HBCSE - TIFR

Mashood K. K.

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Designation: **Reader- F**

Academic Experience

• Research Associate (Feb. 2017 – Dec. 2017), STEM Transformation Institute, Florida International University, USA
• Research Associate (Jan. 2016 – Dec. 2017; Adjunct position from Feb. 2017), Physics Education Research Lab, CREATE for STEM Institute at Michigan State University, USA.

Education

- Ph D in Physics Education Research, 2014, Tata Institute of Fundamental Research, Mumbai, India.
- M Sc Physics, 2007, Cochin University of Science and Technology, Kerala, India.

Areas of Interest

- Alternative Conceptions in Physics, Concept Inventories, Modelling in science education, Conceptual Change

Publications

• Mashood, K. K., Kumar, A. and Mazumdar, A. (2020), Approximations in physics: A pedagogic perspective. ***Resonance - Journal of Science Education*****,** 25(7), 915-932.

• Karnam, D., Mashood, K. K., & Sule, A. (2020). Do student difficulties with vectors emerge partly from the limitations of static textbook media?. ***European Journal of Physics***, 41(3), 035703.

• Mashood, K. K., & Singh, V. A. (2019). Preuniversity science education in India: Insights and cross cultural comparison. ***Physical Review Physics Education Research***, 15(1), 013103.

• Scott, E.E., Anderson, C.W., Mashood, K.K., Matz, R.L., Underwood, S.M. and Sawtelle, V., (2018). Developing an Analytical Framework to Characterize Student Reasoning about Complex Processes. ***CBE—Life Sciences Education***, 17(3), p.ar49.

• Mashood, K. K., Sawtelle, V., Anderson, C., Matz, R., Scott, E., and Underwood, S. (2016). Developing an empirically grounded framework to assess interdisciplinarity of student explanations of everyday phenomena. ***Physics Education Research Conference*** 2016 proceedings, Sacramento, CA, USA.

• Mashood, K. K. and Vijay A. Singh (2015). Rotational kinematics of a rigid body about a fixed axis: Development and analysis of an inventory. ***European Journal of Physics*** 36, 045020.

• Mashood, K.K. and Vijay A. Singh (2013). Large-scale studies on the transferability of general problem-solving skills and the pedagogic potential of physics. ***Physics Education***

(IOP-UK), 48, 629-35.

• Mashood, K.K. and Vijay A. Singh (2013). Development of a concept inventory in rotational kinematics: Initial phases and some methodological concerns. In Nagarjuna et. al . (Eds.), Proceedings of ***epiSTEME 5*** – International Conference to Review Research on Science, Technology and Mathematics Education, Mumbai, India: Cinnamonteal.

• Mashood K. K. and Vijay. A. Singh (2012). An inventory on rotational kinematics of a particle: Unraveling misconceptions and pitfalls in reasoning, ***European Journal of Physics***, 33, 1301-12.

• Mashood K. K. and Vijay A. Singh (2012). Rotational kinematics of a particle in rectilinear motion: Perceptions and pitfalls, ***American Journal of Physics,*** 80(8), 720-23.

• Mashood K. K. and Vijay A. Singh (2012). Variation in angular velocity and angular acceleration of a particle in rectilinear motion, ***European Journal of Physics***, 33, 473-78

• Mashood K. K. (2009). Historico -critical analysis of the concept of mass: From antiquity to Newton, In Subramaniam, K., & Mazumdar, A. (Eds.), Proceedings of ***epiSTEME-3*** - International Conference to Review Research on Science, Technology and Mathematics Education, Mumbai, India: McMillan.

Author, Editor: Books and Proceedings

• Mashood, K. K. et. al. Eds. (2020), Proceedings of epiSTEME-8 - International Conference to Review Research on Science, Technology and Mathematics Education, Mumbai, India: Gaurang. Available online at: https://episteme8.hbcse.tifr.res.in/proceedings/

Expository Articles

• Mashood, K. K. and Punya Mishra (2021), Common sense in the science classrooom , ***I Wonder - Rediscovering School Science***, published by Azim Premji University, Bangalore.

