Curriculum Vitae

K. Subramaniam

Present position and institution

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A brief introduction

I am a professional mathematics educator and researcher with wide ranging interests. My main areas of research are (1) Learning strands for core topics in middle school mathematics: algebra, fractions and proportional thinking, measurement, integers, decimals, and (2) Knowledge resources for professional development of school mathematics teachers. A current and recent area of research is the connection between mathematics and social reality in the school curriculum, with a special focus on data literacy and citizenship education. Other research areas of interest are connecting out-of-school mathematical knowledge with school learning, role of visuo-spatial thinking in science and mathematics education, and the history of mathematics education. I have supervised or co-supervised the doctoral work of multiple students, mentoring them in completing dissertation and securing publications in leading peer-reviewed journals. I have developed and taught courses on mathematics education, cognitive development, research methods, and philosophy of education for Master's and doctoral students, and a course on introduction to history and philosophy of science for undergraduate students in science.

Besides research, I have contributed actively to professional activities in mathematics education and education in India through: (1) Developing education materials and resources (2) Building professional community platforms for mathematics educators (3) Shaping education policy and (4) Support to statutory goverment institutions for framing curricula and textbooks. I have administrative and leadership experience through the positions I have held at the Homi Bhabha Centre.

I have formal training in engineering and philosophy. I am self trained in these disciplinary areas: mathematics education, mathematics, cognitive science, history and philosophy of science. I have full and native level fluency in the English language, including writing. I have functional fluency in speech and reading in the following Indian languages: Hindi, Tamil, Kannada, and Marathi. I can speak and understand Malayalam at a functional level.

Education

- Ph.D. in Philosophy, 1992, Indian Institute of Technology, Bombay, Thesis title: Historicity in Heidegger’s Thought.
- M.A. in Philosophy, 1995, University of Bombay.

- B.Tech. in Aeronautical Engineering, 1984, Indian Institute of Technology, Madras.

Positions held

- 2015-present: Professor ‘H’, Homi Bhabha Centre for Science Education (HBCSE), Tata Institute of Fundamental Research (TIFR), Mumbai
- 2016-2021: Centre Director, HBCSE, TIFR
- 2015-2016: Dean, Faculty of Science Education, HBCSE, TIFR
- 2009-2014: Associate Professor 'G', HBCSE, TIFR
- 2005-2009: Reader, HBCSE, TIFR
- 2000-2005: Fellow-E, HBCSE, TIFR
- 1996-2000: Fellow-D, HBCSE, TIFR
- 1994-1996: Post-doctoral Fellow, HBCSE, TIFR
- 1991-1994: Lecturer in Mechanical Engg., Bharati Vidyapeeth College of Engg., New Bombay.
- 1985-1991: Research scholar, Indian Institute of Technology, Bombay
- 1984-1985: Scientist B, Gas Turbine Research Establishment (DRDO), Bangalore.

Publications

1 Books

1. Subramaniam, K. (2001). *Maths for Every Child, Part A*, Text-cum-workbook of the Homi Bhabha Curriculum in Mathematics for class 3, Mumbai, Homi Bhabha Centre for Science Education. Translated by H.C. Pradhan and A.T. Mavlankar into Marathi as *Sarvaansaathi Ganit, Bhaag Ek*, 2002.
2. Subramaniam, K. (2001). *Maths for Every Child, Part B*, Text-cum-workbook of the Homi Bhabha Curriculum in Mathematics for class 3, Mumbai, Homi Bhabha Centre for Science Education. Translated by H.C. Pradhan A.T. Mavlankar and S. Naik into Marathi as *Sarvaansaathi Ganit, Bhaag Do*, 2002.
3. Subramaniam, K. (2005). *Maths for Every Child*, Teachers’ book to accompany text-cum-workbooks of the Homi Bhabha Curriculum in Mathematics for class 3. Translated into Marathi by S. Naik and H.C. Pradhan. 2006.
4. Subramaniam, K. (main author with multiple other contributors) (2010). *Mathematics Teachers' Training Manual for Classes 1 and 2*. New Delhi, National Council of Educational Research and Training.

2 Edited Books

1. Sriraman, B., Cai, J., Lee, K., Lianghuo, F., Shimuzu, Y., Lim, C.S. & Subramaniam, K. (Eds.) (2015). *The First Sourcebook on Asian Research in Mathematics Education: China, Korea, Singapore, Japan, Malaysia, and India*, Charlotte, North Carolina: Information Age Publishing.

2. Maharashtra State Textbook Bureau. (2013). *Mathematics: Standard One (School Textbook in multiple languages)*. Pune: Maharashtra State Bureau of Textbook Production and Curriculum Research. (Member of Editing and Writing Committee).
3. Maharashtra State Textbook Bureau. (2013). *Mathematics: Standard Two (School Textbook in multiple languages)*. Pune: Maharashtra State Bureau of Textbook Production and Curriculum Research. (Member of Editing and Writing Committee).
4. Sriraman, B., Cai, J., Lee, K., Lianghuo, F., Shimuzu, Y., Lim, C.S. & Subramaniam, K. (Eds.) (2012). *Abstracts of The First Sourcebook on Asian Research in Mathematics Education: China, Korea, Singapore, Japan, Malaysia, and India*, Charlotte, North Carolina: Information Age Publishing.
5. Ramanujam, R. & Subramaniam, K. (Eds.) (2012). *Mathematics Education in India: Status and Outlook* , Mumbai: Homi Bhabha Centre for Science Education (TIFR). Available at http://nime.hbcse.tifr.res.in/articles/INPBook.pdf.
6. Kharatmal, M., Kanhere, A. & Subramaniam, K. (Eds.) (2012) *Proceedings of the NIME National Conference on Mathematics Education,* Mumbai: HBCSE, TIFR. Available at http://nime.hbcse.tifr.res.in/conferences/NIME-NC_2012_Proceedings.pdf
7. Subramaniam, K. (Ed.) (2011). *The epiSTEME Reviews: Research Trends in Science, Technology and Mathematics Education. Vol. 3*. New Delhi: Macmillan.
8. Subramaniam, K. (Ed.) (2010) *Mathematics Teacher Training Manual Class I and II*, New Delhi: National Council for Education Research and Training.
9. Subramaniam, K. & Mazumdar, A. (Eds.) (2009) *Proceedings of epiSTEME-3: International Conference to Review Research in Science, TEchnology and Mathematics Education*, New Delhi: Macmillan India. Available at http://www.hbcse.tifr.res.in/episteme/episteme-3/e-proceeding.

