



Mathematics Education and Computational Thinking

Nature of Mathematics

1. गणित क्या है?
2. वैज्ञानिक तर्क (scientific rationale) गणित से कैसे जुड़ता है?
3. आज के समय में गणित से हमारा क्या तात्पर्य है? गणित में कौन से विषय या टॉपिक शामिल हैं? पहले की तुलना में इसका क्या महत्व है?
4. आज का गणित पहले से कैसे अलग है? कैसे अलग है?
5. How do inter-discipline relationships within mathematics and across subjects work?

History of Mathematics

6. क्या बच्चों को गणित का इतिहास सीखना चाहिए? वह प्रक्रिया जिसके द्वारा गणित विकसित किया जाता है?
7. क्या सभी आधुनिक गणित का आविष्कार यूरॉपियों ने किया था? क्या एशियाई, अफ्रीकी और लैटिन अमेरिकी संस्कृतियां गणित से रहित थीं?
8. भारत में गणित शिक्षा का इतिहास क्या है? अभिनव कार्यक्रमों से क्या सबक लिए जा सकते हैं?

Mathematics and thinking skills

9. गणित से जुड़े सोचने के तरीके क्या हैं?
10. क्या गणित के साथ रचनात्मक और कल्पनाशील होना संभव है? यह किस स्तर/किस विषय में संभव है? इससे जुड़ी शैक्षणिक प्रक्रियाएं क्या होनी चाहिए?
11. Mathematics skills: Measurement, investigation, reasoning, library research, oral, map reading, data reading/analysis, designing surveys, interviews, comparing situations, reading pictures and artifacts, designing research questions, identifying/locating sources, and more...

Mathematics and technology

12. गणित और प्रौद्योगिकी के बीच क्या संबंध है? Most of modern day computer programming relies heavily on mathematics. E.g. 3D geometry and trigonometry for rendering graphics or formal logic for any programming.
13. स्कूली पाठ्यक्रम पर इसके क्या निहितार्थ हैं?



Teaching of Mathematics

Diversity in the Classrooms

14. What causes the fear of maths and how should it be tackled at different stages of school?
15. Is mathematics objective and unbiased? How can mathematics teaching perpetuate biases and stereotypes?
16. SEL? When studying Mathematics, how should differences of opinion within the class be handled? Gender-related, cultural experiences, social history etc.
17. Socialisation and gender roles at home, in community, in society? Inequality? Unbiased language re: gender and social position?

Intended, Enacted and the Hidden Curriculum of Mathematics

18. The approach to the teaching of each subject within the Mathematics. E.g. stereotypes about Mathematics and how to overcome them; from which class should Mathematics be divided into its constituent subjects
19. Can Mathematics be treated like a language? Will it help reduce the fear of maths?

Learning Trajectories and Learning Experiences

20. Role of teachers and students in learning Mathematics
21. When should the teaching of mathematics begin? When does arithmetic become mathematics?
22. What proportion of learning time during the academic year should be given to Mathematics at different stages (classes)?
23. What are the key learning objectives/outcomes for each grade of this stage? What methods will go with them?
24. इस स्तर पर language and quantitative abilities are required for good understanding of Mathematics? Role of logic, thinking abilities, collaboration, self-regulation
25. Relationship between maths and science -
 - a. Some maths topics taught in Class 11-12 require application in Physics or Chemistry in the same class; how should that be organised?



- b. What is the modern day definition of scientific temperament / Scientific literacy?
26. What experiences are necessary for the learner to work with Mathematics at primary/secondary level? What experiences must they gain during this time?
 27. जहाँ पर बच्चों का सामाजिक अनुभव बहुत अलग है वहाँ पर गणित पढ़ाने में क्या ध्यान में रखना चाहिए? E.g. tribal communities have different social structures, how should that be taken care of? The concept of the 'other' and how to deal with it? Maths & moral science.
 28. Age appropriate soft skills that are necessary for learning Mathematics?
 29. What language abilities are necessary for learning mathematics? How should the language of the maths textbook relate to the language of the science/language textbooks?
 30. Mathematics for everyday life - understanding taxation, financial literacy etc.
 31. Do's and don'ts of a Mathematics class - maths treats everyone as equal but in reality do we?
 32. Maths lab - Difference between hands on experiments vs simulations vs doing it digitally

Learning Resources

33. Use of local phenomenon, Mathematics at home, local resources to do Mathematics - The environment as a laboratory
34. बच्चों के लिए किस प्रकार की सामग्री और सीखने के तरीके इस्तेमाल किए जाएँगे? Library, digital resources, teaching aids, practical lab, field visits, On screen teaching?

