



MSD

Louisville & Jefferson County Metropolitan Sewer District
Ellen Swallow Richards Ecology Learning Center

5th Grade Unit: Cooperation and Symbiosis

Curriculum Planning Map

Unit Context

This unit, which is compatible with the Kentucky Educational Reform Act, provides **interdisciplinary classroom connections to the After We Flush© program for 5th graders**, offered at the **Ellen Swallow Richards Ecology Learning Center (ESRELIC)**. MSD hopes that this program will become a “common experience” for local 5th graders.

The ESRELIC is located at Louisville & Jefferson County Metropolitan Sewer District’s Floyds Fork Wastewater Treatment Plant (FFWTP), 1100 (terminus) Blue Heron Road, off Shelbyville Rd (US 60), on Floyds Fork’s east bank, 1.75 mi (2.8 km) east of I-265.

The program, including the free site visit, is available only to teachers who wrap the Wastewater Treatment strand and at least one other strand of this unit around their visit to ESRELIC. Teachers who commit to use three or more strands receive priority-booking privileges. **Participating teachers are required to attend a three-hour professional development seminar**, for which Jefferson County Public Schools continuing-education credit is given. Despite these requirements, teachers are encouraged to tailor the unit to the needs and interests of their students.

Descriptive Information

Though the unit’s **theme is focused on science, social studies and practical living skills**, its **assignments and assessments also incorporate language arts, mathematics and fine arts.**

The **assessments correlate to Bloom’s Taxonomy of Cognitive Skills**, and offer opportunities to develop students’ **visual, oral, written and kinesthetic intelligences.**

Depending on how many of the interdisciplinary strands teachers choose to use, **this unit utilizes from two weeks to one semester.**

The on-site program is **designed to serve two 5th-grade classes per day** and will operate on the following agenda:

Time*	Activity
9:00AM-9:30AM	Both classes will assemble in the classroom (or amphitheater) to meet MSD's learning center teacher, who will impersonate Ellen Swallow Richards, facilitate introductory discussions, go over safety rules and provide an overview of the day's agenda.
9:30AM-10:30AM	The approximately 56 students and 6 (minimum) chaperones will be divided into three groups. The center teacher and one group will tour the wastewater treatment plant, while the two classroom teachers will lead the other two groups in separate activities (that they have selected in advance from the menu of offered options).
10:30AM-11:30AM	The groups will rotate and the three activities will be repeated.
11:30AM-12:15PM	The students will be reminded to use proper hand-washing technique prior to eating their lunches.
12:15PM-1:15PM	The groups will rotate and the three activities will be repeated.
1:15PM-2:15PM	Everyone will reconvene in the classroom (or at the amphitheater) for wrap-up discussions and/or presentations prior to dismissal.

* Times may be adjusted to accommodate the visiting school's schedule.

Major Focus

The unit's principle organizer is children's natural curiosity about and concern for their environment. Studying exotic biomes, such as tropical rainforests, has educational merit, but doing so makes more sense when children first understand their native biome.

Fifth graders are fascinated by poop, as evidenced by their attentiveness and lack of behavior problems during plant tours.

The unit consists of the following six strands:

- Strand 1: Water conservation and pollution prevention
- Strand 2: Cooperation
- Strand 3: Environmental history
- Strand 4: Energy efficiency
- Strand 5: Wastewater treatment
- Strand 6: Watershed ecology and symbiosis

Children are aware that the environment is threatened and want to protect it. Better understanding of the threats and what they and their families can do to protect the environment gives them a sense of **empowerment**. Similarly, learning to cooperate gives children more power over their feelings and human relationships.

The 12-state education agency collaborative, State Education and Environment Roundtable, did a nationwide study of **educational programs using the environment as an integrating context for learning** and concluded that such programs **have** the following **achievement-gap-closing benefits**¹:

- **Better performance on standardized measures of academic achievement in reading, writing, math, science and social studies**
- **Reduced discipline and classroom management problems**
- **Increased engagement and enthusiasm for learning**
- **Greater pride and ownership in accomplishments**

Essential Questions

1. What can my family and I do to improve water quality in my community?
2. Is cooperation worth the required give and take?
3. Where does wastewater go after we flush?
4. Where would we be without micro-organisms?

Big Understandings

Strand 1: Kids and their families can take simple everyday steps to conserve water and prevent water pollution.

Strand 2: Cooperation is important to getting along in life.

Strand 3: Americans once thought we should tame and dominate nature; wasteful resource exploitation and serious pollution resulted. We now know that we must live sustainably, and therefore face some (often tough) choices.

Strand 4: Kids and their families can take simple everyday steps to conserve energy, prevent pollution and reduce global climate change.

Strand 5: Wastewater treatment is a biological process, conducted by microbes.

Strand 6: All organisms, including humans, affect and are affected by the other organisms in their environments. All organisms affect and are affected by their environments. In symbiosis, organisms cooperate for mutual benefit.

