

Elementary Study Group – Vision of Science and Technology Education

Meeting Notes – Tuesday, April 24, 2001 – Thames Valley District School Board

Discussion of “Beyond Processes” (by Robin Millar and Rosalind Driver)

- as a critique of science processes, it perhaps went too far
- made the point that science processes (such as observation, classification, inferring, predicting) are not owned by science, but are “aspects of our general cognitive functioning from infancy and that science can lay no special claim to them.” (p. 4)
- element of community (e.g., consensual agreement on learning) was missing, or at least weak (as compared to perspective of social constructivism)
- regarding transference of skills, there is apparently no evidence for transference of skills between totally different situations
- skills are critically important and memorable when set within a meaningful context
- KEY IDEA of BALANCE of content and process (i.e., dichotomy of content and process is artificial)
- With The Ontario Curriculum, process is possibly less explicit than in the United Kingdom at the time of the article’s writing (1987); however, although Technological Design is weak, Scientific Inquiry is emphasized in each topic
- With teachers panicking over content, there is the danger of going too far towards an emphasis on process or using a didactic approach for the most part; we need to reveal the ‘hidden’ balance of process and content within The Ontario Curriculum
- Other work, such as Project 2061, is heavy on process
- We need to consider enduring understandings (or big picture ideas), rather than fragmented bits (which inhibit understanding)
- Lack of experience with science prevents understanding of big ideas, thereby inhibiting risk taking and two-way teaching and learning (life-long learning together with students)
- Teachers need opportunities to have expert partners/mentors/coaches or classrooms to visit; need to raise teachers’ comfort level by letting them explore/’play’ with challenging concepts and related manipulatives
- Structure of the school day sometimes prevents opportunities for ‘real-time’ learning (days are crammed with ‘busy-ness’ and rigid structures)
- Importance of teachers being facilitators (e.g., set context, manage materials; provide interactions with peers and ‘experts’)
- Need to provide open-endedness within structures (ordered chaos?), including broad-based questioning that can lead to the realization of multiple connections and new neuronal pathways (see Roland for “Education in the Mind”)
- Pedagogical skills need to be in balance with pedagogical content; it is very challenging to try to develop expertise in all four major disciplines; it is a relief for teachers trying to learn it all, when they are guided to just learn about the big ideas

Revisiting Our Study Group's Work

- renewed vision incorporating a broadening of existing strands (possible reorganization of curriculum – see Mars Bloch); incorporate overarching concepts, which can lead to return to Integrated Thematic Instruction (and a variety of ways of responding to Science and Technology learning)
- Models of delivery of staff learning need to be examined: teachers 'hunger' for content; we need to promote balance of content and process (however, there is perhaps a need for separate content workshops to satisfy this 'hunger'); teachers love to be actively involved in investigations/inquiry in the workshop
- Importance of Enduring Understandings: depth vs. breadth; simplify/deepen the curriculum (students actually learn and remember [i.e., understand] important things, as opposed to forgetting fragmented bits [the Science and Technology contains approximately 25% of The Ontario Curriculum's over 4 000 expectations]); not a time saver, but a stress reliever, leading to teacher creativity and learner enjoyment
- Importance of Essential Skills: connection to Enduring Understandings needs to be made clear (e.g., important to do; interweave content and process; taught and learned together); consider Pan Canadian elements (see Peel DSB work on this, including staged implementation profile); content or topic provides context for process; use Culminating Performance Tasks (either Scientific Inquiry or Technological Design driven), with a thoughtfully sequenced set of Learning Experiences (Learning Cycle?) enabling development of required knowledge and skills

Questions and Thoughts To Guide Next Meeting (Tuesday, May 15, 1:00 p.m.; OISE/UofT)

- What is the essence of Science and Technology?
- What are the purposes and overarching concepts of Science and Technology?
- What is scientific literacy?
- What are some foundation statements to describe the above (or that underlie Science and Technology Education)?
- Post these notes on SCCAO Website for all members to view, and invite external commentaries (e.g., Faculties of Education) to visit
- Post previous work on Content, Audience and Format on the Website (See Attachments) for re-consideration
- Post Hodson and Orpwood articles from Orbit (Volume 31, Number 3, 2000) on Website for background reading related to Scientific Literacy in a broad sense: "Toward Universal Scientific Literacy" and "Developing a Science Curriculum: Political Ideals and Political Realities"
- Post article related to 'nature of science' on Website for background reading related to purposes and big ideas