



Senior 2 Science Learning Resources: Annotated Bibliography

A Reference for Selecting
Learning Resources
(June 2001)

Manitoba
Education,
Training
and Youth

Éducation,
Formation professionnelle
et Jeunesse
Manitoba



***SENIOR 2 SCIENCE
LEARNING RESOURCES:
ANNOTATED BIBLIOGRAPHY***

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Learning Resources
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Youth. Errors or omissions will be corrected in a future edition.

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PREFACE

Senior 2 Science Learning Resources: Annotated Bibliography: A Reference for Selecting Learning Resources (June 2001) is a reference tool provided by Manitoba Education, Training and Youth to help educators select student and teacher learning resources that support Senior 2 science instruction. The annotated bibliography describes strengths and weaknesses (if applicable) of each resource listed. It is intended to be used as a reference for selecting learning resources along with *The Manitoba Text Book Bureau Catalogue*, which includes a listing of science learning resources, as well as ordering information and prices. These resources can also be purchased by visiting the online version of *The Manitoba Text Book Bureau Catalogue*:

<http://www.mtbb.mb.ca>

The learning resources listed in the *Senior 2 Science Learning Resources: Annotated Bibliography: A Reference for Selecting Learning Resources (June 2001)* were reviewed in April 2001 for the purpose of identifying materials that support Manitoba's science curricula. Four educators from across Manitoba participated in the review, selected by Manitoba Education, Training and Youth from superintendent nominations.

INTRODUCTION

Foreword

Senior 2 Science Learning Resources: Annotated Bibliography: A Reference for Selecting Learning Resources (June 2001) identifies the science learning resources that are philosophically congruent with Manitoba's science curricula. *Senior 2 Science: Manitoba Curriculum Framework of Outcomes* identifies prescribed student learning outcomes for Senior 2 science in Manitoba. Student learning outcomes in science are divided into thematic clusters. In addition, a "0" (zero) cluster identifies overall skills and attitudes required.

A call for science resources was issued to publishers, producers, and distributors of science materials. A team of teacher-evaluators from Manitoba schools examined the submissions and made recommendations regarding the suitability of the resources using a collaborative review process.

The selection of learning resources in this annotated bibliography was based on the fidelity with the rationale, philosophy, processes, and outcomes of *Senior 2 Science: Manitoba Curriculum Framework of Outcomes*. All the resources included in this annotated bibliography have been designated as Senior 2 science learning resources. Resources that match intended audiences and that aid in the implementation and achievement of prescribed learning outcomes have been identified.

Special Thanks

In April 2001, teacher-evaluators were selected by Manitoba Education, Training and Youth to review items that were received in response to the call to publishers for resource submissions. Manitoba Education, Training and Youth is grateful to the individuals involved in the review and selection processes for identifying the best student and teacher resources for Senior 2 science curricula.

Appreciation is also extended to all school divisions within Manitoba that supported the teachers' participation in the review and selection processes.

Finally, appreciation is extended to the publishers, producers, and distributors who submitted resources designed for Manitoba's science frameworks.

Resource Selection Criteria

The learning resources in this annotated bibliography were selected according to the following criteria:

- **Curriculum Fit/Content/Philosophy:** Evaluators determined the suitability of each resource by considering the degree to which the content and processes of the resource align with the curricula, thus providing support for teacher implementation. Evaluators also determined the degree to which the resource provides for multiple approaches to learning, has a wide range of use, is current, and includes a variety of media formats.
- **Instructional Design:** Evaluators determined the appropriateness of the resource in terms of instructional design, determining the degree to which the resource stated instructional goals and learner outcomes, and addressed a variety of learning and teaching styles.
- **Social Considerations:** Evaluators determined the appropriateness of the resource in terms of social concerns. They considered the degree to which the resource is free of bias and stereotyping, includes Canadian content, utilizes culturally diverse examples, and accurately portrays First Nations, Inuit, and Métis peoples.
- **Technical Design:** Evaluators determined the appropriateness of the resource in terms of technical design, considering the degree to which the resource was visually interesting, appealing, and had a logical and consistent form.

When using this annotated bibliography to select learning and teaching resources, teachers should consider how the resources meet the learning requirements of students and the perspectives of their own student population.

Information on a specific learning resource may be obtained from the descriptive information in this annotated bibliography, as well as from the supplier, published reviews, colleagues, and an examination of the resource.

Terms and Definitions

The following terms and definitions are used in this annotated bibliography to describe the learning resources:

- **Breadth:** identifies student learning resources that address a wide range of topics (with the highest possible level of fidelity with the curriculum framework) for a particular course/grade.

