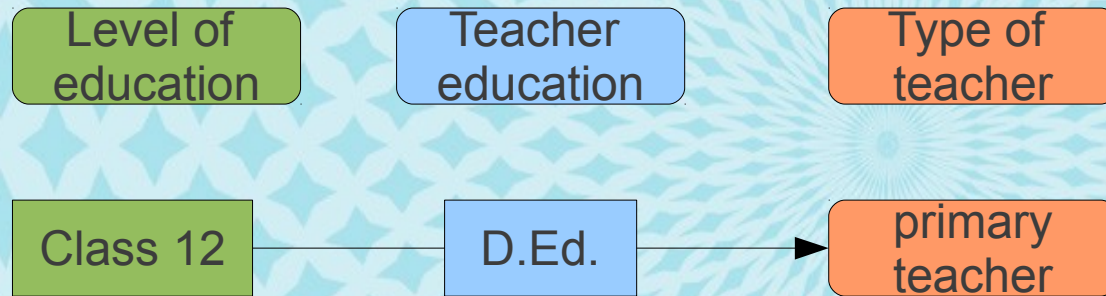


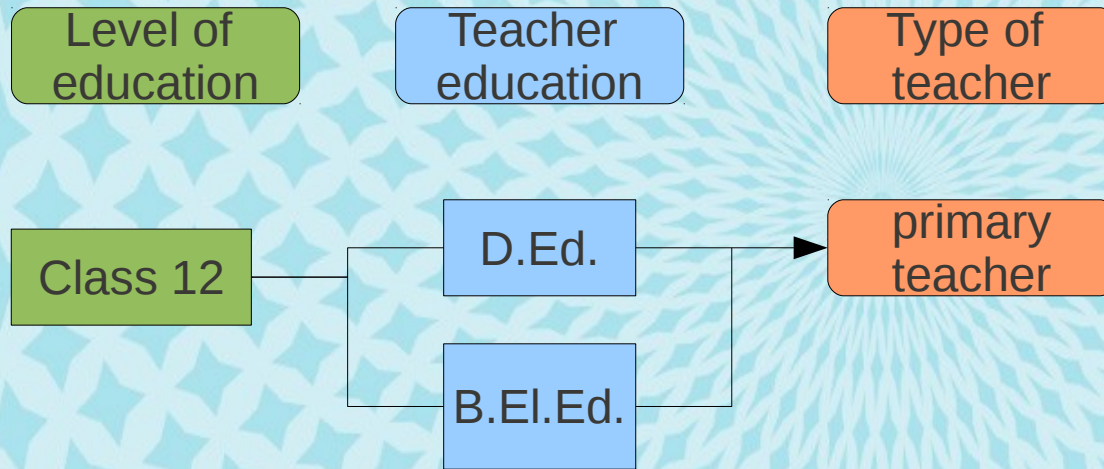
# Preparation and professional development of mathematics teachers in India

Ruchi S. Kumar  
Homi Bhabha Centre for Science Education  
Indian National Presentation (ICME-12)