• Mashood, K. K., Mehta, R and Punya Mishra (2018), To See a World: Using Multiple Metaphors in Science Education , ***I Wonder - Rediscovering School Science***, published by Azim Premji University, Bangalore.

Conference Presentations

• Mashood, K. K., Bameta, T and Gupta, A (2021). Unpacking tensions in a pedagogical transition from lectures to modelling. ***American Association of Physics Teachers (AAPT)*** Virtual Summer Meeting, July 31 - Aug.4.

• Mashood, K. K., Sawtelle, V. D., Anderson, C. W., Matz, R. L., Scott, E. E., Underwood, S. M. (2016). The Need for New Instruments: Assessing Interdisciplinary Thinking. ***Physics Education Research Conference (PERC)***, July 20 - 21, Sacramento, CA.

• Mashood, K. K., Sawtelle, V. D., Anderson, C. W., Matz, R. L., Scott, E. E., Underwood, S. M. (2016). Investigating Student Reasoning of Everyday Interdisciplinary Phenomena -- Initial Phases.***American Association of Physics Teachers (AAPT)*** Summer Meeting, July 16 - 20, Sacramento, CA.

• Mashood, K.K. and Vijay A. Singh (2013). Evaluation of the inventory on rotational kinematics, presented at the ***Foundations and Frontiers in Physics Education Research (FFPER)***, Bar Harbor, Maine, USA.

• Mashood K. K. and Vijay A. Singh (2012). An inventory on angular velocity of a particle, In Tasar, F (Ed.), Book of Abstracts, **World Conference on Physics Education (WCPE)**, Istanbul, Turkey.

Invited Talks and Presentations

• DBT_STAR Sponsored talk, Mar Athanasius College, Kothamangalam, Kerala, India, 10 March 2021.
• INSPIRE 2021 Lecture Series, Mar Dionysius College, Trissur, Kerala, 25 January, 2021.
• Research Training School in Physics (RSTP) - 2020, Department of Physics, Cochin University of Science and Technology, Kerala, India, 27 February, 2020.
• Inter-Collegiate Physics Fest - Kannur University, Government Brennen College, Kerala, India, 30 January, 2020.

• Panel member, Discussion on ` Towards a pedagogy of science as a liberal art', EpiSTEME 8 - International Conference to Review Research on Science, Technology and Mathematics Education, Mumbai, India, 5 January, 2020.

• National Workshop on Physics: Education, Research and Applications, Government College Kazargode, Kerala, India, Nov 15, 2019.

• Invited faculty, Staff exchange program, African Centre for Excellence in Teaching and Learning of Maths and Sciences (ACEITLMS), University of Rwanda, Kigali, Rwanda, 3 - 17 June, 2019.

• Special session on: Physics Teachers Preparation in Different Countries throughout the World, American Association of Physics Teachers (AAPT), Winter Meeting, 2019, Houston, Texas, USA.

• ACEITLMS Training Workshop on Postgraduate Supervision, University of Rwanda, Kigali, Rwanda, 21 -25 May, 2018.

Other Talks and seminars given

• On `Operationalizing criteria to assess interdisciplinary thinking using textbook analysis' at STEM Transformation Institute, ***Florida International University, USA***, 31 January, 2017.

• On `Physics Education Research: A Scientific Approach to Improving Teaching and Learning of Physics', at Department of Physics, Texas A&M University, Qatar, 16 November 2016.

• On `Physics Education Research: Evidence Based Approach to Teaching and Learning of Physics', at Department of Physics, Qatar University, Qatar, 14 November 2016.

• On `Developing an empirically grounded framework to assess student explanation of everyday phenomena' at Michigan section AAPT meeting, 15 October 2016.

• On `Assessing interdisciplinary thinking among undergraduate students', Create for STEM Institute, Michigan State University, 20 April, 2016.