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- **Depth:** identifies student learning resources (with the highest possible level of fidelity with the curriculum framework) that provide especially effective learning experiences for students for a particular grouping of student learning outcomes.
 - **Breadth and Depth:** identifies comprehensive learning resources that provide both breadth and depth dimensions for a particular grouping of student learning resources.
 - **Teacher Reference:** identifies resources that assist teachers in implementing Manitoba's science curricula.
 - **Teacher Content Reference:** identifies resources that include teaching suggestions and learning activities for the science classroom.
 - **Teacher Guide:** identifies a separate guide for teachers or a teacher's edition of a student text.

Organization

The learning resources described in this annotated bibliography include references to the science clusters that comprise the Senior 2 science curricula.

Senior 2 Science Cluster Descriptions

Cluster 0: Overall Skills and Attitudes

Cluster 0 comprises nine categories of specific learning outcomes that describe the skills and attitudes involved in scientific inquiry and the decision-making process for Science-Technology-Society-Environment (STSE) issues. In Grades 5 to 8, students develop scientific inquiry through the development of an hypothesis/ prediction, the identification and treatment of variables, and the formation of conclusions. Students begin to make decisions based on scientific facts and refine their decision-making skills as they progress through the grades, gradually becoming more independent. Students also acquire key attitudes, an initial awareness of the nature of science, and other skills related to research, communication, the use of information technology, and cooperative learning.

In Senior 1 and 2, students continue to use scientific inquiry as an important process in their science learning, but also recognize that STSE issues require a more sophisticated treatment through the decision-making process. This process has been delineated in the Cluster 0 specific learning outcomes.

Teachers should select appropriate contexts to introduce and reinforce scientific inquiry, the decision-making process, and positive attitudes within the thematic clusters (Clusters 1 to 4) over the course of the school year. For example, students will use the decision-making process as they examine an STSE issue related to safe driving conditions in Cluster 3. To assist in planning and to facilitate curricular integration, many specific learning outcomes within this cluster are accompanied by links to specific learning outcomes in other subject areas, specifically English language arts (ELA) and mathematics (Math). There are also links to *Technology As a Foundation Skill Area* (TFS).

Cluster 1: Dynamics of Ecosystems

In this cluster, students examine the complex relationships present in ecosystems in order to further investigate issues of sustainability. The large scale cycling of elements in biogeochemical cycles and the bioaccumulation of toxins in food chains are studied. Population dynamics are examined in the context of the carrying capacity and limiting factors of ecosystems. The concepts and implications of species biodiversity are explored as well. With the knowledge they have gained, students investigate how human activities affect an ecosystem and use the decision-making model to propose a course of action to enhance its sustainability.

Cluster 2: Chemistry in Action

This cluster provides students with the opportunity to examine the interactions among elements as they form compounds through chemical reactions. Students become familiar with the formulas and naming of binary compounds, and investigate the Law of Conservation of Mass. The recognition that mass is conserved in chemical reactions allows students to balance equations with both words and symbols, and classify them by type. The principles of acid-base chemistry are studied and extended to large-scale environmental interactions. Students investigate the use of chemistry in biological, industrial, and domestic settings, recognizing that chemical use is pervasive in modern society.

Cluster 3: In Motion

In order to develop an understanding of the physics of motion, the outcomes of this cluster are examined within the context of the automobile. The relationships among displacement, velocity, acceleration, and time are analyzed in conceptual, numerical, graphical, and symbolic modes. Students investigate the qualitative aspects of inertia, force, impulse, and momentum as they relate to automobile safety. The conservation of energy in car collisions and braking distance is explored. Using the knowledge they have gained, students use the decision-making process to address an STSE issue related to safe driving conditions.

Cluster 4: Weather Dynamics

This cluster develops an understanding of the relationships that control weather and climate. An examination of the global energy budget of the Earth through water and heat transfer provides the basis for discussion of severe weather phenomena. Students gather and analyze meteorological data related to a severe weather event, and explore the social, economic, and environmental impact of the event. Evidence that climate change occurs due to natural events and human activities is investigated and evaluated. Students apply their understanding of weather and climate in a discussion of the potential consequences of climate change.

OBTAINING LEARNING RESOURCES

Purchase of Learning Resources

The learning resources described in this annotated bibliography will be listed with ordering information and prices in *The Manitoba Text Book Bureau Catalogue*. For information or assistance regarding the purchase of learning resources listed in this catalogue, please contact:

The Manitoba Text Book Bureau (MTBB)

Box 910

Souris, MB R0K 2C0

Toll free: 800-305-5515 (in Manitoba)

Telephone: 204-483-4040 (outside Manitoba)

Fax: 204-483-3441

Email: mtbb@minet.gov.mb.ca

Online catalogue:

<http://www.mtbb.mb.ca>

Loans and Bookings for Learning Resources

The learning resources listed in this annotated bibliography are available to Manitoba educators from:

Instructional Resources Unit (IRU)

Manitoba Education, Training and Youth

1181 Portage Avenue

Winnipeg, MB R3G 0T3

Online catalogue: <http://libcat.merlin.mb.ca>

Educators who are registered with IRU may request learning resources from the library in person, by telephone, by mail, by facsimile transmission, or by electronic mail.