3 Refereed Research Articles in Journals and Book chapters

(See Google Scholar profile page for updated list: https://scholar.google.co.in/citations?user=byuTU9kAAAAJ&hl=en)

1. Jayasree, S., Subramaniam, K., & Ramanujam, R. (2022). Coherent formalisability as acceptability criterion for students' mathematical discourse. *Research in Mathematics Education*, Online: https://doi.org/10.1080/14794802.2022.2041469.
2. Subramaniam, K. (2022). The Unfinished Agenda of Mathematics Curriculum Reform. In Ramachand, M. Khunyakari, R. & Bose, A. (Eds.) *Learning without Burden* (pp. 282-304). Routledge India.
3. Takker, S., & Subramaniam, K. (2018). Teacher Knowledge and Learning In-situ: A Case Study of the Long Division Algorithm. *Australian Journal of Teacher Education*, 43(3). http://dx.doi.org/10.14221/ajte.2018v43n3.1
4. Takker, S. & Subramaniam, K. (2017) Knowledge demands in teaching decimal numbers. *Journal of Mathematics Teacher Education,22*(3), 257-280.
5. Kumar, R. S. & Subramaniam, K. (2017). Constraints and Affordances in Bringing About Shifts in Practice Towards Developing Reasoning in Mathematics: A Case Study. In Kaur, B., Kwon, Oh Nam & Leong, Y. (Eds.) *Professional Development of Mathematics Teachers – An Asian Perspective* (pp.

121-140). Springer, Singapore.

6. Kumar, R. S. Subramaniam, K. & Naik, S. (2017). Teachers' construction of meanings of signed quantities and integer operation. *Journal of Mathematics Teacher Education, 20*: 557-590.
7. Kumar, R. S. & Subramaniam, K. (2015). From 'Following' to Going Beyond the Textbook: Inservice Indian Mathematics Teachers' Professional Development for Teaching Integers. *Australian Journal of Teacher Education*, 40(12): 86-103.
8. Kumar, R. S. Subramaniam, K. & Naik, S. (2015). Professional Development Workshops for In-Service Mathematics Teachers in India. In Sriraman, B., Cai, J., Lee, Kyeong-Hwa, Fan, L., Shimizu, Y., Lim, Chap Sam, & Subramaniam, K. (Eds.). *First sourcebook on Asian research in mathematics Education* (Vol. 2, pp. 1631-1654). Charlotte, NC: Information Age publishers.
9. Sridharan, R. & Subramaniam, K. (2015). Representations of Numbers and the Indian Mathematical Tradition of Combinatorial Problems. In Sriraman, B., Cai, J., Lee, Kyeong-Hwa, Fan, L., Shimizu, Y., Lim, Chap Sam, & Subramaniam, K. (Eds.). *First sourcebook on Asian research in mathematics Education* (Vol. 2, pp. 1749-1767). Charlotte, NC: Information Age publishers.
10. Banerjee, R. & Subramaniam, K. (2012). Evolution of a teaching approach for beginning algebra. *Educational Studies in Mathematics*. 80:351–367.
11. Subramaniam, K. & Banerjee, R. (2011). The arithmetic-algebra connection: A historical-pedagogical perspective. In Cai, J. & Knuth, E. (Eds). *Early Algebraization: A Global Dialogue from Multiple Perspectives*. Springer, 87-107.
12. Subramaniam, K. & Padalkar, S. (2009). Visualisation and Reasoning in Explaining the Phases of the Moon. *International Journal of Science Education*, Vol. 31(3), 395-417.
13. Subramaniam, K. (2003) Elementary Mathematics: A Teaching Learning Perspective. *Economic and Political Weekly, Special issue on the Review of Science Studies: Perspectives on Mathematics*, Vol 37, no. 35, 3694-3702.
14. Subramaniam, K. (1999). Inscriptions, Facts and Black-boxes: Is Modern Science Radically Different? In Raina, D. and Irfan Habib, S. (Eds.) *Situating the History of Science: Dialogues with Joseph Needham*, New Delhi, Oxford University Press.
15. Subramaniam, K. (1994). Combining Science and Ethics in Public Decision-making: The Case of Big Dams. *Economic and Political Weekly*, Vol. XXIX, No. 14, pp. 813- 818.
16. Bhargavi, V. & Subramaniam, K. (1990). History, Indian Science and Policy-making: a Philosophical Review. *Journal of the Indian Council of Philosophical Research*, Vol. 8, No.1, pp. 115-128.

4 Refereed Articles in Conference Proceedings

(See Google Scholar profile page for updated list: https://scholar.google.co.in/citations?user=byuTU9kAAAAJ&hl=en)

1. Subramanian, J., Subramaniam, K., & Ramanujam R. (2020). Exploring mathematical explorations. In K. K. Mashood, T. Sengupta, C. Ursekar, H. Raval and S. Dutta (Eds.), *Proceedings of epiSTEME8: Eighth international conference to review research on Science, TEchnology and Mathematics Education*, HBCSE (pp. 155-164). India: HBCSE/Gaurang Publishing Globalize Pvt. Ltd.

