

A SET OF POSSIBLE PURPOSES FOR LEARNING SCHOOL SCIENCE

- 1. to prepare those students who have an interest in further science-based studies*
- 2. to develop citizens to participate in social and political choices in science-influenced technological society*
- 3. to stimulate intellectual and moral growth in students*
- 4. to provide appropriate preparation for modern fields of work*

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Science for All Canadians, Science Research Council of Canada,
1984

Science Curriculum Emphasis (or Purpose)

Douglas Roberts, Science Education, 1982

Each emphasis (or purpose) has its own set of learning outcomes for students,

Each emphasis (or purpose) requires its own supporting content for teaching and learning, its own pedagogy and its own assessment

If two or more emphases are attempted with the same students over the same period of schooling, the more traditional purpose will win out.

The target student groups for these possible purposes for school science

- 1. to prepare the minority of students who have an interest in further science-based studies (future scientific professionals)***
- 2. to develop all students as future citizens to participate in an increasingly science-influenced technological society (future science-confident citizens)***
- 3. to stimulate intellectual and moral growth in all students re socio-scientific issues (future science-aware and critical citizens)***
- 4. to provide appropriate preparation for the majority of students to enter modern fields of work (future STEM-skilled workers)***

Science learning outcomes from the different purposes for school science

Purpose for school science

1. future science professionals
2. future science-confident citizens
3. future science-informed and critical citizens
4. future STEM-skilled workers

Science learning outcomes

- disciplinary science knowledge and basic laboratory procedures
- applying science knowledge to real life situations
- informed decision making about socio-scientific issues
- skills from STEM for 21stC economy

Examples of different science purposes in practice

Purpose for school science

1. future science-based professionals
2. future science-literate citizens
3. future science-informed and critical citizens
4. future STEM-skilled workers

Examples in practice

The original disciplinary-based form of the sciences still dominant in school science (late 1800s to present)

Science for All: STS Science(1980s); scientific literacy (1990s)

Science as culture (1990s); Nature of Science, SSIs teaching (2000s)

STEM Science?

School Science-An historical overview

Time period

Societal demand on School Science

late 19th C to present

- Scientific manpower: preparation for university science studies

1980s to present

- Science for All as future confident and critical citizens

late 1990s to 2007

- Challenge of Knowledge Wave: generic competences for work place

2008 to present

- 21st C Economy: work place skills from study of Science T, E, and M

Science Education-related skills for 21st C Workforce

Skill to be learnt in science education

Comment re current common practice

Learning to learn
learning how to keep on learning
learning how to learn with others

meta-cognitive aspects would need to be much more explicit and less individualistic

learning to see alternative solutions to solve problems

Science assessment would need much more open questions with multiple answers

Learning to improve performance

Higher order thinking would need more encouragement in school science

learning to adapt to change
learning to generate new knowledge

Science knowledge would need to be taught as both “established knowledge” , “evolving” and “emerging knowledge”

learning to ask questions and formulate ideas

Big shift in science teaching from transmissive to

learning to communicate with different audiences

Requires quite new assessment modes

Figure 1. A model of the competing societal demands on school science education (from Fensham, 1988)

