Science and Technology 11

Draft Learning Outcomes

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Science and Technology 11
Overview

Science K to 12

The Science K to 12 curriculum provides students with opportunities to apply the basic concepts, principles, laws, and theories of science through scientific inquiry. Over the 13 years, students will gain the knowledge, skills, and attitudes required to become a scientifically literate citizen through active participation in their science studies. The Science K to 12 curriculum will allow scientifically literate citizens to act responsibly in making informed decisions about oneself, the home, the workplace, and the global community.

Science and Technology 11 is a selected studies course and part of the Science K to 12 curriculum. This curriculum is a minor revision of the existing curriculum guide. A complete Integrated Resource Package (IRP) for Science and Technology 11, including learning outcomes, instructional strategies, assessment strategies, and learning resources will be available in April 1995.

Science and Technology 11

Science and Technology 11 addresses our understanding of inventions and discoveries and how science and technology affects the well-being of individuals and our global society. Students learn invention, entrepreneurship, and experimentation by the practical application of skills in business, science, formal debate, and technology. The course gives students opportunities to appreciate the history of science, technology, and human thought; to learn ethical, responsible decision making; and to apply the skills of innovation in exploring the challenges of life.

Science and Technology 11 consists of four inter-related curriculum organizers. Each organizer consists of one core topic and several optional topics. The curriculum organizers are: Human and Natural Systems, Inventions and Discoveries, Tools and Processes, and Society and Change.

Goal Statements

▶ **To develop in students an appreciation of the interactive nature of science, technology, and society**

It is expected that students will:

- recognize technology's increasing potential for both a positive and negative impact on society

- understand that society controls technological development

- understand that society influences and responds to scientific activity

- understand that technology is both a cause and a result of scientific activity

▶ **To enable students to gain knowledge of technologies as applications of science**

It is expected that students will:

- understand that technology is an application of the concepts and principles of science

- recognize that historical events have shaped and will continue to shape technologies

- use knowledge of technologies in practical situations

- examine technology's effect on the skills and knowledge required by the workforce

▶ **To develop in students the ability to respond critically to technological issues**

It is expected that students will:

- recognize that decisions concerning scientific and technological issues are influenced by values

- understand how evidence and opinion are determined

- apply decision-making skills to problem solving

- analyze decisions involved in the development, implementation, and use of technologies

- explore alternative solutions to problems arising from technological issues

Implementation Support

The Ministry of Education will support the implementation of the Science and Technology 11 curriculum in the following ways:

- The Integrated Resource Package (IRP) for Science and Technology 11 will be available in April 1995. The IRP will provide teachers with the learning outcomes prescribed for each grade level, suggested instructional and assessment strategies, details of recommended learning resources, and methods of evaluation. The IRP for Science and Technology 11 will allow teachers to make use of new resources that have been identified or created for use with the Science and Technology 11 distance learning package.

- Throughout the spring, the Ministry will assess the need for regional forums and district school-based workshops on Science and Technology 11. These workshops will help teachers and districts commence the implementation of the new curriculum in September 1995. The inclusion of Science and Technology 11 in summer institutes which are being planned for July and August 1995 is being considered.

- Full implementation is expected in 1996/97.

- In addition, the Ministry will continue to work with our education partners to support the implementation process in a variety of ways within available resources.

It is expected that students will:

Introductory Topic (core)

- Distinguish between science and technology

- Give examples of how:
    - science has influenced society
    - science has given rise to technology
    - society influences the development of science
    - society influences the development of technology
    - technology affects society
    - technology facilitates and motivates scientific activity

- Explain why there has been a population explosion during the past century

- Outline the concept of the "global village" and relate our society's well-being to the well-being of the rest of the world

- Outline the need to direct our technologies, finances, and efforts toward solving some of the crucial problems of the world

- Distinguish between fact and opinion

- Describe how issues are influenced by people's values

It is expected that students will:

Health Technologies (core)

- Describe the interactions of science and technology in the development of modern medical technologies
- Suggest or create a possible technological solution to a problem
- Relate societal values to the use and emphases of health technologies and technological development
- Contrast positive and negative impacts of an increased life span

Forestry (optional)

- Identify the major technological concentrations in the forest industry of B.C.
- Describe the interactions of science and technology in a specific technological concentration in the B.C. forest industry
- Compare the impact of forest resource uses with that of environmental protection
- Identify the impact of technological development on occupations in the forest industry

Recreational Technology (optional)