¹ Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning, Gerald A Lieberman, PhD, Linda L Hoody, MA, and the State Education and Environment Roundtable, 1998

Performance Standards

The following **Jefferson County Public School performance standards** are emphasized in the unit's content:

Life Science 2.2, 2.3, 2.4, 2.5 and 2.6
Social Studies 2.14, 2.16, 2.18, 2.19, 2.20
Practical Living 2.30, 2.29, 2.31 and 2.33

The following standards can be addressed via the activities and suggested assignments:

Writing 1.11
Reading 1.2
Mathematics 2.7, 2.8, 2.11, 2.12 and 2.13
Visual Arts 1.13 and 2.22
Drama 1.12 and 2.22
Dance 1.5 and 2.22
Vocational Studies 2.37

This unit meets the North American Association for Environmental Education's Environmental Education Materials: Guidelines for Excellence.²

Instructional Planning

To get the most out of this unit, students will need to have already – or gain coincidentally – the following knowledge, skills and aptitudes:

Microbial metabolism concept	Cause-and-effect analysis
Awareness of ultraviolet light	Sequencing
Understanding of the Water Cycle	Arithmetic calculations
Connection between the actions of individuals and their community	Measuring unit manipulation
Research (in library and on web)	Map reading
Field observation and note taking	Persuasive communication skills
Visual comparison	Basic artistic abilities (drawing, painting, block lettering)

² Environmental Education Materials: Guidelines for Excellence, North American Association for Environmental Education, 1996.

Assessment

Each strand of this unit includes suggested assessment activities for each level of Bloom's Cognitive Taxonomy³, ranging from lower- to higher-order thinking skills:

1. Knowledge
2. Comprehension
3. Application
4. Analysis and critical thinking
5. Synthesis and creative thinking
6. Evaluation, critical thinking and using criteria

Each assessment includes a variety of suggested assessment products, to allow emphasis of the visual, oral, written and/or kinesthetic intelligences. Teachers may assign products individually, on the basis of an intelligence that each student needs to further develop, or let students choose themselves.

Culminating Performance

The culminating performance will depend on which strands are used. Teachers may utilize some of the above assessments -- on the basis of what will challenge each individual student to grow -- as culminating performances.

Rubrics will be added to the lesson plans as they are developed. Teachers are encouraged to submit their own rubrics for future inclusion in this unit.

Critical Resources

Participating teachers are required to attend a three-hour professional development seminar prior to using the unit. Science resource teachers should attend in addition to, not in lieu of, individual participating classroom teachers. For seminar dates, consult www.msdlouky.org/programs/education/afterweflush/profdevel.htm. Please download the registration form at www.msdlouky.org/programs/pdfs/pdappl.pdf, complete and fax it to 540-6106. Or call Sandra Gibson at 540-6351 for dates and forms.

The Jefferson County Public Schools and Louisville Archdiocese offer credit for attendance. JCPS teachers should call 485-3055 at least one week in advance to register.

The Lesson Plans list required and recommended resources and materials.

The Annotated Bibliography lists related, recommended trade literature.

³ Bloom, Benjamin, editor, Taxonomy of Educational Objectives: The Classification of Educational Goals: Book 1 Cognitive Domain, Longman, 1956.

Resources Used To Design The Unit

Besides the more specific resources listed in the individual strand lesson plans and on-site activity documents, the following general resources were used to design this unit:

1. Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning, Gerald A Lieberman, PhD, Linda L Hoody, MA, and the State Education and Environment Roundtable, Science Wizards, Poway, CA, 1998. Contact info for SEER: 16486 Bernardo Center Drive, Suite 328, San Diego, CA 92128, 619-676-0272 (phone) and 619-676-1088 (fax) and www.seer.org
2. Environmental Education Materials: Guidelines for Excellence, North American Association for Environmental Education, 1996. Contact info for NAAEE: POB 400, Troy, Ohio 45373, 937-676-2814 (phone and fax), www.naaee.org
3. Excellence in Environmental Education -- Guidelines for Learning (K-12), NAAEE, 1999. Contact info: see above.
4. Guide for Developing Interdisciplinary Thematic Units, 2nd Edition, Patricia L Roberts and Richard D Kellough, Merrill (Prentice-Hall, Inc), 2000.
5. Interdisciplinary Curriculum: Design and Implementation, edited by Heidi Hayes Jacobs, Association for Supervision and Curriculum Development, 1989.
6. Interdisciplinary Inquiry in Teaching and Learning, 2nd Edition, Marian L Martinello and Gillian E Cook, Merrill (Prentice-Hall, Inc), 2000.
7. Community Connections for Science Education, Volume I: Building Successful Partnerships, by William C Robertson, NSTA Press, 2001, www.nsta.org.
8. Community Connections for Science Education, Volume II: History and Theory You Can Use, edited by Phyllis Katz, NSTA Press, 2001, www.nsta.org.
9. Jefferson County Public Schools Performance Standards, 2000.

**For a participation information, visit MSD's web site
(www.msdlouky.org/programs/education/afterweflush/application.htm)
or call MSD's (24/7) Customer Service Dept (502-587-0603) to request that it be
mailed to you.**

Please refer curricular questions and send feedback to the ESRELC manager:

Sarah Lynn Cunningham, PE,
CERES Principals Engineer
Metropolitan Sewer District
POB 740011
Louisville, KY 40201
502-540-6118 P, 502-540-6106 F
cunningh@msdlouky.org