2. Subramaniam, K. (2019). Representational coherence as a means of enhancing students' access to mathematics. In M. Graven, H. Venkat, A. Essien & P. Vale (Eds.). *Proceedings of the 43rd Conference of the International Group for the Psychology of Mathematics Education* (Vol. 1, pp. 33-52). Pretoria, South Africa: PME.
3. Subramaniam, K. (2019). Constraints on mathematics education reform in India – A response to Cabral and Baldino. In J. Subramaniam (Ed.), *Proceedings of the Tenth International Mathematics Education and Society Conference*. Hyderabad: MES10. pp. 159-163.
4. Bose, A. & Subramaniam, K. (2015). "Archaeology" of measurement knowledge: Implications for school math learning. In S. Mukhopadhyay & B. Greer (Eds.), *Proceedings of the 8th Annual Conference of Mathematics Education and Society (MES)*, Vol. 2, pp. 241-250. Portland, USA: MES.
5. Banerjee, R. & Subramaniam, K. (2015). Emerging ideas of generalization, proof and proving among grade 6 students. In S. Chandrasekharan, S. Murthy, G. Banerjee & Adithi Muralidhar (Eds.). *Proceedings of epiSTEME-6: Third International Conference to Review Research on Science, Technology and Mathematics Education*, India: CinnamonTeal Publishing.
6. Kumar, R, S. & Subramaniam, K. (2013). Elementary Teachers' beliefs about teaching of mathematics. In Nagarjuna, G., A. Jamakhandi & E. M. Sam (Eds.). *Proceedings of epiSTEME-5: Third International Conference to Review Research on Science, Technology and Mathematics Education*. Margao, India: CinnamonTeal Publishing.
7. Bose, A. & Subramaniam, K. (2013). Characterising work-contexts from a mathematics learning perspective. In Nagarjuna, G., A. Jamakhandi & E. M. Sam (Eds.). *Proceedings of epiSTEME-5*. pp. 173-179, Margao, India: CinnamonTeal Publishing.
8. Rahaman, J., Subramaniam, K. & Chandrasekharan, S. (2013). A network model of the mathematical concept of area. In Nagarjuna G., A. Jamakhandi, and E. M. Sam (Eds.) *Proceedings of epiSTEME-5.* pp. 300-306, Margao, India: CinnamonTeal Publishing.
9. Takker, S., Kanhere, A., Naik, S., & Subramaniam, K. (2013). From relational reasoning to generalisation through number sentence tasks. In Nagarjuna, G., G., A. Jamakhandi & Sam, E. (eds.). *Proceedings of epiSTEME-5.* pp. 300-306, Margao, India: CinnamonTeal Publishing.
10. Rehman, J., Subramaniam, K., & Chandrasekharan, S. (2012). Exploring the connection between multiplicative thinking and the measurement of area. *Proceedings of the 12th International Congress on Mathematical Education (ICME-12)*, pp. 1964-1973, Seoul, Korea: ICME.
11. Subramaniam, K. & Bose, A. (2012). Measurement units and modes: The Indian context. *Proceedings of the 12th International Congress on Mathematical Education (ICME-12)*, pp. 1974-1983, Seoul, Korea: ICME.
12. Ruchi Kumar, & K. Subramaniam. (2012) Understanding teachers' concerns and negotiating goals for teaching: Insights from collaborative lesson planning. *Proceedings of the 12th International Congress on Mathematical Education (ICME-12)*, pp.5157-5166, Seoul, Korea: ICME.
13. Takker, S. & Subramaniam, K.. (2012). Understanding teacher's knowledge of and responses to students' mathematical thinking. *Proceedings of the 12th International Congress on Mathematical Education (ICME-12)*, pp. 4906-4915, Seoul, Korea: ICME.
14. Kumar, R.S., Dewan, H. Subramaniam, K. (2012) The preparation and professional development of mathematics teachers,In R. Ramanujam, & K.Subramaniam (Eds.) *Mathematics Education In India:*

Status and Outlook. pp. 151-182. Mumbai: HBCSE.

15. Bose, A. & Subramaniam, K. (2011). Exploring school children's out of school mathematics. In Ubuz, B. (Ed.). *Proceedings of the 35th Conference of the International Group for the Psychology of Mathematics Education*, Vol. 2, pp. 177-184, Ankara, Turkey: PME.
16. Subramaniam, K. & Naik, S. (2010) Attending to Language, Culture and Children's thinking as They Learn Fractions. In Pinto M. M. F. & Kawasaki T.F (Eds.) *Proceedings of the 34th International Conference for Psychology in Mathematics Education*. Belo Horizonte, Brazil: PME.
17. Banerjee, R., Subramaniam, K. and Naik, S. (2008). Briding Arithmetic and Algebra: Evolution of a Teaching Sequence, In O. Figueras et al. (eds) *International group of the psychology of mathematics education: Proceedings of the Joint Meeting of PME 32 and PME-NA XXX*, Vol 2, 121-128, Morelia, Mexico.
18. Naik, S. and Subramaniam, K. (2008). Integrating the measure and quotient interpretation of fractions. In O. Figueras et al. (eds) *International group of the psychology of mathematics education: Proceedings of the Joint Meeting of PME 32 and PME-NA XXX*, Vol 4, 17-24, Morelia, Mexico.
19. Subramaniam, K. (2008). Drawing from Cognitive Studies of Mathematical Learning for Curriculum Design. In *Proceedings of the International Conference of Mathematics Education: ICME-11*, Monterrey, Mexico. Available online at http://tsg.icme11.org/document/get/794.
20. Subramanian, J., Subramaniam, K., Naik, S. and Verma, B. (2008). Combining Share and Measure Meaning of Fractions to Facilitate Students' Reasoning. In *Proceedings of the International Conference of Mathematics Education: ICME-11*, Monterrey, Mexico. Available online at http://tsg.icme11.org/document/get/823.
21. Banerjee, R. and Subramaniam, K. (2007). Exploring student's reasoning with algebraic expressions. *Proceedings of the 32nd International Conference for Psychology in Mathematics Education*. Seoul, Korea.
22. Banerjee, R. & Subramaniam, K. (2005). Developing Procedure and Structure Sense Of Arithmetic Expressions, In H. L. Chick and J. L. Vincent (Eds.) *Proceedings of the 29th conference of the international group of the psychology of mathematics education (PME29),* Vol. 2, pp. 121-128. Melbourne, Australia.
23. Naik, S. S., Banerjee, R & Subramaniam. K. (2005). Understanding Student's Reasoning While Comparing Expressions, In P. Clarkson et al. (Eds.) *Proceedings of the annual conference of the mathematics education research group of Australasia Inc. (MERGA)*, Melbourne, Australia.
24. Subramaniam, K. & Banerjee, R. (2004). "Teaching arithmetic and algebraic expressions". In M. J. Hoines & A. B. Fuglestad (eds.), *Proceedings of the 28th conference of Psychology of Mathematics Education*, Vol. 3, pp 121-128, Bergen, Norway.
25. Subramaniam, K. (2004). Naming Practices that Support Reasoning about and with Expressions. *Proceedings of the International Congress on Mathematics Education (ICME 10)*, CD-ROM, pp. 1-21, Denmark, 2004.

