

Eagle Eye Inc.

Extending the Classroom Into the Community

By forming community partnerships, students can experience meaningful rewards and a sense of achievement through personal effort.

Every student who takes science needs to have experiences similar to those of scientists. Students should identify problems, create and implement solutions, bring projects to completion, and communicate the results.

As an Adventist science teacher, I also believe it is essential for students to experience the "joy of service."¹ For them to become responsible members of society, they must not only be exposed to adults involved in these meaningful and demanding tasks, but must also participate in such activities themselves.² Therefore, it is vital to connect science instruction to everyday life.

Students at Walker Memorial Junior Academy (WMJA) in Avon Park, Florida, learn, through service, to gain a personal sense of purpose. By forming community partnerships, students can experience meaningful rewards and a sense of achievement through personal effort.

By Gordon Davis

By extending the classroom into the community and providing hands-on cooperative problem-solving, I seek to bring students face to face with social and environmental issues and to create opportunities for them to become stewards of creation.

The outdoor classroom has become more than trips to the woods, fields, or stream. During field studies, learning occurs in the context of reality rather than being mediated by textbooks or videos.³ The outdoor classroom thus connects students with the affairs of their community.

To provide students with relevant work, an environmental monitoring project has been developed within the sophomore biology program at WMJA, where two teachers help with the project. Gordon Davis teaches grades 7 to 10, science, and physical education, and provides general guidance; and Stephen Roche, math and computer teacher for grades 7 to 10, serves as technology consultant. Partnerships have been formed with the University of Florida, Global Learning and Observations to Benefit the Environment (GLOBE),⁴ and the Highlands County Lakes Association. Eagle Eye Incorporated (EEI), a student-directed water-quality monitoring project, provides a community service and improves the environment.

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Jessica Current uses a Secchi disk to calculate the water clarity of Lake Lillian, while Larrie Parreno collects water samples that Lakewatch will test for nitrate, phosphate, and chlorophyll "a."

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The Organization

The project is patterned after a corporate structure. Three officers—president, vice-president, and secretary—are elected at the beginning of the school year. These officers organize and direct the monthly meetings. EEI has four divisions: data retrieval, data control, lake restoration, and public relations, which are subdivided into departments. Division leaders provide leadership and management for the four divisions and their individual departments. All students, including the officers and leaders, are assigned to specific de-

partments, where they conduct the activities of that department.

The job descriptions of each division and its departments are as follows:

Data Retrieval has three departments: Lakewatch, Chemical Tests, and Benthic Macroinvertebrates. *Lakewatch* collects water samples once a month from Lake Lillian and Eagle Pond for both nitrate and phosphate analysis, and determines chlorophyll “a” content. It also calculates water clarity and depth, and conducts a site survey. These procedures are conducted under the direction and cooperation of the Florida Lakewatch Program at the University of Florida. *Chemical Tests* collects and analyzes monthly water samples, providing a monthly water-quality index. Nine tests are performed: temperature, dissolved oxygen, five-day biological oxygen demand, pH, fecal coliform, total solids, total nitrates and phosphates, and turbidity. This department works in cooperation with GLOBE and reports monthly hydrology data to the GLOBE Internet

server. The *Benthic Macroinvertebrate* department collects monthly bottom samples to determine the kinds of invertebrates found on the lake bottom. Using statistical analysis indices of sequential comparison, taxa richness, and diversity, this department also provides a monthly water-quality index.

Lake Restoration has two departments: Lake Management and Environmental History. Using information from Data Retrieval, *Lake Management* first identifies problems, then designs and implements solutions. For example, the students discovered storm water runoff. The members of Eagle Eye Inc. offered a partial solution by stenciling storm drains with this message: “Dumping here pollutes our lakes.” Testing also revealed dumping of trash around the lake’s watershed. Students designed a plan for collecting trash around the lake, bringing it back to school, and then sorting, weighing, and recycling it. The *Environmental History* department compiles a historical descrip-

Water Quality Index

Date: 8/28/98

Time: 10:30

Test Location: Lake Lillian

Data Gatherer(s): Margie Dunn & Michael Baker

Weather Conditions: Sunny

	Test Results		Q-Value	Weighting Factor	Total
Dissolved Oxygen:	110%	% Saturation	96	0.17	16.32
Fecal Coliform:	0	Colonies/100mL	98	0.16	15.68
pH:	67	units	75	0.11	8.25
BOD:	7	mg/1	48	0.11	5.28
Temperature:	31	oC	10	0.1	1
Total Phosphate:	7.2	mg/1	100	0.1	10
Nitrates:	7.2	mg/1	100	0.1	10
Turbidity:	3'8"	NTU/feet	28	0.08	2.24
Total Solids:	0.1	mg/1	78	0.07	5.46

Water Quality Index Ranges

90-100	Excellent
70-90	Good
50-70	Medium
25-50	Bad
0-25	Very Bad

Overall Water Quality Index: 74.23
Water Quality: Good

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To discourage people from dumping pollutants, Kim Talaa, vice-president of Eagle Eye Inc., prepares to stencil a storm drain that flows directly into Lake Lillian.

tion of the lakes from geological, social, and economical perspectives.

Data Control oversees the input of information into the appropriate spreadsheets and databases. This division supplies EEI with charts and tables for both monthly and year-end reports. It also ensures the safe storage of the data collected.

Public Relations has two departments, Promotions and Networking. *Pro-*

motions manages several large projects such as a monthly newsletter, press releases, multimedia presentations, and grant writing. *Networking* coordinates all communications between EEI and its constituency, using various forms of communication such as the World Wide Web, E-mail, faxes, and the postal service.