- Outline ways that technology can produce leisure time
- Describe how technology is used to develop innovations in specific recreational activities
- Identify and describe the effect of technology on the development of specific recreations
- Describe the historical development of the technologies used in a specific recreation, as well as the science on which they are based
- Provide evidence that the use of recreational technologies involves personal and societal values
- Evaluate and select recreational equipment suited to their needs

Resource Management (optional)

- Describe the potential costs and benefits of extracting a specific resource from the environment
- Describe the technological advance made in the methods of extraction over the past 100 years
- Describe the changes that the workforce has undergone during this same period
- List internal and external (outside B.C.) forces that control the rate of resource harvesting
- Describe the difficulties that are still present in the extraction of the resource and predict the direction technology will take to solve these difficulties
- Describe the role of current scientific research in improving extraction techniques for a resource

It is expected that students will:

The Computer (core)

- Trace the scientific and technological developments involved with the computer
- Describe how the computer has altered the work patterns in traditional work settings
- Describe how the computer has altered the work patterns in industrial settings
- Describe the impact of computers on a specific organization
- List products and opportunities made possible by the development of the computer and suggest possible future advancements
- Discuss the major issues or concerns that the computer's capacity has provided society and explore potential solutions

Technology for the Home (optional)

- Identify the influences of technologies on family life and the home
- Trace or outline the development of specific home appliances
- Discuss the changes in lifestyles allowed by labour-saving appliances in the home
- Describe the interaction of science and technology in the development of a specific appliance or home technology
- Identify impacts of the computer or microprocessor on the home and home technologies and suggest possible future implications

Space (optional)

- Relate space technologies to concepts and principles of science
- Describe new areas of scientific and technological activity that have been generated by space technologies
- Outline the influence of historical, political, and economic factors on space technologies and sciences
- Discriminate between science and science fiction in terms of space technologies

Technology of the Home (optional)

- Describe the interactions of technology and society in the development of alternative forms of shelter
- Describe the interactions of science and technology in shelter design
- Identify or describe technological advances in the service systems of a modern house
- Relate safety and building codes to the specific service systems involved, and identify the scientific basis for such codes

Waste: Technology's By-Product (optional)

- Identify undesirable and unexpected by-products and relate them to specific technologies
- Describe the interactions of technology and society in the historical development of a specific waste management technology
- Relate individual responsibilities to societal waste problems

It is expected that students will:

Information Technology (core)

- Outline the development of the computer and telecommunications networks

- Relate the term "global village" to the growth of telecommunications networks

- Describe the interaction of science and technology in the development of information technology

- Describe the impacts of information technology on the workforce and suggest possible future trends

- Analyze the impact of information technology on personal lifestyles and societal values and suggest possible responses

Transportation (optional)

- Investigate the impact of transportation technologies on their own lifestyles

- Describe the contribution of transportation technologies to the evolution of a "global village"

- Describe the interactions between society and technology as they relate to side effects of transportation systems

- Outline the scientific and technological development of a specific transportation technology

Military and Defense Technology (optional)

- Identify military and defense technologies as major global economic activities

- Identify increases in destructive power and remoteness in the history of military and defense technologies

- Relate the history of military conflict to the accelerated development of specific technologies

- Describe the effects of military and defense technologies on the shaping of society

- Analyze decisions involved in the development, implementation, or use of military and defense technologies

It is expected that students will:

The Future (core)	Food Production and Distribution (optional)
• Outline the use of technologies for prediction and compare technological and non-technological predictions • Describe the societal impacts of increasing technological change and suggest possible responses • Analyze the effects of technologies on society and predict future effects • Demonstrate an awareness that decisions made today will influence the future of society	• Describe the relationships among world food production, world food shortages, and world food distribution • Describe and analyze the ways that society directs the development of food production, food processing, and food distribution technologies • Identify examples of food production technologies in British Columbia • Relate the effects of changing technology in food production and processing to the changes in skills required by the workforce • Describe the interactions between science and technology that contribute to food plant and food animal production

Energy and Environmental Trade-Offs (optional)	
• Relate energy systems to corresponding natural resources in British Columbia • Identify the environmental impacts and societal benefits attributable to a specific source of energy • Describe the interactions of society and technology involved in the choice and development of a B.C. energy source • Describe the interactions between society and technology involved in the choice and development of energy systems and their technologies • Identify technologies created by society's concern for dwindling non-renewable energy resources	

Province of British Columbia
Ministry of Education