5 Refereed Abstracts in Conference Proceedings

1. Bose, A. & Subramaniam, K. (2019). Enabling shifts in classroom norms to integrate out-of-school and school mathematics. In M. Graven, H. Venkat, A. Essien & P. Vale (Eds.). *Proceedings of the*

43rd Conference of the International Group for the Psychology of Mathematics Education (Vol. 4, p 15). Pretoria, South Africa: PME.

2. Subramaniam, K. (2017) Naming practices in mathematical discourse in instruction. In *Proceedings of the 41st conference of the International group for the Psychology of Mathematics Education*. Vol. 1, p. 274, Singapore.
3. Kumar, R. S. & Subramaniam, K. (2012). One teachers struggle to teach equivalent fractions with meaning making. In *Proceedings of the 36th conference of the International group for the Psychology of Mathematics Education*. Vol. 4, pp. 290, Taipei, Taiwan.
4. Kumar, R. S. & Subramaniam, K. (2012). Interaction between belief and pedagogical content knowledge of teachers while discussing use of algorithms. In *Proceedings of the 36th conference of the International group for the Psychology of Mathematics Education*. Vol. 1, pp. 246. Taipei, Taiwan.
5. Bose, A. & Subramaniam, K. (2012). Profile of students' arithmetical knowledge acquired in and outside school. *Proceedings of the 12th International Congress on Mathematical Education (ICME-12)*, p. 7386, Seoul, Korea: ICME.
6. Takker, S. & Subramaniam, K. (2012). Towards Conceptualising a Teaching Sequence to Promote Early-Algebraic Thinking . In Proceedings of *National Meet on Celebration of National Year of Mathematics 2012,* Department of Education in Science and Mathematics, NCERT, New Delhi.
7. Subramaniam, K. (2011) Connecting to the folk mathematical culture through puzzles (Short oral presentation), In Ubuz, Behiye (ed.) *Proceedings of the 35th Conference of the International group for the psychology of mathematics (PME35), Vol 1*, p.396, Ankara, Turkey.
8. Bose, A. & Subramaniam, K. (2011). Exploring school children's 'everyday' mathematical knowledge. Poster Presentation. In Ubuz, B. (Ed.). *Proceedings of the 35th Conference of the International Group for the Psychology of Mathematics Education, Vol. 1*, p. 477, Ankara, Turkey: PME.
9. Kumar, R. S. & Subramaniam, K. (2011). Collaborative approach for continuous in-service teacher professional development. *Abstracts of National Seminar on Current Issues in Teacher Education,* CASE, Dept. of Education, Faculty of education and psychology, The Maharaja Sayajirao University of Baroda, Vadodara (pp 39-40).
10. Banerjee, R. & Subramaniam, K. (2007). Exploring student's reasoning with algebraic expressions (Short oral paper). *Proceedings of the 31st International Conference of the Psychology of Mathematics Education*, Seoul, Korea.

6 Invited contributions, Articles not refereed and Expository Articles

1. Subramaniam, K. (2019). Constraints on mathematics education reform in India – A response to Cabral and Baldino. In J. Subramaniam (Ed.), *Proceedings of the Tenth International Mathematics Education and Society Conference*. Hyderabad: MES10. pp. 159-163.
2. Subramaniam, K. (2018, March). The conjoining error in school algebra, *At Right Angles*, Vol.7(1), 44-47.
3. Subramaniam, K. (2018, July). Closing bracket, *At Right Angles*, Vol. 7(2), 146.
4. Chambris, C., Dougherty, B., Subramaniam, K., Ruwisch, S. & Chung, I. (2017). Report on Topic

Study Group No. 9: Teaching and Learning of Measurement (Focus on Primary Education). In Kaiser, G. (Ed.) *Proceedings of ICME 13*. Springer. pp. 415-419.

5. Askew, M., Subramaniam, K., Halai, A., Ronda, E., Venkat, H., Adler, J. and Lerman, S. (2017). Report of the Discussion Group on Mathematical Discourse in Instruction in Large Classes. In Kaiser, G. (Ed.) *Proceedings of ICME 13*. Springer. pp. 637-638.

6. Subramaniam, K. (2017). Engaging with teachers' knowledge. In Penlington, T. & Chikiwa, C. (Eds.) *Proceedings of the 23rd Annual National Congress of the Association for Mathematics Education of South Africa*, Vol 1. pp. 46-48.

7. Subramaniam, K. (2016). Institutions of higher education and research in India: Do they need to take interest in school science education?. Guest Editorial. *Current Science 110*(11), 1575-76.

8. Subramaniam, K. (2016). Giving meaning to numbers and operations in arithmetic. *Voices of Teachers and Teacher Educators 5*(1), 18-25.

9. Subramaniam. K. (2016). Jill Adler – A South African mathematics education researcher. *At Right Angles, 5*(2), 5-10, July 2016.

10. Subramaniam, K. (2015). Introduction to the India section. In Sriraman, B., Cai, J., Lee, Kyeong-Hwa, Fan, L., Shimizu, Y., Lim, Chap Sam, & Subramaniam, K. (Eds.). *First sourcebook on Asian research in mathematics Education* (Vol. 2, pp. 1507-1513). Charlotte, NC: Information Age publishers.