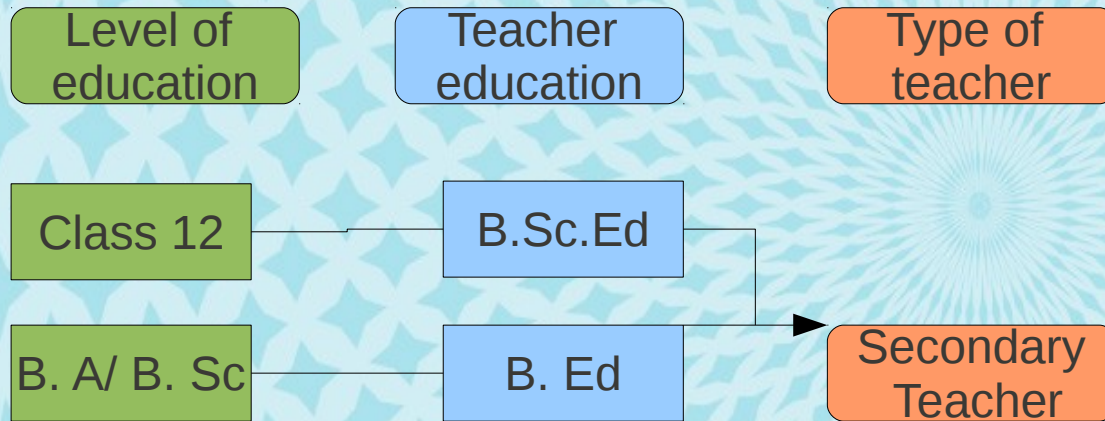
# Structure of teacher education



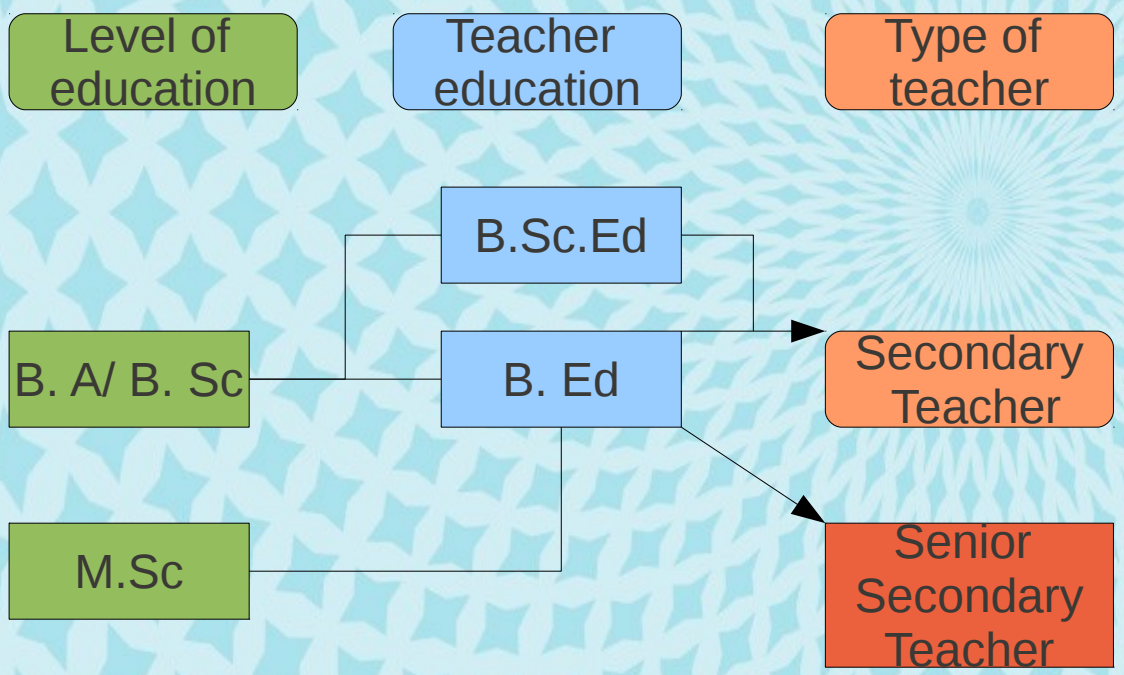
# Structure of teacher education



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# Institutional structure

- National Council of Teacher Education -regulatory body for pre service teacher education and development of curriculum for teacher education
- National Council for Educational Research and Training- supporting in service teacher education and developing curriculum for school education
- Supporting teacher education through horizontal and vertical spread of institutes: State level, regional level, district level, block level

# Typical syllabus for teacher education- B. Ed.

- Math education percentage in B. Ed course: Theoretical – 5 to 14%, practical- 30 to 48%
- Theoretical part:
  - Nature of mathematics,
  - Methods of teaching,
  - Study of content through textbooks,
  - Pedagogical analysis of concepts
- Practical part:
  - Teaching learning material,
  - Micro and Macro teaching, Lesson planning, Practice teaching
  - Achievement test



Challenges on the ground



# The Big challenge of Numbers

- Right to Education Act 2009 has increased need for trained teachers
  - 81 % of 5.3 million 'regular' elementary teachers have professional qualification (NUEPA, 2011)
  - Rapid and uneven expansion of teacher education: 1.1 million new teachers trained every year, 0.523 million teacher posts vacant in 2009-2010 (MHRD, 2012)
  - Policy of appointing 'Para teachers': 10.97% of total 5.8 million elementary teachers in all schools (NUEPA, 2011)
- Many primary teachers have done mathematics only upto 10<sup>th</sup> grade
- Teachers think of learning mathematics as learning to solve problems by known method or trick
- This perpetuates a view of mathematics as set of limited problems that have been solved

# Structure of Teacher Education

- Strengths:
  - Large number of institutions established to cater to the demand of teacher education
  - Teacher eligibility test now compulsory for getting a teaching job
- Constraints:
  - Teaching not a preferred profession
  - No lateral entry into teacher education; B. Ed and M.Ed. essential to become a teacher educator.
  - Math qualification not compulsory for taking math methods course

# Implementation of National curriculum framework 2005

- NCF 2005 recommends
  - Linking school learning and life outside school
  - Using students ideas as resources in teaching
  - Emphasizing process aspects and mathematisation
- Little clarity about classroom implementation, processes in mathematics, mathematisation
- Need for professional development of teacher educators: knowledge about how children learn and how teachers learn
- Need to address teachers beliefs, lack of content knowledge and understanding of psychology of children's learning

# Challenge: Teacher education pedagogy divorced from content

- Addressing teachers' confidence in doing mathematics
- Addressing knowledge about why procedures work, comparing alternative methods, generating representations and questions to support learning
- No opportunity to examine and reflect on beliefs
  - Some students can't learn mathematics
  - Mathematics is about calculations
  - All problems have single solutions

# Research in Teacher Education

- Lack of literature and research in modern Indian Languages
- Research needed on
  - teacher beliefs about mathematics, its teaching
  - supporting development of content knowledge among teachers and relating it to effect on students' learning
- Most research in Quantitative, quasi experimental paradigm

# Major shifts in teacher education curriculum

- Increased weightage of practical part
- Bridging the research-practice divide by including readings, observation, documentation and analysis of experiences in field
- Pedagogy of teacher education: dialogical exploration, reflective practice (NCTE, 2009)
- Focus on learner and her sense making process e.g. student conceptions, learning approaches
- Teacher education framework “generic” not addressing “What a *mathematics* teacher needs to understand?”
- Need for focus on processes of mathematics in Methods course

# The way forward

- Professionalisation of teacher education
  - Removing isolation from university life and ground realities of schools
  - Considering pre-service and In-service as a continuous process
- Insights from field experience :
  - Relating teacher education to teachers' experiences through reflection, developing understanding of self and recognizing their active agency
  - Relating teacher education to the 'work' of teaching
  - Importance of subject knowledge and doing mathematics
  - Importance of students' constructions and relating subject to out of school life