To register with the library, contact:

Circulation Desk, IRU (see address above)

Telephone: 204-945-5371 (in Winnipeg)

Toll free: 800-282-8069, ext. 5371 (outside Winnipeg)

Fax: 204-945-8756

Email: irucirc@gov.mb.ca

To borrow books, multimedia kits, and audio CDs, contact:

Reference Desk, IRU (see address above)

Telephone: 204-945-7830/7851 (in Winnipeg)

Toll free: 800-282-8069, ext. 7830/7851 (outside Winnipeg)

Fax: 204-945-8756

Email: iruref@gov.mb.ca

To request videocassettes, videodiscs, CD-ROMs, and selected kits, contact:

Media Booking, IRU (see address above)

Telephone: 204-945-7849 (in Winnipeg)

Toll free: 800-592-7330 (outside Winnipeg)

Fax: 204-945-8756

Email: irucirc@gov.mb.ca

ANNOTATIONS

Titles and Descriptions

Nelson Science 10 (Print-Non-Fiction). Ritter, Bob. (Nelson Science 10). Nelson Thomson Learning (NEL), 2001.

Recommended components in this program are:

- *Nelson Science 10*. 2001. 729 p. ISBN 0-17-607501-1.
- *Nelson Science 10 Teacher's Resource*. 2001. ISBN 0-17-612086-6.
- *Nelson Science 10 Teacher's Resource: Applied Supplement*. 2001 380 p. ISBN 0-17-612103-X.
- *Transparencies*. 2001. 60 p. ISBN 0-17-612088-2.

The student text provides comprehensive coverage of the specific student learning outcomes in Cluster 1 (Dynamics of Ecosystems), Cluster 2 (Chemistry in Action), and Cluster 4 (Weather Dynamics), as defined in the *Senior 2 Science Manitoba Curriculum Framework of Outcomes*. It does not comprehensively support Cluster 3 (In Motion).

A comprehensive skills handbook segment is provided at the end of the text. Cluster 0 (Skills and Attitudes) outcomes, especially those related to Science-Technology-Society-Environment (STSE) issues, are well represented throughout this text.

Each cluster is represented by a unit, which is divided into chapters and subdivided into sections.

Each chapter contains an introduction ("Getting Started"), case studies, references to the skills handbook within each chapter, reminders for practising science safety, investigations/labs/activities, explorations of issues, and a Canadian career profile. At the end of each chapter is a summary that includes key expectations, key terms, and review questions. The well-organized text also contains an index and glossary.

This material enhances and extends student learning and provides opportunities for higher level thinking. The resource includes questions and activities that address specific student learning outcomes and different learning styles.

The questions also encourage reflection and critical thinking, and provide opportunities to apply skills and make connections. The resource includes numerous Internet links that provide students with the opportunity to extend their learning experience.

Caution: The student text has several references to Internet websites that have not been reviewed. Previewing websites is recommended before use with students. Each *Teacher's Resource* binder is organized into five sections: an introduction, unit synopsis, blackline masters, assessment tools, and teacher support materials.

Within the *Teacher's Resource* binder are foundation statements, instructional strategies, suggestions for differentiating instruction, background information, answer keys, ideas for curriculum adaptation and assessment planning, and 80 colour transparencies that replicate materials from the student text. The *Applied Supplement* focusses on alternative assessment strategies for the diverse learner and reduces the level of mathematical treatment of concepts.

Suggested Use: Grade 10; Cluster 0; Cluster 1; Cluster 2; Cluster 3; Cluster 4; Student-Breadth & Depth; Teacher Reference

Sciencepower 10: Science, Technology, Society, Environment (Print-Non-Fiction). Grace, Eric. (Sciencepower 10). McGraw-Hill Ryerson Limited (MHR), 2001

Recommended components in this program are:

- *SciencePower 10: Science, Technology, Society, Environment*. 2001. 633 p. ISBN 0-07-56-363-2.
- *Teacher's Resource Binder*. 2001. 1184 p. ISBN 0-07-56-364-0.
- *Blackline Masters* resource (print/CD-ROM). 2001. ISBN 0-07-560778-6.
- *SciencePower 10: Science, Technology, Society, Environment Videotape Module*. 2000. ISBN 0-07-086491-8.

SciencePower 10: Science, Technology, Society, Environment supports the specific learning

outcomes of Cluster 1 (Dynamics of Ecosystems) and Cluster 2 (Chemistry in Action), as defined in the *Senior 2 Science Manitoba Curriculum Framework of Outcomes*. It largely supports the student learning outcomes for Cluster 4 (Weather Dynamics). It does not comprehensively support Cluster 3 (In Motion).

