

4-H ChickQuest: Connecting Agri-Science with STEM Standards in Urban Schools

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Abstract: *While young students are more capable of scientific inquiry than previously believed, elementary school teachers are often inexperienced in and lack confidence with teaching science. ChickQuest is a 4-H-created embryology curriculum for third-graders that meets Ohio state science standards, teaches STEM skills, and promotes ongoing interaction with the experiment. Extension educators work closely with teachers to provide logistical and content support, decreasing any anxiety associated with having eggs and live animals in the classroom. This article explores the experience of third-grade teachers in a large, urban school district that implemented the ChickQuest curriculum. Implications for Extension educators are identified.*

Introduction

"Curiouser and curiouser!" said Alice, and the same might be said of today's elementary students. Within recent years, the science education community has recognized that young children are capable of higher-level inquiry than previously believed. (Metz, 2008) STEM (Science, Technology, Engineering, and Math) skills are stressed in middle schools and high schools; however, these areas receive little attention in elementary school. Unfortunately, elementary science teachers are usually less likely to enjoy science or to feel confident about teaching science. (Gunning & Mensah, 2011; Roseman & Koppal, 2008)

National 4-H (2006) and others also have documented the disconnection between youth and commercial agricultural production. Urban youth, particularly, often lack the opportunity to see live farm animals and do not realize where their food originates. (Kinder, 2008; Marie & Baker, 1996)

During the 2010-11 school year, most third-grade classrooms in the Akron, Ohio, School District participated in ChickQuest, a 4-H embryology curriculum that meets state science standards, includes daily math and reading, and allows students to "do science" through hands-on experiments, charting, hypothesizing, and other forms of inquiry. (Horton, Warkentien, & Gogolski, 2009)

Goals

The ChickQuest curriculum has several ambitious goals.

1. Meet State Standards—ChickQuest meets many of Ohio's third-grade science standards while using the core subjects of reading and math. The curriculum also meets the Ohio math academic content standard relating to measurement. Using ChickQuest's logbook,

students keep track of the incubator's temperature and humidity and engage in other measurement activities.

2. Teach 21st Century and STEM Skills—Using the logbook, each student learns about other birds and life cycles, records observations and results, thinks creatively about hypotheses, and solves problems. Students interact with the embryology experiment daily, rather than learning only from a book.
3. Decrease anxiety about teaching science—Elementary school teachers found the teacher's guide and accompanying posters and student logbooks to be helpful. Teachers also found assistance from Extension professionals was invaluable.
4. Increase the connection between students and commercial agricultural production—With 4-H's skill at writing curricula for project clubs, reaching out to schools to provide enrichment during the school day is a natural, and appropriate, fit. (Tochterman & Carroll, 2004) An accompanying DVD allows students to discover how eggs for eating make their way from farm to grocery.
5. Scaffold learning on familiar experiences—ChickQuest allows students to apply scientific and mathematical concepts to something real and familiar. After all, every student has eaten an egg!

According to a post-project survey, only 14% of the teachers used live animals in the classroom before ChickQuest. "I didn't use anything as engaging as hatching chicks!" one teacher wrote. "Science came alive this year!"

Case Study: Akron Public Schools

Akron Public Schools, a large urban school district with more than 23,000 students, adopted ChickQuest for most of its 1,800 third-graders for Spring 2010. With help from a STEM K-8 Excellence Grant (Ohio Board of Regents), the district purchased supplies, incubators, brooders, teacher guides, and student logbooks. Primary impetus for the project came from the district's Science Learning Specialist, who invited the curriculum's authors to present a workshop for 74 third-grade teachers. The area's Extension educator handled the main logistical challenges—finding viable eggs and homes for the chicks.

As the eggs incubated, students in 74 third-grade classrooms tackled lessons involving observation, hypothesis testing, and problem solving. Several lessons focus on the life cycle of other egg-bearing animals. Some incorporate engineering by asking students to design and construct nests and egg catchers.

Nearly half (49%) of the 36 teachers reporting felt "negative" or "neutral" toward the ChickQuest curriculum before the workshop. Many teachers asked a variety of questions and expressed concerns. Questions included: "What if none of the eggs hatch?" "What if a chick dies?" "Could someone get salmonella?" However, after the workshop, the teachers felt more confident; only 12% felt "neutral," and none felt "negative" toward the curriculum. "The training made a big impact," wrote one teacher. "I felt confident."

Every teacher surveyed agreed that the ChickQuest curriculum engages and excites students about science. Moreover, teachers became more confident about teaching the life cycle. As a result, the Akron Public School District committed to teaching ChickQuest to all third-graders during the following school year.

Challenges

ChickQuest's greatest challenge is timing. Teachers want the incubator set-up to not interfere with state testing days. And everyone wants the chicks to hatch on a weekday. Those helping with the incubators and eggs face a tight window.

A second challenge is overcoming anxiety about teaching a new curriculum, particularly one involving eggs. The pre-project workshop and support from the 4-H Extension educator and other volunteers helped to alleviate these concerns.

