

Promising Practice in Action: *Integrating Science and Literacy in the AgriScience Classroom*

Presque Isle Regional Career and Technical Center (PIRTC)¹

Presque Isle, ME

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- **Location:** Adjacent to Presque Isle High School
- **Student population:** 285 (almost all are from Presque Isle High School)
- **Sending schools/districts:** 7
 - ▶ **Program focus:** Integration of literacy and academic rigor into the Agri-Science program.

There has been an agricultural science program at PIRTC since 1991 but the academic side of it has not been emphasized. However, the district's Educational Farm and related businesses (nursery, cidery, orchards, farm stand, wholesale fruit) have received much attention. In response to enrollment trends and discussions about academic requirements resulting from the Maine Learning Results, it was decided that the academic side of the program needed to be substantively revised.

Getting Started

Under the direction of the former CTE director, a new program lead teacher was hired in the summer of 2005 and her first task was to redesign the core science courses into a two-year *Applied Science* course sequence that would:

- Meet all four life science content standards of the Maine Learning Results
- Add needed academic rigor to the curriculum
- Integrate literacy development into the program

Students who take the two-year sequence of *Applied Science* courses are assessed using the same assessments as Presque Isle High School biology students and receive a Life Science credit. In addition, they get substantive hands-on experience through real-life agricultural experience in the laboratory, greenhouse, or school farm. Additional courses in the program include agricultural application courses (aquaculture, agricultural production, and natural resources conservation). Leadership and work experience classes complete the curriculum.

The 2005–06 academic year was the first year the new curriculum was implemented.

Literacy Integration

Literacy development was integrated into the *Applied Science* classes in several ways during the 2005–06 school year. The classroom environment where instruction took place was literacy-rich. In the two connected rooms, the shelves were full of textbooks, trade journals, and reference books. On the walls there were posters, pictures of the farm and the science fair, and signs. One room had a bank of computers. A “quote of the day” was displayed on a flip chart.

¹ This mini-case study is based on conversations with PIRTC staff, document and student work review, and data collected during an onsite visit in June, 2006.

Magnetic poetry was on the white board. A lab safety word/phrase wall was in the back corner of one room. An events calendar and newspaper clippings were on a side wall. One of the instructors remarked, “I don’t understand how you can teach anything without teaching literacy.” Approaches to literacy integration included:

- *A focus on vocabulary.* Students received assigned vocabulary at the beginning of the chapter. Students also obtained a comprehensive list of scientific suffixes and prefixes with meanings and examples which they added to throughout the year.
- *Web-based Scavenger Hunts.* Students were asked to complete several web-based scavenger hunts that required skimming, reading for information, analyzing, and synthesizing. Topics for 2005–06 included *herbs, biotechnology, and the human genome project.*
- *Note taking*
- *Reading aloud*
- *Use of leveled lab manuals.* The lab manuals that accompanied the biology textbook used in the course came in two ability levels and helped the instructor address the high percentage of identified students in *Applied Science I* (50%) and *Applied Science II* (10%). The textbook was a standard biology text published by Prentice Hall.
- *Additional reading beyond the text.* Reading and responding to trade journals, Internet articles, and readings in other texts was expected during the year.
- *The Science Fair Project*

All *Applied Science* students participated in an Agri-Science Fair Project, held for the first time during the 2005–06 academic year. This new program component, described in the Program of Studies, required students to investigate an issue in agricultural science and design an experiment using the scientific method. Students completed written papers documenting their methods, findings, and conclusions, and each created a display of results on posterboard trifold. Projects were judged “according to how well the students followed the scientific method and were able to display and explain their months of work” (Program of Studies, 2006–07). What was unique about this long-term assignment was the scaffolding provided—even students with weaker reading, organizational, and writing skills were able to be successful. Students received feedback on each component all along the way. Clear guidelines with eleven steps described what students were to do between mid-October and the fair in mid-March. State and national FFA science fair standards were incorporated into the project criteria. The expectations were high and the teacher reflected that many students needed to recreate several pieces more than once.

Projects were completed in the scientific areas of botany, zoology, micro-biology, engineering, natural resources, biology, and agriculture and included exploration of such topics as deer feeding, cooking sprays, potato storage, and plant fertilizer effects. While it was clear some of the students had more difficulty with expressing themselves in writing, and some experiments were much simpler than others, an examination of posters, pictures documenting the process and the fair, and discussions with the instructors made it evident this project had supported students to develop general academic literacy skills—*reading, writing, presentation, and critical thinking skills*—as well as to develop scientific literacy skills—*an improved understanding of the scientific method, scientific texts, and formats.*

Improved Academic Rigor

In several ways, the *Applied Science* classes were more academically rigorous than the Agri-Science classes they replaced. First, an *applied science* textbook was used instead of the earlier agriculture textbook. The course design was more rigorous because of the need to address the life science standards and included more hands-on scientific applications as part of the curriculum. The increased assessment requirements, note taking requirements, science fair requirements, and general reading and writing requirements also added rigor to the course expectations. In addition, the class periods at the farm were limited and those that occurred included *applied science* lessons as well as work experience.

Next Steps

- Establish a career portfolio requirement for Agri-Science students.
- Ensure that all Agri-Science students complete at least two science fair projects.
- Incorporate more literacy development strategies into instruction, such as the use of triple-entry vocabulary journals; notetaking strategies other than copying of notes; paired or rehearsed reading; and use of editing checklists.
- Discuss the appropriate population for the program, course articulation, and credits with sending schools.
- Review other CTE program areas to determine if they might benefit from greater academic and/or literacy integration.

For more information, contact Larry Fox, Director, or Shelly Gross, Agri-Science Program Leader.