11. Subramaniam, K. (2013). When you don't know the solution to a problem? *At Right Angles*, 2:1.

12. Subramaniam, K. (2013). Research on the learning of fractions and multiplicative reasoning: A review. In Chunawala, S. (Ed.) *The epiSTEME Reviews: Research Trends in Science, Technology and Mathematics Education. Vol. 4*. New Delhi: Macmillan.

13. Subramaniam, K. (2012). Does participation in household based work create opportunities for learning mathematics?. Plenary Panel on Opportunities for Learning Mathematics, In *Proceedings of the 36th conference of the International group for the Psychology of Mathematics Education*. Vol. 1, pp. 107-112, Taipei, Taiwan.

14. Subramaniam, K. (2010). Culture in the Learning of Mathematics. *Learning Curve. Special Issue on Mathematics*, March 2010. pp. 26-28.

15. Subramaniam, K. (2008) What Mathematics does Everyone need to Learn. In *Proceedings of Core Group Workshop on Science Education in India*, Peoples Council of Education, Homi Bhabha Centre for Science Education, Mumbai.

16. Subramaniam, K. (2007) 'Is School Mathematics All about Recipes for Calulation? '. In *Proceedings of the Conference on Technology and Innovation in Math Education*, I.I.T., Bombay.

17. Dhakulkar, A. and Subramaniam, K. (2007) 'Mathematical Literacy And Situated Social Knowledge: Understanding Revolving Credit', *Proceedings of the Indian Social Science Congress.*

18. Padalkar, S. and K. Subramaniam (2007)'Reasoning Processes Underlying the Explanation of the Phases of the Moon', *Proceedings of Episteme-2*, New Delhi: Macmillan India. 121-125.

19. Subramaniam, K. and S. Naik (2007) 'Extending the Meaning of the Fraction Notation', *Proceedings of Episteme-2*, New Delhi: Macmillan India, 223-227.

20. Banerjee, R., K. Subramaniam and S. Naik, (2005) Designing an Instructional Sequence for Transiting from Arithmetic to Algebra in the Middle School, *Proceedings of Episteme-2*, New Delhi:

Macmillan India, 218-222.

21. Subramaniam, K. (2005). What is mathematics education research and why is it important? *Learning Curve*, Issue V, March,

22. Subramaniam, K. (2004). Naming Practices that Support Reasoning about and with Expressions. *Proceedings of the International Congress on Mathematics Education (ICME 10)*, Denmark. Available online at http://www.icme10.dk /proceedings/pages/regular_pdf/ RL_K_Subramanian.pdf

23. Banerjee, R. and Subramaniam, K. (2004). 'Term' as a bridge concept between arithmetic and algebra. *Proceedings of Episteme-1*, HBCSE. 76-77.

24. Naik, S., Banerjee, R. and Subramaniam, K. (2004). Students' use of language and symbols in reasoning about arithmetic expression. *Proceedings of Episteme-1*, HBCSE. 92-94.

25. Subramaniam, K. (2004). ICME-10 report. *Bulletin of the International Commission on Mathematics Instruction*.

26. Subramaniam, K. (2004). Innovative Practices in Mathematics Education: An Overview. *Proceedings of the National Conference on Enhancing Learning in Elementary Schools*, Organized by MHRD, Govt. of India and Azim Premji Foundation, Bangalore, 2004. Available online at http://www.azimpremjifoundation.org/ downloads/ KSubramaniampaperforlearningconference.pdf

27. Subramaniam, K. (2002). The Homi Bhabha Curriculum in Primary Mathematics: Background and Overview. *Conference Proceedings: Science Technology and Mathematics Education for Human Development*, Vol. 1, HBCSE, TIFR.

28. Subramaniam, K. (2002) "Chapter 1: Our Early Ancestors", in *The Roots of Reason: Science and Technology in the Ancient World*, ed. by Arvind Kumar & S. Mahurkar, Quest Publications, Mumbai.

29. Subramaniam, K. (2000). Geometrical Examples from Real Life. In Bhalwankar, A.G., Modi, K. and Rawool, S. (eds.) *Pathways in Mathematics Education, Colloquium in Mathematics, World Mathematics Year 2000*, PVDT College of Education, SNDT University, Mumbai, 2000.

30. Olson, D. (1996). Cognitive Consequences of Literacy. *Vivek*, 9(2). Lecture notes written by K. Subramaniam.

31. Singh, V. (1995). Epistemology of the natural and the social sciences, *Vivek*, 8(4), Lecture notes written by K. Subramaniam.

7 Technical/Internal Reports

1. Padalkar, Shamin, *Moon in the Sky: Project in Visuospatial Reasoning*, Internal Report, Project supervisor: K. Subramaniam, May, 2006.

2. Saibaba, L., Subramaniam, K. and Bandyopadhyay, A., *Mathwiki: A Resource for Problem Solving*, HBCSE Technical Report, November, 2005.

3. Subramaniam, K., Sahoo, P.K. (1999). *Threads in time: Historical Connections to School Mathematics*, Technical Report no. 45, HBCSE.

4. Subramaniam, K., Vasudeva Murthy, V. & Fernando, A.V.L. (1999) *Exploring Mathematics: Dissections and Graphs*, Technical Report no. 44, HBCSE.

5. Subramaniam, K. & Bhatt, K.M. (1997). *Activities for the school mathematics laboratory*, Technical report no. 37, HBCSE.

6. Bhatt, K.M. & Subramaniam, K. (1997). *Geometry through Collage: Boosting performance in school geometry*, HBCSE.
7. Subramaniam, K., Pradhan H.C & Sule, R. (1996). *Evaluation of Gammat Jatra (educational fun fair) held in M-East and M-West wards*, HBCSE report.

