

Course Outline

Part I

Programme Title : Doctor of Education (Science Education)

Course Title : The social and psychological dynamics of science learning

Course Code : SCG8013

Department : SES

Credit Points : 3

Contact Hours : 4-12 hrs (contact hours) 27-35 hours (directed study)

Pre-requisite(s) : Nil

(If applicable)

Medium of Instruction: EMI

Level : Applied Stage

Part II

1. Synopsis

This course critically examines the shift of views in science education, with science as explanation and model building, science inquiry as an individual and social process, and science teaching focusing on the management of learners' ideas, access to information, and interactions between learners. The importance, value and impact of social interactions, discourse and argumentation play in science learning is analyzed. The course also includes the study of research to understand the major ideas behind and evidence that science learning in formal and informal environments that promote science learning. The significant outcomes of the course are applicable conditions for science learning in and outside the classrooms through the establishment of learning environments, instructional practices and activities to scaffold science thinking and promote active/interactive science learning.

2. Course Intended Learning Outcomes (CILOs)

Upon successful completion of this course, students should be able to:

- CILO₁ Account for and compare the main features of the different views in science education;
- CILO₂ Critically analyze the impact of social and psychological dynamics on science learning;
- CILO₃ Critically review the strength and limitations of the different learning environments on science learning.

3. Content, CILOs and Teaching & Learning Activities

Course Content	CILOs	Suggested Teaching & Learning Activities
Study on the shift of views in science education - science teaching focusing on the management of learners' ideas, access to information and evidence and multiple representations	CILO ₁	- Study the key literature - Discuss about the application to professional practices
Study on the social dynamics and learning environments of science learning - Interactions between learners - discourse & argumentation in science classrooms - learning science in informal environments	CILO _{2,3}	- Present a critical review of the key literature - Discuss about the application to professional practices
Study of the psychological dynamics and learning environments of science learning - scaffolding of scientific thinking - instructional practices and activities to enhance science thinking - metacognition and self-regulated learning	CILO _{2,3}	- Present a critical review of the key literature - Discuss about the application to professional practices

4. Assessment

Assessment Tasks	Weighting (%)	CILO
a. Reflective reports on reading of related topic areas	20	CILO _{1, 2,3}
b. An essay on a critical review of the literature in one specific content area with discussion focusing on the application to professional practice. (about 4000 words)	80	CILO _{1,2, 3}

5. Required Text(s)

Nil

6. Recommended Readings

Content Area 1

- Donovan, M. S., & Bransford, J. D. (2005). *How Students Learn: Science in the Classroom*. Committee on How People Learn: A Targeted Report for Teachers, National Research Council. Retrieved from <http://www.nap.edu/catalog/11102.html>
- Duit, R. & Treagust, D. F. (2010). Conceptual change: A powerful framework for improving science teaching and learning. *International Journal of Science Education*, 25(6), 671-688.
- Vosniadou, S., & Ioannides, C. (1998). From conceptual development to science education: a psychological point of view, *International Journal of Science Education*, 20(10), 1213-1230.
- Oh, P. K. & Oh, S. J. (2010). What Teachers of Science Need to Know about Models: An overview. *International Journal of Science Education*, 33:8, 1109-1130.
- Waldrip, B., Prain, V., & Carolan, J. (2010). Using Multi-Modal Representations to Improve Learning in Junior Secondary Science. *Research in Science Education*, 40(5), 65-80.
- Waldrip, B., Prain, V., & Carolan, J. (2010). Using Multi-Modal Representations to Improve Learning in Junior Secondary Science. *Research in Science Education*, 40(5), 65-80.
- Hoban, G. F. (2007). Using slowmation to engage preservice elementary teachers in understanding science content knowledge. *Contemporary Issues in Technology and Teacher Education*, 7(2), 75-91.
- Adadan, E., Irving, K. E. & Trundle, K. C. (2009). Impacts of Multi-representational Instruction on High School Students' Conceptual Understandings of the Particulate Nature of Matter, *International Journal of Science Education*, 31:13, 1743-1775
- Hubber, P. & Tytler, R. & Haslam, F. (2010). Teaching and Learning about Force with a Representational Focus: Pedagogy and Teacher Change. *Research in Science Education*, 40, 5-28.

Content Area 2

- Erduran, S., Simon, S., & Osborne, J. (2004). TAPping into Argumentation: Developments in the Application of Toulmin's Argument Pattern for Studying Science Discourse. *Science Education*, 88(6), 915-933.
- Fenichel, M., & Schweingruber, H. A. (2010). *Surrounded by science: Learning Science in Informal environments*. USA: National Academy of Sciences.
- Kim, M., Yoon, H., Ji, Y. R., & Song, J. (2011). The Dynamics of learning science in everyday contexts: A case study of everyday science class in Korea. *International Journal of Science and Mathematics Education*, 10, 71-97.
- Osborne, J., Erduran, S., & Simon, S. (2004). Enhancing the Quality of Argumentation in School Science. *Journal of Research in science teaching*, 41(10), 994-1020.
- Scott, P., & Ametller, J. (2007). Teaching science in a meaningful way: striking a balance between 'opening up' and 'closing down' classroom talk. *School*

Science Review, 88(324), 77-83.

Content Area 3

- Klahr, D., & Li, J. (2005). Cognitive Research and Elementary Science Instruction: From the Laboratory, to the Classroom, and Back. *Journal of Science Education and Technology*, 14(2), 217-238.
- Kuhn, D., & Pearsall, S. (2000). Developmental Origins of Scientific Thinking, *Journal of Cognition and Development*, 1, 113-129.
- Schraw, G., Crippen, K. J., & Hartley, K. (2006). Promoting Self-Regulation in Science Education: Metacognition as Part of a Broader Perspective on Learning. *Research in Science Education*, 36, 111–139

7. Related Web Resources

- Asia-Pacific Forum on Science Teaching and Learning
<http://www.ied.edu.hk/apfslt/>
- East Asian Science Education Association <http://thease.org/>
- National Association for Research in Science Teaching <http://www.narst.org/>
- National Science Teacher Association <http://www.nsta.org/>
- Association for Science Education <http://www.ase.org.uk/home/>

8. Related Journals

- *International Journal of Science Education*
- *Journal of Research in Science Teaching*
- *Journal of Science Teacher Education*
- *Research in Science Education*
- *School Science Review*
- *Science Education*
- *International Journal of Science and Mathematics Education*
- *Journal of Science Education and Technology*

9. Other