

Success Stories

Colorado State University
Extension

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Enhancing school science with 4-H baby chick embryology

Extension helps teachers deliver life science lessons through hands-on standards-based experiential classroom project.

Situation

Between assessment demands and budget cuts, elementary school teachers can't always generate the kind of science-based learning their students will remember and enjoy. Field trips to museums, natural areas and other experiential school enrichment opportunities are effective, yet costly. Instead, hands-on classroom science projects can enhance curriculum standards, reinforce student learning and keep costs low.

Extension's Response

According to the National Assessment of Educational Progress, only 18 percent of U.S. high school seniors are proficient in science, and less than 10 percent of college graduates earn degrees in science, technology or engineering. In response, 4-H seeks to engage one million new youth nationwide in science programs by 2013. 4-H school enrichment programs, such as baby chick embryology, help meet this goal.

For over a decade, Colorado State University Extension 4-H Youth Development agents have explored life cycles and life science with elementary and middle school students through classroom embryology projects. For 21 days, fertilized eggs grow in an incubator until baby chicks hatch. Once hatched, chicks remain in the classroom for approximately a week before they return to the farm they came from, or are adopted as 4-H poultry projects.

During incubation, students explore embryo development by 'candling' eggs—a process that involves shining a very bright light through eggs to see if embryos are alive and well. Students work in teams to make sure incubator conditions are just right for embryos to develop and hatch. They record incubator temperature and humidity data on a daily basis.

4-H embryology projects differ from county to county. Typically, agents rent incubators, charge a base price for fertilized eggs, and provide lesson plans. The cost to participate might also include classroom instruction (two to four classroom visits), log books, and other supplies like sawdust and feed. Each curriculum supports 4-H's Science, Technology, Engineering and Math (STEM) initiative and meets state science standards.

Arapahoe and Douglas counties have two of the state's most active 4-H embryology programs. In 2010, these counties reached over 2,000 students in 80 classrooms with 4-H baby chick embryology education. Across the state, nearly 3,500 students participated in embryology projects during the 2009-2010 school year.



The Bottom Line

Elementary students introduced to the life cycle through the 4-H baby chick embryology outreach program learn more than basic science information. Overall they:

- Become excited about science
- Gain knowledge of life science and are able to use scientific terminology

Many students:

- Become more responsible during the project
- Are immersed in their learning
- Learn respect and compassion

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Results

According to CSU Extension 4-H Youth Development agents, students are increasing their scientific knowledge and gaining an appreciation for living things as a result of participating in 4-H embryology projects.

To verify this outcome, many agents survey teachers at the end of the school year. According to Douglas County Extension 4-H Youth Development agent Mary Baldwin, in 2010 teachers reported increased scientific knowledge among students. Embryology projects develop science skills such as observation, comparing, measuring and relating. Classroom discussions about incubator data and embryo development help reinforce life science and life cycle concepts. Some students also learn about engineering related facts, such as egg shell strength and design.

The reported gains in scientific knowledge from Baldwin's county are also directly related to the hands-on learning environment. This teacher response from the 2010 Douglas County survey reinforces that connection:

I expect that they'll retain the information much more than if we had covered it by using a text book or just talking about it. By doing it they learned a vast amount of information and they've already taught others about what they learned. This is indicative of a higher level of understanding, something that just wouldn't have happened without the hands-on piece.

Beyond science and technology, 4-H embryology projects teach students how to develop citizenship and leadership skills through cooperation. "Students have to work together to take care of the animals," says Baldwin. According to El Paso County 4-H Youth Development agent Jonathan Vrabc, students also gain life skills such as planning and organizing, and keeping records.

Lastly, Arapahoe County 4-H agent Larry Hooker sees two clear benefits of 4-H embryology projects. He explains:

Students get excited and love this project, it makes science fun and they learn more that way. Each year I receive stacks of hand-made thank you notes from many of the classes I work with, they want to do it again!

He also says the project gives teachers a chance to teach real life lessons in a controlled environment. Hooker says, "Sometimes they are tough lessons, like when the chicks die or cannot make it out of the shells, but the students learn something they did not know."

4-H STEM

4-H's Science, Technology, Engineering and Math (STEM) initiative reaches more than five million youth nationwide with hands-on learning experiences that encourage discovery, develop young minds and fill the pipeline of young leaders proficient in science. For more information: www.ext.colostate.edu/4_h/stem.pdf.

"I think this is an excellent program. We were very excited to have live chicks hatch from the incubator. My students enjoy the classroom visits from Larry, except when he has to take the chicks away. We have tears of joy and sorrow, but it is still their favorite program to have in our classroom."

– 2010 Arapahoe County 4-H Embryology Teachers Survey

"We love the program because it fits perfectly into our school's curriculum and also allows students to show responsibility, compassion for animals and to be completely immersed in their own learning."

– 2010 Douglas County 4-H Embryology Teachers Survey

County Programs

Arapahoe County
Larry Hooker, 4-H youth development agent

Broomfield County
Hollie Campbell, County director

Douglas County
Mary Baldwin, 4-H youth development agent

El Paso County
Jonathan Vrabc, 4-H & agriculture agent

Jefferson County
Barbie Garnet, 4-H youth development agent

Kit Carson County
Mick Livingston, 4-H & livestock agent

Moffat County
Alisa Comstock, County director & 4-H youth development agent