8 Other Educational Materials

1. Advisor for the following video films included in the Indian National Presentation at ICME-12: (i) Puzzles and inspirations in mathematics education (ii) Legacy of maths at work and play (iii) Diverse learners multiple terrains (iv) Initiatives to transform maths learning
2. Conceptualized and implemented a website for the National Initiative in Mathematics Education (NIME). http://nime.hbcse.tifr.res.in
3. Conceptualized and led the development of a collaborative wiki site for researchers, curriculum developers and teachers: http://web.gnowledge.org/cw
4. Conceptualized and led the development of a wiki site for problems in mathematics: http://web.gnowledge.org/wiki
5. *Video modules for teacher training* (approx. 15 to 20 minutes each): (concept and script: K. Subramaniam; script assistance: Shweta Naik; camera and editing: Manoj Nair), 2001.
    - Assessment in the maths classroom
    - Teaching a mathematical procedure
    - Explaining a concept
    - Using teaching aids
    - Teaching through questioning
6. *Exhibition on Polyhedra* This exhibition was developed as part of the mathematics laboratory with Rakhi Banerjee. The exhibition included models of Platonic and Archimedean solids, and reflection and rotation symmetries in polyhedra. Workshops on the topic were also held for teachers at educational fairs such as the Bal-vividha. 2002.
7. Twelve *posters* on various topics in school mathematics (Pythagoras theorem, polyhedra, triangle centres, Pascal's triangle and measuring the diameter of the earth, Fibonacci numbers, Golden ratio, etc.) were developed by the mathematics education group under my co-ordination.
8. "Working with fractions", Unit for course on Teaching of Primary Mathematics - PMT - 02, IGNOU.
9. "Working with decimals", Unit for course on Teaching of Primary Mathematics - PMT - 02, IGNOU.

Doctoral students supervised

1. Rakhi Banerjee (completed 2008)
2. Arindam Bose (Completed 2015)
3. Ruchi Kumar (Completed 2018)
4. Shikha Takker (Completed 2021)
5. Rossi D'Souza (Completed 2021)

6. Jeenath Rahaman (Submitted)
7. Himanshu Srivastava (Submitted)
8. Jayasree Subramanian (Current)

Post-Doctoral Fellows supervised

Aaloka Kanhere (2009-2012)

Teaching

1 Courses developed and taught to doctoral students

1. Theoretical Perspectives on School Mathematics, 2019
2. Introduction to Symbolic Logic, 2019
3. Seminar course: Research on multiplicative thinking and algebra learning, 2017
4. School teaching experience, 2015
5. Philosophy of science, 2015, 2016
6. Quantitative research methods in education, 2013
7. Philosophy of Education, 2011, 2014
8. Identifying learning progressions for early mathematics, 2011
9. Classics in mathematics education research, 2010, 2015
10. Introduction to Mathematics Education Research, 2008, 2010, 2014, 2015, 2016
11. Representations and Reasoning, 2008
12. Pedagogy of Mathematics, 2006, 2007, 2008
13. Cognitive Development, 2003, 2006, 2007, 2008
14. Imagery and Reasoning, 2005
15. Visuospatial Thinking in Geometry, 2005
16. Algebra Education: Research results and questions, 2004
17. Learning Algebra, 2003
18. Topics in Mathematics Education, 2002
19. Polyhedra, 2002
20. Member of the Co-ordinating Academic Committee for the inter-institutional collaborative M.A. program on 'Elementary Education', 2005-2008.

2 Development of courses and teaching at the undergraduate/ diploma levels

1. Teaching fractions, ratio and proportion (Online certificate course in mathematics education, in collaboration with St. Xavier's Institute of Education)
2. Teaching Mathematics (I Am A Teacher, Post-graduate Diploma in Learning and Teaching, Mumbai,

2018, 2019).

3. Introduction to History and Philosophy of Science (IISER, Pune, 2010; Central University, Jharkhand, 2011)
4. Honours course on Learning Mathematics through Geogebra for B.Sc. mathematics/statistics students, St. Xavier's College, Mumbai, 2009.

Invited talks in Conferences and Seminars since 2010

1. Inaugural address, *Two Day National Level Researchers' Meet*, organized by Department of Education, University of Mumbai, in collaboration with HBCSE, Kalina Campus of University of Mumbai, January 5, 2017
2. Preparation of mathematics teachers - what are the significant gaps? Plenary talk at the *National Conference on Innovations in Mathematics Education*, Lady Shriram College, Delhi, March 3, 2017
3. Connecting university mathematics and school mathematics, the *National Level Symposium on "Mathematics and Women in Mathematics"*, N.E.S. Ratnam College, Mumbai, January 28, 2017.
4. Supporting teachers in making sense of students' mathematics, Institute for Mathematical Sciences, Chennai, February 2, 2018.
5. School mathematics education – multiple challenges. Workshop on Studies on Science and Technology Education, Zakir Hussain Centre for Educational Studies, JNU, Delhi, March 2, 2017.
6. Professional development of mathematics teachers – Role of PCK, *Active Teachers' Forum Annual Conference*, Nashik, May 14, 2017.
7. The qualitative paradigm shift in social research (Inaugural Keynote address), Workshop on understanding research methodology in social sciences for SC/ST students, jointly organized by Department of Education, University of Mumbai and the *Indian Council of Social Science Research* (Western Regional Centre), June 8, 2017.
8. Engaging with teachers' knowledge (Plenary address as Zenex Foundation International Speaker), *Annual Conference of Association for Mathematics Education of South Africa,* Nelson Mandela University, Port Elizabeth, July 4, 2017.
9. "Implications of out-of-school knowledge of measurement for school learning." Co-author with Arindam Bose of Paper presented at the *13th International Congress on Mathematics Education*, Hamburg, Germany, July 24-31, 2016.
10. "Constructing the concept of area measurement in a classroom." Co-author with Jeenath Rahman of Paper presented at the *13th International Congress on Mathematics Education*, Hamburg, Germany, July 24-31, 2016.
11. "Changing teacher knowledge-in-practice: The case of decimal fractions." Co-author with Shikha Takker of Paper presented at the *13th International Congress on Mathematics Education*, Hamburg, Germany, July 24-31, 2016.
12. "Capturing the quality of mathematics instruction." Seminar Series, HBCSE, July 14, 2016.
13. "Re-conceptualizing teachers' specialized knowledge for the teaching of mathematics". Invited talk at the 2-day Conference on Emerging Trends in Science and Mathematics Education, Dept. of Education, University of Delhi, February 2016.

