

M. Ed. Two Year Programme

S.Sc. 3 (e): Science Education: Policy and Practice

Maximum Marks: 100

This course aims to develop an understanding of perspectives in science education through a study of policy and practice. It looks at trends in science education policy in the last couple of decades and reviews how those have influenced school practices. It fosters deliberation on significant contemporary debates on reconceptualising science education to achieve 'science for all' through either a humanist or human capital perspective, to critically understand current competitive trends driving curricular change. The course provides an in-depth understanding of pedagogical issues related to students' processes of knowledge construction in diverse socio-cultural contexts. It looks at the emerging role of science education as a social enterprise. The course focuses on different discursive practices in science education and exposes students to research perspectives in relation to practice and policy.

Unit I The policy perspective

The influence of policy on envisioned aims and practices of science education (on the curriculum, including syllabi, pedagogy, classroom and assessment practices resources etc.).

Reconceptualising science education in the context of 'science for all'- issues of equity and diversity; the role of indigenous knowledge, traditional ecological knowledge (TEK).

Science-technology-society-environment (STSE) education; rethinking 'scientific literacy' for social transformation; the role of teachers as partners in change.

Unit II The policy-practice interface

Curriculum and practice; negotiating change; review of studies on some innovative school science curricula, such as, Hoshangabad Science Teaching Programme, Nuffield Science, Science in Context, etc.

Formal and in/non formal learning in science; multicultural science education addressing agency, identity and voice, drawing upon students' 'funds of knowledge' through multimodal representations; understanding learners' conceptual development, alternative frameworks; young people's images of science and scientists; through constructivist and culturally responsive pedagogies.

Discursive practices in science education; the role of language - expressive or transactional; understanding the use of different styles of oral, literate, visual representation; science communication and the popular media.

Authentic assessment for learning; engaging with broader notions of 'scientific literacy for life'; critical analyses of processes of assessment in school, and at national and international levels.

Unit III Research in science education

The policy-practice-research interface: science education research and praxis, understanding how perspectives shape research in science education - through readings and discussion of research studies, and students themselves conducting critical analyses of textbooks and assessment practices, or classroom observations.

Readings:

Aikenhead, G.S. (2006) *Science Education for Everyday Life*. Teachers College Press, N.Y. p 1-23, 107-127.

Behrendt Helga & Dahneke Helmut. (Eds)(2001). *Research in Science Education- Past, Present and Future*, Kluwere Academic Publishers

Bruguiere, Catherine, Tiberghien, Andree and Clement, Pierre. (2013). *Topics and Trends in Current Science Education*. Springer.

Cakir, Mustafa.(2008).Constructivist Approaches to Learning in Science and Their Implications for Science Pedagogy: A Literature Review. *International Journal of Environmental & Science Education*, Vol. 3(4) pp193-206.

Carter, Lyn.(2005).Globalisation and science education: Rethinking science education reforms, *Journal of Research in Science Teaching*; volume 42(5)pp 561-580.

Cobern,w.w. (1998).*Socio-Cultural Perspectives on Science Education*. Kluwer Academic Publishers.

Costley, Kevin C. (2015).*Research Supporting Integrated Curriculum: Evidence for using this Method of Instruction in Public School Classrooms*. files.eric.ed.gov/fulltext/ED552916.pdf

Devetak, Iztok, Glazar,Sasa A. &Vogrinc, Janez. (2010).The Role of Qualitative Research in Science Education. *Eurasia Journal of Mathematics, Science & Technology Education*, 6(1), pp77-84.

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Driver, R. (1983). *The Pupil as Scientist?* Milton Kenyes: The Open University Press. Chapters V, VI, VII, VIII.

Driver, R., Squires, A., Rushworth, P. and Wood- Robinson, V. (1994). *Making Sense of Secondary Science*. London: Routledge. Chapters I, II, V, VI, VIII, X, XI, XII, XVII, XVIII, XX, XXI XXIII, XXIV.

