Research Methodology: Advanced Course on STEM Education Research (Qualitative Methods) Course Outline

August -December 2024

Course title:	Research Methodology: Advanced Course on STEM Education Research (Qualitative Methods)
Course Number:	SCE403.2
Type of course:	Elective course (2 credits)
Course duration:	12 weeks
Meeting time	Weekly once for a two hour session
Course learning goals	• Critically evaluate theoretical/ paradigmatic positions and understand how (and what extent) theoretical positions can influence design and data collection and analysis choices • Understanding design of quantitative surveys/assessment techniques/observation protocols stemmed from theoretical & qualitative foundations • Integrating multiple worldviews in the conduct of qualitative education research • Applying self-reflexivity in the understanding of research methods in science education research
Course assessment & evaluation	a) A term paper submission on observational data analysis with a suggested methodological approach (40%) b) A literature review paper on the choice of methodology (30%) c) Reflection diaries of workshop activities (20%) d) Participation in discussions (instructor review 10%)
Course start date	19 August 2024
Course timings	Thursday (11 AM to 1 PM)
Course instructor & contact	Deepa Chari Email: deepa@hbcse.tifr.res.in Office: Room 209, Main building, HBCSE

Please note that the course credits are given **only** upon successful completion of both assessments and appropriate attendance. Most papers are freely accessible with the provided DOI, those with limited access will be shared with the course takers through Baadal drive at the start of the course

Course is open for all HBCSE members for auditing purpose.

Work plan (weekly)

Week 1, 2	**(Theme: Phenomenology and phenomenography)** **Reading 1:** Using Phenomenography to Tackle Key Challenges in Science Education, (2019) Han and Ellis, Frontiers in Psychology **Journal DOI :** www.frontiersin.org/articles/10.3389/fpsyg.2019.01414/full **Reading 2:** Understanding science teachers' implementations of integrated STEM curricular units through a phenomenological multiple case study (2018) Dare et al. International Journal of STEM Education, 5:4 Journal DOI: 10.1186/s40594-018-0101-z **Workshop:** Phenomenology Vs Phenomenography
Week 3, 4	**(Theme: Science agency, STEM identity, critical science agency)** **Reading 1:** What is 'Agency'? Perspectives in Science Education Research (2014) Jenny Arnold & David John Clarke (2014), International Journal of Science Education, 36(5), pp 735-754 Journal DOI: www.tandfonline.com/doi/full/10.1080/09500693.2013.825066 **Reading 2:** Critical physics agency: further unraveling the intersections of subject matter knowledge, learning, and taking action (2009) Cultural Studies of Science Education, 4:387–392 Journal DOI 10.1007/s11422-008-9155-4 **Workshop:** Observational analysis of Vigyan Pratibha episode for CSA
Week 5,6,7	**(Theme: Teacher professional development frameworks, Responsive teaching)** **Reading 1:** Characterizing pedagogical decision points in sense-making conversations motivated by scientific uncertainty (2022) Jessika Watkins and Eva Menz, Science Education Journal DOI: https://doi.org/10.1002/sce.21747

	Reading 2: The Growing Awareness Inventory: Building Capacity for Culturally Responsive Science and Mathematics With a Structured Observation Protocol (2016) Julie Brown and Kent Crippen, School science and mathematics Journal DOI: https://doi.org/10.1111/ssm.12163 **Reading 3:** Multimodal classroom interaction analysis using video-based methods of the pedagogical tactic of (un)grouping (2024) Pedagogies: An international Journal Journal DOI: https://doi.org/10.1080/1554480X.2024.2313978 **Workshop:** Observational analysis of Vigyan Pratibha episode for responsive teaching
Week 8	Break and catching up with reading/workshop activities
Week 9,10	**(Theme: Design based education research)** **Reading 1:** Design-Based Research: A Methodology to Extend and Enrich Biology Education Research (2020) Emily E. Scott, Mary Pat Wenderoth, and Jennifer H. Doherty, CBE Life Sci Education. Journal DOI: DOI:10.1187/cbe.19-11-0245 **Reading 2:** Sweeping area across physical and virtual environments (2021) Corey Brady, Richard Lehrer, Digital Experiences in Mathematics Education, 2021 Journal DOI: https://doi.org/10.1007/s40751-020-00076-2 (available through research gate) ***Interaction with graduate students**
Week 11, 12	**(Theme: Some major or contemporary research methods)** **Reading 1:** Case studies and generalizability: grounded theory and research in science education, International Journal of Science Education, (2000) Keith S. Taber, 22:5, pp 469-487, Journal DOI: 10.1080/095006900289732 **Workshop:** Methodology comparison
Week 13	Written assignment and presentation **Workshop:** Seeking ethical permission from Institutional review board. Discussion of cases, guidelines and practice application.