Introduction

The 4-H Incubation and Embryology project is designed to provide teachers with background information and exciting experiential activities dealing with life science for use in the classroom. Children have a natural sense of curiosity about living things in the world around them. Building on this curiosity, students can develop an understanding of biology concepts through their direct experience with living things, their life cycles, and their habitats. Students also get the opportunity to develop life skills related to science processes such as teamwork, recordkeeping, planning, and organizing.

Participants

One hundred thirty-three (133) teachers teaching grades K-2 from schools in nine counties in Northeastern Illinois responded to the 2014 Incubation and Embryology survey. A reported 7368 students from those schools were involved in the program in 2014. Sixty-one percent (61%) of the teachers taught kindergarten. Seventeen percent (17%) of the teachers were participating in embryology for the first time while 57% reported being involved for five-plus years. Ninety-five percent (95%) of the 107 teachers who answered this question reported that they would participate in the program again.

Incubation Process and Hatch Rate

Teachers reported setting an average of nearly 25 eggs and had an average hatch rate of 13 eggs. (Fifty percent hatch rate is considered excellent.) Nearly two-thirds of the teachers candled eggs during the incubation period and candled an average of 13 eggs during the program. Teachers reported on average that 2 chicks pipped the shell but did not hatch. Thirty percent (30%) of the teachers reported opening the eggs that did not hatch while 70% reported that they did not open the eggs.

Eighty-four percent (84%) of the teachers used an automatic egg turner. For those classrooms that did not have a turner, the eggs were turned on average 3 times per day (eggs should be turned three times per day) and 91% of the teachers reported turning the eggs on the weekends. All but one of the teachers reported keeping water in the incubator for humidity while the eggs were being set.

Impact of the Incubation and Embryology Experience on Students

In response to two questions, teachers were asked to share their perception of the impact of the incubation and embryology experience on eight (8) different life skills and five (5) science abilities of their students. Increases in at least one of these skill or ability areas were reported by 88 (83%) of the 106 teachers who answered these questions.

With respect to life skills, more than one-half of the 106 teachers reported perceived increases in their students’ skills in:

- Keeping records, 68 (64%)
- Empathy—59 (56%)
- Concern for others 58 (55%)
- Teamwork--54 (51%)

Forty to fifty percent (40-50%) of the teachers reported perceived increase in the following life skills:
- Self-responsibility—48 (45%)
- Cooperation—47 (44%)
- Learning to learn—45 (44%)
- Planning/organizing—45 (44%)

In total, 88 (83%) of the 106 teachers who answered this question indicated a perceived increase in at least one of these eight (8) life skills.

With respect to **science abilities**, more than half of the 106 teachers who answered the question reported perceived increases in their students’ ability to:
- Observe—76 (72%)
- Predict—58 (55%)
- Hypothesize—56 (53%)
- Organize/order/classify--54 (51%)

Fifty (48%) of the teachers reported perceived increases in their students’ ability to compare/contrast.

In total, 88 (83%) of the 106 teachers who answered this question indicated a perceived increase in at least one of these five (5) science abilities.

Students were asked to hold up their hands in responding to six science-related statements. More than 90% percent of the teachers sharing the information indicated that more than half of their students 1) would like to do more activities like this Incubation and Embryology project in the future (100%), 2) like science (99%), 3) feel science will be important in their future (95%), and 4) feel they are good at science (90%). In addition, more than three-fourths of the teachers reported that more than half of their students feel that science is useful for solving everyday problems (87%) and would like to have a job related to science (76%).

**Success Stories**
- **This was my first year hatching chicks. I was extremely excited and so were my students. I followed everything we were told in the training and I was very happy that 9 of 12 eggs hatched. The most anyone at my school had ever had was 8 chicks. I felt very proud and my students were so excited in watching them hatch. We named the eggs before hatching. Although we had 5 yellow, 3 black and 1 golden chicks, my students were positive they knew the name of each chick.**
- **We watched a little chick struggle to get out of the shell. It took hours to break free but the chick did it all on its own. The students kept coming to the incubator to watch progress. It was a great learning experience—patience and perseverance in nature.**
- **The whole project was wonderful. The kids were amazing. I saw such gentleness and caring that I had not observed all year with my especially difficult class. The kids loved it and so did the parents.**
- **The students were very excited about this unit. From the beginning to the end of the unit, the students were inquiring about all aspects of a life cycle of chicks. We used books about birds, compared egg sizes of other birds, and wrote an informational paper about the process of hatching the eggs,**
This was my first time participating and I'm thrilled with the experience. The number of chicks hatched was impressive. I was able to extend the unit by performing many "eggsperiments." The children looked forward to these activities and the quality of their writing improved after each experiment. My students were able to watch a chick fully hatch because I was able to video it using my phone and replaying it on the projector. I invited parents to come into the classroom and they really enjoyed the experience holding a baby chick as much as my students enjoyed being the leader and instructor teaching the parents the appropriate way to handle the chicks. Students enjoyed sharing their newfound knowledge about the eggs, the incubation period, the hatching and finally the aftercare of the chicks. This was an amazing unit and I’m looking forward to many years of success like this!

My class learned so much about embryology through this program. They loved having the eggs in the classroom and it was such an awesome experience being able to watch the chicks hatch out of the eggs. Our whole grade level was able to watch 2 eggs hatch. I put the incubator under my Elmo and projected it up on the Smartboard. We were able to see everything very clear. It was really exciting for the students and adults. As we are doing our end of the year writing projects one of the things all of the kids are writing about is the chicks that hatched this year.

My students really learned the importance of taking care of another living thing and the importance of empathy. We put our chicks in a baby pool and the students were able to name each one and pick them up and give them love! It was so cool to watch them walk in the pool! The pool was perfect because it was at my student's height and I did not have to worry about the chicks getting dropped. I would recommend this to anyone!

Most of our students do not have pets, so hatching chicks gave them the feeling and experience of making a connection with an animal. It's something they remember for years!

Summary
University of Illinois Extension 4-H offers teacher training for a fee in Incubation and Embryology in the spring of each year. Teachers participate in hands-on activities; receive educational materials to use in the classroom, chick feed, a list of homes for baby chicks, and access to a website of teacher resources. Teachers may also earn CPDU’s. In return, the teachers provide their own incubators, brooder box, and heat source as well as follow the principles of incubation. In 2014, 191 teachers in grades K-12 and 12,161 students shared their experiences and what they learned while participating in the programs conducted in classrooms throughout northeast Illinois.

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