14. “Encouraging and supporting students’ thinking in the learning of science”. Chitra Natarajan Memorial Lecture and Keynote Address, One-day Teachers’ Conference on Encouraging and Supporting Students’ Thinking in the Learning of Science, Navi Mumbai Science Foundation, Vashi, February 2016.
15. “Relating Knowledge Gained from Work Contexts to School Learning”. Invited talk at the National Seminar on Mathematics Education and Social Justice Concerns, Tata Institute of Social Sciences, Hyderabad, February 2016.
16. “Teacher action and teacher knowledge”. Invited talk at the Conference on Philosophy of Education, Azim Premji University, January 2016.
17. “Teacher Education: Building a foundation for professionalization”. Keynote address *Seminar on New Perspectives in Teacher Education*, Dept. of Education, Mumbai University, March 2015.
18. “Towards Quality in Teacher Education: Reflections on the Justice Verma Commission”. Invited talk at the *National Conference on Skill Development in Teacher Education*, Govt. College of Education, Panvel, January 2015.
19. “The construct of identity: Is it useful in mathematics education”. Invited talk at National Meet on Mathematics Education organized by NCERT, RIE, Bhopal, Dec 2014.
20. “Resources to build capability of mathematics teachers”. Keynote address at the Consultative National Seminar- cum – Workshop on Enhancing Mathematics Potential Through Facilitative Resource Material, Central Institute of Education, University of Delhi. July 2014.
21. “Conceptualizing knowledge-how for education theory and practice.” Invited talk at the Second International Philosophy of Education Seminar, Azim Premji University, Bangalore, May 2014.
22. “What underlies teaching: Understanding and changing classroom teaching”, Invited plenary talk at the national conference on “Developing Mathematics Teacher for Quality Learning for All”, NCERT, Regional Institute of Education, Ajmer, December 2013.
23. “Knowing contexts for the teaching of mathematics”, Talk at the Annual Research Meet, Homi Bhabha Centre for Science Education, October, 2013.
24. “Towards achieving numeracy for all”, Invited talk at the International Panel on Numeracy, Johannesburg, August 2013.
25. “Mathematics Education Research: A Perspective”, Invited talk at the NCERT National Meet on Year of Mathematics , December 2012.
26. “Does participation in household based work create opportunities for learning mathematics?”. Invited talk as member of the Plenary Panel on Opportunities for Learning Mathematics, *PME 36 Conference*, Taipei, Taiwan, July 2012.
27. “A critical perspective on popularisation of mathematics”. Talk at a review workshop on mathematics popularisation, Vigyan Prasar and Institute of Mathematical Sciences, Chennai, Apr 2012.
28. “The elementary mathematics curriculum: Locating mathematics in a contested terrain”. Invited talk at the Swedish *Matematikbiennalen 2012* Conference, Umea University, Jan 2012.
29. “Mathematics education research across the world”. Talk presented at the *National Initiative on Mathematics Education National Conference.* HBCSE, Mumbai, Jan 2012.
30. “Finding Teaching-Learning Paths in the Domain of Multiplicative Thinking ”. Invited review talk at

the epiSTEME-4 Conference, Mumbai: HBCSE. January 2011.

31. "Has primary school mathematics in Maharashtra changed over the years?" Talk presented at *National Seminar on the History and Cultural Aspects of Mathematics Education.* IGNOU, New Delhi. Dec 2011. (co-author: Aaloka Kanhere)
32. "Mathematics Curriculum at school level: does it ever change really?" Talk presented at the *National Initiative on* Mathematics *Education Eastern Regional Conference.* Dec 2011. (Similar talks were presented at the Pune Ganit Adhyapak Mandali Annual conference and Seminar on mathematics education organized by Acharya Marathe college, Mumbai.)
33. "Mathematics Education at HBCSE". Talk presented at *National Initiative on Mathematics Education Western Regional Conference*, IISER, Pune, Dec 2011.
34. How can psychology help in preparing teachers to teach mathematics', NCERT National Consultation, University of Mumbai, Jan 2010.
35. "Action schemes, symbols and number concepts ". Invited talk at the Symposium on Mind, Mathematics and Language, 20th convention of National Academy of Psychology, New Delhi: JNU, December 2010.

Talks for teachers and educators since 2015

For over 25 years, I have organized numerous workshops for teachers and teacher educators, conducted numerous sessions and have developed a team with high expertise in the professional development (PD) of mathematics teachers at the Homi Bhabha Centre. Here I have listed only workshops or talks that I have given outside the Centre since 2015 to indicate what I discuss in my PD sessions.

1. Listening to student thinking in the mathematics classroom, Talk at the *Instructional Leadership Workshop for Principals of Kendriya Vidyalayas*, *Zonal Institute of Educational Training, Kendriya Vidyalaya Sangathan,* Mumbai, November 22, 2019.
2. One day workshop for *Resource Persons of Jodo Gyan, Delhi* on Children's Mathematical Thinking and Problem Solving, April 8, 2019.
3. One day workshop for *Mentor Teachers of Delhi Govt. Schools* on Teachers' Knowledge for Teaching Middle School Mathematics. April 9, 2019.
4. In-service teacher professional development: Understanding contexts, goals and effective processes, for *M.A. students, Azim Premji University*, Bengaluru, April 9, 2018.
5. Exploring integer meaning in contexts, Workshop session at the *Annual Conference of Association for Mathematics Education of South Africa*, Nelson Mandela University, Port Elizabeth, July 6, 2017.
6. Specialized knowledge that teachers need to teach school mathematics. *Workshop on Science Education, IISER, Pune*, March 6, 2016.
7. Mathematics learning for *higher secondary school students and teachers, Kerala Govt. Model Residential Schools, CREST, Kozhikode*, September 26, 2015.
8. Four lectures on "Scientific Rationality". *Summer course in Philosophy of Education, Azim Premji University*, Bengaluru, June 15 and 16, 2015.
9. "Understanding the discipline of mathematics", Lecture at the *UGC Refresher course, Mumbai University*, June 2015.