Cluster 0 outcomes, particularly those related to Science-Technology-Society-Environment (STSE) issues, are well represented throughout the text.

SciencePower 10 pays particular attention to constructivist approaches to teaching and learning.

Each of the four clusters is represented by a unit, which is divided into chapters and subdivided into sections. Each chapter comprises an introduction ("Opening Ideas"), activities, Canadian career profiles, science log, key concepts, key skills, key terms, reminders for practising science safety, a Chapter-at-a-Glance summary, and a chapter review.

Blackline Masters are comprehensive and appropriately formatted, and accompanied by answer keys. The *SciencePower 10* video includes 14 topics, embracing all four clusters in eight- to ten-minute well-focussed segments. A Science and Technology Skills Guide provides 12 SkillPOWER tutorials to develop students' experimental skills.

The resource includes numerous Internet links that provide students with opportunities for further, in-depth treatment of topics.

Caution: The student text has several references to Internet websites that have not been reviewed. Previewing websites is recommended before use with students.

The *Teacher's Resource Binder* provides a clear and comprehensive treatment of topics, question sections, substantive teaching notes, differentiated instruction strategies, and 15 colour transparencies.

Suggested Use: Grade 10; Cluster 0; Cluster 1; Cluster 2; Cluster 3; Cluster 4; Student-Breadth & Depth; Teacher Reference

Weather Workstation. (CD-ROM). EOA Scientific Systems, Inc. (EOA), 1999. ISBN 1-55241-038-2.

Weather Workstation is a software title that provides extensive coverage of the specific student learning outcomes from Cluster 4 of *Senior 2 Science: Manitoba Curriculum Framework of Outcomes*. Outcomes from the Manitoba Framework Cluster 0, particularly those related to Science-Technology-Society-Environment (STSE) issues, are also covered and dealt with in a balanced manner.

This resource exploits the CD-ROM medium by presenting the material in an easy-to-navigate, interactive format, and by integrating animation, videos (including unusual and engaging weather graphics), audio, and still photography throughout the program. The student is able to access the material by subject, title, or through key word searches. Shareware programs are also available on CD-ROM to assist with research.

The content provides a global perspective on issues, and includes a lot of information that is beyond the Senior 2 Science curriculum. The project work also encourages higher-level thinking. This is useful for students interested in extending their knowledge of the subject. Also useful to Grade 5 science teachers as a reference source.

The program has an extensive glossary, interactive learning activities with instant constructive feedback, and numerous research projects. It supports a variety of instructional strategies.

System Requirements

Windows: 95/98/NT/2000; Pentium, CD-ROM drive

Macintosh OS 7.1+, Imac or G3+; CD-ROM drive

Suggested Use: Grade 10; Cluster 0; Cluster 4; Student-Depth; Teacher Reference

Index of Suggested Uses

Please note that the titles in this list are truncated. The complete titles appear in the citations for each resource.

Cluster 0

Nelson Science 10
Sciencepower 10: Science, Technology, So
Weather Workstation.

Cluster 1

Nelson Science 10
Sciencepower 10: Science, Technology, So

Cluster 2

Nelson Science 10
Sciencepower 10: Science, Technology, So

Cluster 3

Nelson Science 10
Sciencepower 10: Science, Technology, So

Cluster 4

Nelson Science 10
Sciencepower 10: Science, Technology, So
Weather Workstation.

Grade 10

Nelson Science 10
Sciencepower 10: Science, Technology, So
Weather Workstation.

Student-Depth

Weather Workstation.

Student-Breadth & Depth

Nelson Science 10

Sciencepower 10: Science, Technology, So

Teacher Reference

Nelson Science 10
Sciencepower 10: Science, Technology, So
Weather Workstation.

Media Index

Please note that the titles in this list are truncated. The complete titles appear in the citations for each resource.

CD-ROM

Weather Workstation.

Print-Non-Fiction

Nelson Science 10
Sciencepower 10: Science, Technology, So

Distributor Directory

EOA EOA Scientific Systems, Inc.
181 Herring Cove Rd Suite 200
HALIFAX NS B3P 1K9
(902) 477-1908
(888) 666-6362
Fax: (902) 477-6834
E-mail: sales@eoascientific.com
WEBSITE: <http://www.eoascientific.com>

MHR McGraw-Hill Ryerson Limited
300 Water St
WHITBY ON L1N 9B6
(800) 565-5758
(905) 430-5000
Fax: (800) 463-5885
WEBSITE: <http://www.mcgrawhill.ca>

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1120 Birchmount Rd
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(800) 268-2222
(416) 752-9448
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