Funded by “Collaborations to Advance Understanding of Science & Ethics”, a Science Education Partnership Award from the National Center for Research Resources, National Institutes of Health, 1R25RR016284-01A2.

© 2008 NWABR
All Rights Reserved

Permission granted for educational use

When citing this Ethics Primer, please use the following citation:

The Primer is available online at www.nwabr.org.
**Primer Development Team**

**Jeanne Ting Chowning, MS**  
Education Manager, Northwest Association for Biomedical Research  
Program Director, Collaborations to Advance Understanding of Science and Ethics  
in conjunction with  

**Paula Fraser, MLS**  
Bellevue School District, PRISM Program

**Collaborations to Advance Understanding of Science and Ethics**

**Susanna Cunningham, PhD**  
Principal Investigator and Professor  
Dept. of Biobehavioral Nursing and Health Systems, University of Washington

**Susan Adler**  
Co-Principal Investigator and Executive Director  
Northwest Association for Biomedical Research

**Mark Windschitl, PhD**  
Co-Principal Investigator and Assistant Professor  
School of Education, University of Washington

**Consultants**

**Laura Bishop, PhD**  
Ethics Consultant and Program Coordinator  
High School Bioethics Curriculum Project, Georgetown University

**Lola Szobota, MA, MEd**  
Professional Development Consultant and Ethics Trainer  
District Science Supervisor, Northern Valley High School District, Demarest, NJ

**LueRachelle Brim-Atkins, MA**  
Diversity Consultant, Brim Donahoe and Associates
Curriculum Advisory Committee

**Wylie Burke, MD, PhD**
Professor and Chair, Department of Medical History and Ethics
University of Washington

**Mel Dennis, PhD**
Professor and Chair, Department of Comparative Medicine
University of Washington

**Suzanne Holland, PhD**
Associate Professor, Department of Religion, University of Puget Sound

**Beverly Torok-Storb, PhD**
Senior Scientist, Fred Hutchinson Cancer Research Center

**Paul Robertson, PhD**
CEO and Scientific Director, Pacific Northwest Research Institute

**Pat Wasley, PhD**
Dean, College of Education, University of Washington

Professional Development Advisory Committee

**Winona Hauge, MSW**
Community Outreach Manager, External Relations and Communications
Fred Hutchinson Cancer Research Center

**Karen Hoffman**
Executive Director, North Carolina Association for Biomedical Research

**Carole Kubota, PhD**
Assistant Professor, Department of Education, University of Washington

**Wendy Law, PhD**
Scientific Liaison, Office of the Director, Fred Hutchison Cancer Research Center

**Maureen Munn, PhD**
Director, High School Human Genome Program, Department of Genome Sciences
University of Washington

**Louisa Stark, PhD**
Director, Genetic Science Learning Center, University of Utah

This publication was made possible by the National Center for Research Resources (NCRR), a component of the National Institutes of Health (NIH). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of NCRR, the NIH, or the consultants/advisory board members.
Field Test Teachers

Debbie Alan  
Tri-Cities Prep, Tri-Cities, WA

Stella Bass  
Washington Middle School, Seattle, WA

James Cooke  
Mercer Island High School, Mercer Island, WA

Elise Cooksley  
Two Rivers School, North Bend, WA

John Elyard  
Trout Lake School District, Trout Lake, WA

Mary Giodowski  
Juanita High School, Kirkland, WA

Shannon Hemrich  
La Center High School, La Center, WA

Rosetta Lee  
Seattle Girls School, Seattle, WA

Dianne Massey  
Kentridge High School, Kent, WA

Jodie Mathwig  
Kentridge High School, Kent, WA

William Monahan  
Eastlake High School, Sammamish, WA

Special Thanks to

Kelly Fryer-Edwards, PhD  
Professor, Department of Medical History and Ethics, University of Washington

Carolyn Church Landel, PhD  
Project Director, N. Cascades and Olympic Science Project  
Western Washington University

Drego Little  
Research Assistant, University of Washington

Lori Miller  
Graduate Staff Assistant, University of Washington  
Genomics Outreach for Minorities Project

La Neu  
Graphic Design
123 **Decision Frameworks**

125 Ethical Decision-Making Framework
126 Ethical Decision-Making Framework (4-page version)
130 Ethical Decision-Making Framework Scoring Guide
131 Alternate Decision-Making Framework #1
132 Alternate Decision-Making Framework #2
133 ‘4-Box Method’ for Clinical Decision-making

135 **Appendix**

137 Model Letter to Parents
138 Topics List for Bioethics
139 Case Study: Pennington’s Sweetie Pie
141 Classroom Teaching Example
145 Ethical Analysis of the Case: Pennington’s Sweetie Pie
150 Ethical Concerns Regarding Genetic Modification of Organisms
152 Genetic Modification in Medicine
153 Xenotransplantation Time Line
154 Additional Online Resources for the Pennington Case
156 Additional Case Studies
168 Recommended Resources
173 References
Most of the secondary science teachers who shy away from incorporating ethics into their curricula are quite clear about the reasons they do so. First, they are uncomfortable with teaching ethics, a subject that science teachers often have very little experience with. Ethics as a discipline is full of unfamiliar terms and its own jargon. Secondly, teachers fear classroom discussions ‘getting out of control’, degenerating into a battle of opinions, or having parents and administrators confuse teaching about values and morals with teaching particular values and morals. Lastly, something as seemingly subjective as ethics can be perceived as somewhat out of place in a science classroom, where the focus is ostensibly on objectivity: “Why are we studying values in science class?” Ethics seems like just one more element in an already crowded curriculum. This primer focuses on tools and strategies for overcoming these barriers, as well as some perspective on the importance of addressing the ethical dimensions of science with students.

The primer is designed to help science teachers in guiding their students to analyze issues in light of the scholarly discipline of ethics. This Ethics Primer provides classroom-friendly lesson ideas for integrating ethical issues into a science curriculum. It also provides basic background on ethics as a discipline, with straightforward descriptions of major ethical theories. Several decision-making frameworks are included to help students apply reasoned analysis to ethical issues. The primer is designed to be flexible enough to use with many different types of topics and science content.

The primer is not intended to be used as a unit from cover to cover. Rather, teachers should review the strategies and resources that seem most suitable for their classes. Although this document is geared towards secondary science teachers, we hope that it will prove of broad value to educators across grade levels and subjects.
The Preface examines ethics as a unique discipline and outlines the core concepts to convey to students. It introduces one approach for distinguishing between the related terms 'values', 'morals', and 'ethics'. Key features distinguishing ethics from other modes of thought are presented, and the relationship between ethics and science is explored. The Preface also provides rationale for teaching ethics in science, and addresses state and national science education standards.

Three key elements are necessary for effective teaching of ethical issues in science - lesson strategies, decision-making models, and student understanding of ethical perspectives and theories. A brief overview of these elements is provided in this section. Each element is further described in its own section of the Primer.

This section provides summaries of ethical perspectives and theories that can be utilized in the decision-making process. The Process of Ethical Inquiry flow diagram provides a model for asking ethical questions, gathering relevant background, reasoning through an ethical dilemma, making and acting on a decision, and evaluating the outcome.

This section provides ideas for general approaches to take with students when integrating ethics into the science classroom. An Ethics Classroom Strategies summary chart provides an overview of the approaches featured. In addition, rubrics for assessment/evaluation are presented.

Decision-Making Frameworks provide students with a way to structure their thinking. Elements of a sample decision-making model are discussed in this section. Alternative frameworks are also provided at the end of the text for that section.

The Appendix provides resources and background for teachers seeking additional information.