Graduate Studies - Courses Taught

- Cognitive Accounts of Modelling and Conceptual Change, 2 Credit Course, Aug. - Dec., 2020.
- Modelling in Science Education, 2 Credit Course, Jan. - April, 2020.
- Cognition, Conceptual Development and Conceptual Change, 4 Credit Core Course, (with Prof. Sanjay Chandrasekharan), Aug. - Dec., 2019.
- Advanced Course on Research Methodology in Education, 4 Credit Core Course, Jan. - April, 2018.
- Introduction to Research Methodology in Education, 2 Credit Core Course, Aug. - Dec., 2018.
- Introduction to Science and Mathematics Education Research, 4 Credit Core Course, Aug. - Dec., 2018; Feb.- May, 2021.

Research Mentoring, Ph D Supervision

- Thesis Advisor, Joseph Salve, Ph D student (2020 -), Homi Bhabha Centre for Science Education (TIFR), Mumbai, India.
- Co - Advisor, Kirya Kent, Ph D student (2020 -), African Centre for Excellence in Teaching and Learning of Maths and Sciences (ACEITLMS), University of Rwanda, Kigali, Rwanda.
- Co - Advisor, Beni Mbwile, Ph D student (2021 -), African Centre for Excellence in Teaching and Learning of Maths and Sciences (ACEITLMS), University of Rwanda, Kigali, Rwanda.
- Member, Thesis Advisory Committee, Sujatha Varadarajan, Ph D student, Homi Bhabha Centre for Science Education (TIFR), Mumbai, India.
- Member (Special Invitee), Thesis Advisory Committee, Durga Prasad, Ph D student, Homi Bhabha Centre for Science Education (TIFR), Mumbai, India.
- Member, Thesis Advisory Committee, Don Bosco, Ph D student, African Centre for Excellence in Teaching and Learning of Maths and Sciences (ACEITLMS), University of Rwanda, Kigali, Rwanda.
- Mentor, Dr. Tripti Bameta, Visiting Fellow, Homi Bhabha Centre for Science Education, July 2019 - October 2020.

- Mentor, Dr. Vimal Kumar (St. Thomas College, Trissur, Kerala, India), BESTM Fellow 2019, Homi Bhabha Centre for Science Education (TIFR), Mumbai, India.
- Co - Mentor, Snehal Choudhary, (Abasaheb Garware College, Pune, India), BESTM Fellow 2019, Homi Bhabha Centre for Science Education (TIFR), Mumbai, India.
- Mentor, Dr. Jijo Ulahannan (Government College, Kasargode, Kerala, India), Short Term Visitor at Homi Bhabha Centre for Science Education, 6-16, June, 2018
- Mentor, Justin Gambrell, Undergraduate student in physics, Michigan State University, USA. Worked on a project aimed at developing an instrument to assess interdisciplinary thinking in natural science at the undergraduate level, Oct. 2016 – May, 2017. Received first prize in University Undergraduate Research Arts and Forum, 2017 for this work.

Internship, projects and workshops

• Internship at the University of Washington, Seattle under the Visiting International Student Internship Training (VISIT) program. Supervised by Prof. Paula Heron, Physics Education Group, Department of Physics, April – June, 2013.

• Short visit to Mazur group, Harvard University which has pioneered the interactive pedagogy – Peer Instruction, June 2013.

• Attended workshop for teachers in Peer Instruction conducted by Prof. Eric Mazur at Indian Institute of Technology, Bombay, November 2013.

• Attended Indo -US Science and Technology Forum Workshop on Science Communication, Indian Institute of Science (IISc), Bangalore, December, 2010.

• Attended National Conference on Science Education, Atomic Energy Education Society, Mumbai, 11-15 Decemeber, 2007.

• Carried out the project titled ' Nurturing scientific creativity in India: A pedagogical challenge', Indian Institute of Technology (IIT), Madras, June-July, 2007.

Service work - Reviewing activity

- European Journal of Physics Physical Review – Physics Education
- Research Physics Education Research Conference, USA.
- Foundations and Frontiers in Physics Education Research, USA.

Awards and grants won

- Award of USD 3000 from the Indo-US Science Technology Forum (IUSSTF) and the American Physical Society (APS) under the APS-IUSSTF Physics Student Visitation Program in 2013.
- Mini scholar in residence grant from the American Association of Physics Teachers in 2013.
- Travel grant of INR 60000 from Sir Ratan Tata Trust, Mumbai, India in 2013

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