Assessment

35. क्या इस उम्र में आकलन की आवश्यकता है? आकलन क्यों और कैसे किया जाएगा? On-going assessment?
36. SICA (skills, information, concepts and attitudes) - link with assessment
37. What should a Mathematics report card contain?

Impact of Mathematics

38. Can mathematics change the world?



39. What are the career prospects of Mathematics? Investment banking, statisticians, epidemiologists, interdisciplinary, academic etc.
40. What would not have happened if Mathematics teaching did not exist?
 - a. By normalising arithmetic, the control over powerless using bookkeeping came down
 - b. Advancements in science and technology could not have been made
 - c. ...?
41. What is the relevance of Mathematics today?

Enabling and Supporting Reflective Practitioners

Teacher Training

42. शिक्षकों की ट्रेनिंग गणित के लिए कैसे अलग होगी?
43. What are the qualities and skills needed for the teachers to teach mathematics - both at pre-service and in-service?
44. Pre-service curriculum में क्या include किया जाना जरूरी होगा? Methodology क्या होगी?
45. गणित में teacher performance standards कैसे बनाए और मापे जा सकते हैं?
46. How will supportive supervision for mathematics be done?
47. How is teaching of mathematics in school related to that in teacher education and adult education?
48. क्या 21वीं सदी के जीवन कौशलों का गणित से सम्बंध है? कैसे?
49. How will students with autism, learning disabilities or physical disabilities be accommodated in mathematics teaching?

Using Data to Inform Decision Making

50. DISE और NAS/SLAS के अंतर्गत इकट्ठा किया गया डेटा गणित के शिक्षण में सुधार लाने के लिए कैसे इस्तेमाल किया जा सकता है?
51. Role of assessments like NAS, Parakh etc.

Research



52. गणित पढ़ने - पढ़ाने में technology का प्रयोग कैसे और किस मात्रा में किया जाना चाहिए? Research का इस पर क्या मानना है।
53. गणित सीखने के क्रम पर क्या शोध किया जा चुका है? गणित के विभिन्न टॉपिक समझने के लिए research अनुसार कौन से तरीके सब से सटीक साबित हुए हैं? Keep in mind the work done in the Indian context.

Role of community and larger society

The Context

54. What is the role of the community in learning at this stage? “All of us are smarter than one of us” - the community has greater social experience than the teacher, how should they be included in the teaching?
55. यदि विद्यालय में सीखने-सिखाने की प्रक्रिया समुदाय में हलचल/मत परिवर्तन का कारण बनती है तो क्या किया जाना चाहिए?
56. जहां पर बच्चों का सामाजिक अनुभव बहुत अलग है वहाँ पर विज्ञान पढ़ाने में क्या ध्यान में रखना चाहिए? E.g. tribal communities have different social structures, how should that be taken care of? The concept of the ‘other’ and how to deal with it?
57. What is the relation of these to teaching of mathematics – socialisation and gender roles at home, in community, in society; Inequality; Unbiased language re: gender and social position
58. What are the second-order consequences of mathematics and statistics? गणित की समझ से कोई सामाजिक तौर पे किस तरह से प्रभाव डाल सकता है? जैसे - सरकारी खर्चों को RTI के माध्यम से चेक करना, loophole exploit करना आदि।
59. What is the relationship between industrial demands and mathematics? Who funds advanced research in mathematics? How does advanced mathematics help the industry?

Roles and Responsibilities

60. माता-पिता और समुदाय की गणित पढ़ाने में क्या भूमिका है?
61. What is the role of the Panchayat education committee at gram, block, zila level? Can they be involved in any way?



Avoidable

62. Vedic maths का वेदों से कोई सम्बंध नहीं है। इसका अविष्कार 1965 की एक किताब में किया गया था - [Wikipedia article](#)
63. Fraud Mathematics - Beware of WhatsApp forwards, Indian fake journals etc.
64. The “show” of Mathematics versus actual Mathematics. Many times on the Internet or in news media statistical data is misinterpreted. Does that count as doing mathematics?