10. "Pedagogy of mathematics", Lecture at the *UGC Refresher course, Mumbai University*, June 2015.
11. "Inferring pedagogical content knowledge from teaching" and "Formulating research questions", two talks at the *Doctoral research school, Southern African Association for Research in Mathematics, Science and Technology Education. Johannesburg*, June 2015.
12. "What is pedagogical content knowledge? Why is it needed to teach maths?" Lecture at *PVDT College, SNDT University*, Mumbai, February 2015.

Talks/lectures for students

Over the years, I have delivered over 80 special talks to school and college students on topics of interest in science and mathematics, which include the following:

1. Data literacy and citizenship
2. Overviews of the history and philosophy of Science and Mathematics
3. Archimedes and the beginning of mathematical physics
4. Empiricism and Knowledge
5. Questions of Philosophy, Answers from Science?
6. Ways of counting: numbers and rhythm patterns in the history of Indian mathematics
7. Hands-on mathematics
8. On topics in mathematics: Graphs, Matrices, Sequences and series, Primality testing, The five types of rotational symmetry, Moebius strip and other twists, Efficient Calculation Methods

Professional recognition

1. Plenary Panelist, Mathematics Education Panel, International Congress of Mathematicians (ICM 2022)
2. Plenary Panelist in International Congress of Mathematics Education (ICME-14) in 2020
3. Plenary Speaker, Psychology of Mathematics Education Conference (PME-43) in 2019
4. Invited editor for the India section for *The First Sourcebook on Asian Research in Mathematics Education*. Published in 2015.
5. Member, International Program Committee, ICME-12 (2010-2012)
6. Member of organizing team for topic study groups in ICME-11 (2008), ICME-12 (2012) and ICME-13 (2016)
7. Reviewer for international journals including *Journal of Research in Mathematics Education* and *ZDM: The International Journal on Mathematics Education*; Reviewer for several international conferences
8. Member, Advisory Board, Mathematics Teachers' Association (India), 2018-2021
9. Member, National Council for Teacher Education (NCTE); 2013-2017
10. Member, NCTE sub-committee on developing guidelines for "Teacher Eligibility Test"; 2013-14
11. Member, NCTE sub-committee on teacher education through ODL mode (2013-14)

12. Member, NCTE sub-committee on developing norms for faculty for B.El.Ed. Programme (2013-14)
13. Member, Academic Committee, NCERT, New Delhi (2014-2019)
14. Country representative for India, International Commission for Mathematics Instruction (2012-present)
15. Member, Journal Editorial board, *Contemporary Education Dialogue* (2010-2020)
16. Member, Journal Editorial board, *At Right Angles* (2013-present)
17. Member, International Programme Committee for ICME-12 (International Congress of Mathematics Education) (2009-2012)
18. Member, Steering Committee for the National Initiative in Mathematics Education (NIME 2011-2012).
19. Chairperson, Curriculum and Syllabus Committee (Class 1 to 8) for Mathematics of the Maharashtra State (2011-2013)
20. Member, Mathematics textbook editing and authoring committees, Textbook bureau, Maharashtra (2013-2014)
21. Member, Executive Committee for the Sarva Shikhsa Abhiyan, MHRD, 2013-2014.
22. Member of Editing and Writing Committee for mathematics textbooks for Maharashtra state for classes 1 and 2, Maharashtra State Bureau of Textbook Production and Curriculum Research. Pune, 2013.
23. Key member of various committees in revising the National Curriculum Framework in mathematics education (NCF-2005): member of the Focus group on mathematics education, member of the Syllabus committee and the Textbook committee for mathematics at the primary level.
24. Co-ordinated the review of testing instruments in mathematics for Grades 1 to 5 developed for the Learning Guarantee Program, Govt. of Madhya Pradesh, 2004.

Professional Consultation

1. Invited expert on the Advisory committee of the "Time-on-task study in secondary schools" done by MHRD, World Bank and Educational Initiatives, India, 2016.
2. Invited expert to review the materials on mathematics education of the TESS-India (Teacher Education through School-based Support in India) project led by the Open University, UK.
3. International expert to evaluate the two Numeracy Chair projects, FirstRand Foundation and Department of Science and Technology, South Africa. August 2013.
4. Invited for consultation by Shiv Nadar University for setting up a school of education, 2012-2013.
5. Reviewed the work and proposal of the Children's Science Center, IUCAA, on the invitation of Sir Ratan Tata Trust, 2006 & 2007.
6. Member, Governing Board, Gyan Shala (A voluntary organization running about 150 primary schools in Ahmedabad for poor children), 2007-2010.
7. Invited by various government and non-government agencies for expert consultation on educational projects: Digantar, Jaipur, Govt of Uttaranchal, Dehra Dun, Naandi Foundation, Hyderabad, Educational Initiatives, Ahmedabad, 2005-2007.

8. Invited expert for field-based assessment of needs of teacher intervention, Joint Educational intervention by Naandi Foundation and A.P. Govt. in the Paderu tribal region, Andhra Pradesh, Aug. 2004.
9. Developed a baseline competency test for administering to Municipal school children in Chandrapur and Yavatmal. Administration and analysis of baseline performance carried out by Navnirmiti, an educational NGO under a UNICEF sponsored project. (Collaborators: A.T. Mavlankar and Shweta Naik) (2002).
10. Member of a five-day Asia Regional Workshop to review materials designed for the Training of Primary Mathematics Trainers, Organized by the Commonwealth Association for Science, Technology and Mathematics Education, IGNOU, New Delhi, June 2000.