Although every class hatched at least one or two chicks, the unhatched eggs also presented an opportunity to learn. The ChickQuest curriculum asks students to study their temperature and humidity charts to hypothesize why the eggs were not viable. Observing that not all fertile eggs reach viability is an important part of teaching the life cycle.

Conclusions and Implications for Extension Educators

In the August 2011 issue of the *Journal of Extension*, Kenyatta Nelson-Smith asks, "Why aren't we involved in urban education?" ChickQuest offers a natural bridge between rural and urban settings.

Extension can make a difference by:

- Helping run the pre-project workshop
- Setting up and taking down incubators and brooders
- Teaching teachers and students how to candle the eggs
- Visiting classrooms regularly to answer teachers' and students' questions.

One teacher wrote, "The students LOVED ChickQuest. The entire building was excited about science." But Extension educator participation is vital to success. Extension professionals and volunteers helped teachers feel more competent about teaching new content and using new materials. One teacher stated, "I felt I could ask questions when in doubt, and they answered my questions as well as the kids' questions." Another declared, "I couldn't have done it without their help."

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AgriScience is often considered to be the nation's leading teaching and learning approach for science-based agricultural education. The first five editions have filled prominent roles throughout the nation in grades 9 and 10. Now, the Sixth Edition will increasingly serve a major role in those classes with high expectations for student mastery. Standards developed in many states to guide local programs speak to this science emphasis. The instruction focuses on the principles of science that provide a foundation in plant and animal production. Further, this applies to horticulture, forestry, natural resources, wildlife, environmental science, agricultural supplies and services, and products and processing. As a second-grader at George Washington Carver STEM Elementary School on Cleveland's East Side, Green was inspired by Rob Isner, who has led the school's 4-H Agri-science in the City program since it began in 2014. In Cincinnati's Over-the-Rhine neighborhood, Tony Staubach offers the same program at Rothenberg Preparatory Academy. As 4-H staff members, Isner and Staubach integrate food- and farm-related science activities during the school day, in afterschool programs, in 4-H Clubs and at summer day camps. "When I started the program, most students said science was their least favorite subject ChickQuest is a 4-H-created embryology curriculum for third-graders that meets Ohio state science standards, teaches STEM skills, and promotes ongoing interaction with the experiment. Extension educators work closely with teachers to provide logistical and content support, decreasing any anxiety associated with having eggs and live animals in the classroom. This article explores the experience of third-grade teachers in a large, urban school district that implemented the ChickQuest curriculum. Implications for Extension educators are identified. Keywords: STEM, embryology, school enrichment, a... 4-H Urban Agriculture STEM Initiative Rothenberg Preparatory Academy. OSU Extension, Hamilton County. Volume 1 Issue 1: April 25, 2014. State University Extension and the Cincinnati Public School District. This pilot partnership will result in a 4-H Agri-Science STEM program at the Rothenberg Preparatory Academy with three main objectives: Provide Agri-Science STEM. classroom instruction across the K-6 curriculum; organize and conduct an afterschool 4-H community club program; engage community partners and volunteers in support of the in-school and afterschool components of the program. European Urban Studies in a Global Age. The interdisciplinary curriculum designed specifically for 4CITIES builds on the strengths of each host city, university, and department or research institute. Theoretical coursework is enhanced by field observation, applied skills, and a wide array of excursions. Students are challenged to connect readings and concepts from across the disciplinary spectrum and to analyse urban systems and elements at micro, meso, and macro levels. How 4CITIES works. News Show all. 09/04/2020. Finding Comfort in the Kitchen: Cohort 10's Cookbook. 17/03/2020. © All rights reserved by EMMC in Urban Studies, 4Cities. With the support of the Erasmus+ Programme of the European Union, the programme is developed in collaboration with.

Ricardo Valentini, professor at RUDN University, IPCC Nobel Peace Prize laureate and Vyacheslav Vasenev, assistant professor of Department of Landscape design and sustainable ecosystems at RUDN University, presented an international interdisciplinary project Smart Urban Nature aimed at developing smart technologies for monitoring and evaluating urban natural capital, forecasting changes in urban ecosystems services and interpretation of the data to support decision-making for. "Our goal is to turn the Pharmaceutical Garden not only into a center of science and culture, but also into a place where plants, animals, people and art harmoniously coexist. As a second-grader at George Washington Carver STEM Elementary School on Cleveland's East Side, Green was inspired by Rob Isner, who has led the school's 4-H Agri-science in the City program since it began in 2014. In Cincinnati's Over-the-Rhine neighborhood, Tony Staubach offers the same program at Rothenberg Preparatory Academy. As 4-H staff members, Isner and Staubach integrate food- and farm-related science activities during the school day, in afterschool programs, in 4-H Clubs and at summer day camps. "When I started the program, most students said science was their least favorite subject STEM is a curriculum based on the idea of educating students in four specific disciplines " science, technology, engineering and mathematics " in an interdisciplinary and applied approach. Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning paradigm based on real-world applications. Though the United States has historically been a leader in these fields, fewer students have been focusing on these topics recently. According to the U.S. Department of Education, only 16 percent of high school students are interested in a STEM car