The Schedule

The logistics of this project could not

be managed without the aid and cooperation of the entire WMJA staff. The last Friday of every month, known as Expedition Day, the 10th-grade biology class is released from its normal schedule. Gordon Davis and Stephen Roche are also relieved of their regular classes.

In the morning, each grade has a block schedule so students can engage in projects that would not fit within a traditional schedule. The biology class is trans-

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As part of data collection for the University of Florida's Lakewatch program, Desiree Rada calculates the monthly water depth of Lake Lillian.

formed into Eagle Eye Incorporated. The day starts with a corporate meeting, directed by the three corporate officers. Each student reports orally to the corporation about the previous month's accomplishments and discusses short-term goals. Upcoming events are also discussed. After the meeting, the students are dismissed to go about their individual responsibilities within EEI.

Integration

Because of the project's applied math and science emphasis, students have learned a great deal about these areas. It came as a surprise, however, that writing was so central to the success of this project—both in terms of amount and quality. From the obvious (a newsletter) to the more obscure areas (like explaining the correlating of data points in different charts), writing has been foundational to almost all aspects of the project. Everyone in EEI has to do some writing—of a type that is relevant to real life. For EEI to form necessary partnerships, letters to business, civic, government, and educa-

tional leaders must be done well. Communication through an extensive Web site allows the world to appraise the quality of the students' creative effort.

The need for artistic expertise also emerged. Corporate logos were needed for letterheads, business cards, envelopes, and the newsletter. The creative and artistic talents of several students were needed to develop a unique Web site design. Promotional displays featuring many aspects of EEI require a variety of artistic skills.

Oral presentations combine the skills of writing, artistic expression, and communication. Each student has the opportunity to share his or her experiences with fellow students and the community. In addition to the monthly meetings, the students also speak publicly about the work of EEI. They make formal and informal presentations at large conferences like the Florida Educational Technology Conference in Orlando, as well as to smaller local groups like the home owners' association, local public schools, and to the many guests who visit our campus on Expedition Day.

Technology plays an ever-increasing

role in the implementation and success of Eagle Eye Inc. Each aspect of the project requires some form of technology literacy. Software applications like Microsoft Word, Access, Excel, and PowerPoint make it possible for students to create and develop spreadsheets, databases, and multi-media presentations, and to write and design the many communication forms needed. Microsoft FrontPage gives the students the opportunity to design and manage a World Wide Web presence. Other computer applications give the students experience with scientific probe-ware⁵ and video editing. There are always technology problems to fix, and students, under the direction of Stephen Roche, solve those problems.

Conclusion

Eagle Eye Inc. allows students to initiate their own learning, participate in productive questioning, and probe for information they can use in real life rather than just to fill in the blanks on a test. These students have a voice in their society and form a vital part of their community.

EEI helps students understand the importance of science literacy, which goes beyond vocabulary, concepts, or procedural methods. It encourages a wholistic understanding of science, as they observe, infer, analyze, and predict outcomes. It enables them to be problem-solvers, and to find solutions for family, career, and community dilemmas. As they are trained in Christian service, our students learn to become leaders. To accomplish this goal, we must teach them to conceive ideas, not just mirror other people's thoughts, so they can successfully guide the future of the church and community.⁶

A Christian school requires teachers with a vision, passion, and commitment who enjoy a challenge. It must prepare its students for the world out there and for eternity. Outdoor education makes an important contribution to this goal. ✍

Resources

Jane Healy:

Endangered Minds (New York: Simon and Schuster, 1990).

Your Child's Growing Mind (New York: Doubleday, 1994).

Failure to Connect (New York: Simon and Schuster, 1998).

National Science Teacher Association periodicals:

Science and Children

Science Scope

The Science Teacher

Association for Supervision and Curriculum Development periodicals:

Curriculum Report

Curriculum Update

Educational Leadership

Time Magazine, October 27, 1997

For the past 16 years, **Gordon Davis** has taught grades 7 to 10, science, and physical

education at Walker Memorial Junior Academy in Avon Park, Florida. In 1987, he received the Zapara Award for Excellence in Teaching, and in 1996, the Innovative Teaching Award from the Southern Union Conference of Seventh-day Adventists.

REFERENCES

1. Ellen G. White, *Education* (Mountain View, Calif.: Pacific Press Publ. Assn., 1952), p. 13.
2. Jane Healy, *Endangered Minds* (New York: Simon and Schuster, 1990), p. 286.
3. Amy Eckman, "Making Science Popular," *Curriculum Update* (Fall 1998), p. 7.
4. GLOBE is a worldwide network of scientists working together with students and teachers from more than 6,000 schools in 70 countries to study and understand the global environment.
5. Probeware includes scientific instruments such as a pH meter that collects data while connected to a computer. The computer's software allows for collecting, storing, graphing, printing, and analyzing the data.
6. White, p. 17.

LAKEWATCH Lake Lillian

Lake name/County:

Lillian/Highlands

Sampler:

Gordon Davis

Phone:

(941) 453-3131

Month/day/year:

9/29/98

Time:

3:43pm

Vanishing Point

Station 1: 8'2" ft.

Station 2: 10'2" ft.

Station 3: 9' ft.

Sun Code

1

1

1

Sun Code Codes

1= full sun

2= haze over sun

3= thin cloud cover

4= medium cloud cover

5= heavy cloud cover

Water Depth

22'7" ft.

12'10" ft.

16'6" ft.

Wind from?: sse

Wind strength: weak

Wave height: 1 Inches

Wind speed: none mph

Pollen on lake: little

Activity in your waters: none

Strong winds: none

Herbicides in lake: none

Heavy boat traffic: none

Large flocks of birds: none

Rainfall from: 8/28/98

Lake level changes: none

to: 9/29/98 184.15mm

Anything else?: none

Unusual weather: n/a