Driver, R., Leach, J., Millar, R., & Scott, P. (1996). *Young people's images of science*. Open University Press, Buckingham.

Eijck, M. C. and Roth, W.M. (2007) Keeping the Local Local: Recalibrating the Traditional in Science and Traditional Ecological Knowledge (TEK) Education. *Science Education 91*: 926 – 947.

Elstgeest, J. and Harlen, W., *UNESCO Sourcebook for Science in the Primary School*. National Book Trust, New Delhi. Chapters VI, VII, XI.

Fraser, B. & Tobin, Kenneth. (2003). *International Handbook of Science Education*. Springer.

Khine, Myrint Swe. (2015). *Science Education in East Asia: Pedagogical Innovations and Research-informed Practices*. Springer.

Koba, Susan, Wojnowski, Brenda & Yager, Robert Eugene. (2013). *Exemplary Science: Best Practices in Professional Developmen*. NSTA Press.

Hodson, D. (1988). "Science curriculum change in Victorian England: A Case Study of the Science of Common Things." In *International Perspectives in Curriculum History*. London, Routledge.

Joshi, S. (2015) *Never a Dull Moment: Academic Narrative of the Hoshangabad Science Teaching Programme*. Eklavya, Bhopal.

Lederman, Norman G. & Abell, Sandra K. (Eds) (2014). *Handbook of Research on Science Education, Volume II*. Routledge.

Lee, O. and Buxton, C. (2010) *Diversity and Equity in Science Education*. Teachers College Press. p23-35.

Millar, R. (Ed.) (1989). *Doing Science: Images of science in science education*. Lewes: Falmer Press. Chapters II, V.

NCERT(2008) *Sourcebook on Assessment of Children's Learning in Environmental Studies*. New Delhi: National Council for Education Research and Training.

NCERT (2006) *Position Paper on the Teaching of Science*. New Delhi: National Council for Education Research and Training.

OECD (2009) The PISA Assessment Framework (p131-152); *Take the Test*.

Nuffield Resource Materials: Resources for Chemistry, Measuring Forces, Materials, Weathers, Energy, Light, Metals and Chemical Patterns. Available at <https://www.stem.org.uk/elibrary/collection/>.

Rampal, Anita, & Mander, H. (2013) Lessons on Food and Hunger: Pedagogy of Empathy for Democracy. *Economic & Political Weekly*, 48(28), 51-57.

Rampal, A. (1992) 'School Science in Search of a Democratic Order?' *Social Scientist*, 20, no. 7-8, p.50-74.

Raveendran, Aswathy & Chunawala, Sugra (2013). *Towards an Understanding of Socioscientific Issues as Means to Achieve Critical Scientific Literacy*. Proceedings of epiSTEME 5, India.

Rhoton, Jack & Shane, Patricia. (2006). *Teaching Science in the 21st Century*. NSTA Press.

Slaton, A. And Calabrese Barton, A. (2011) 'Respect and Learning'. In B. Fraser, K.G. Tobin and C.J. McRobbie, (Eds.) *The Second International Handbook of Science Education*, Springer. p.513-526.

Steele, A. (2014) The Seventh Current: A Case for the Environment in STSE Education. *Canadian Journal of Science, Mathematics and Technology Education*, 14:3, 238-251.

Tan, Daniel Chwee Kim & Mijung, Kim.(Eds) (2012). *Issues and Challenges in Science Education Research: Moving Forward*. Springer.

Tytler, Russel. (2007). *Re-imagining Science Education*. Australian Council for Educational Research, Victoria.

Wellington, J and Osborne, J. (2001) *Language and Literacy in Science Education*. Buckingham: Open University Press.

Wolf-Roth, M. and Calabrese Barton, A. (2004) *Rethinking Scientific Literacy*. London: RoutledgeFalmer. Chapters VI-VIII.