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By Jenise C. Platt

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For the degree of Master of Science

Signed by the final examining committee:

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AN EVALUATION OF DIGITAL VERSATILE DISC (DVD) INSTRUCTION, LIVE INSTRUCTION, AND LIVE ANIMALS IN THIRD GRADE CLASSROOMS

A Thesis

Submitted to the Faculty

of

Purdue University

by

Jenise C. Platt

In Partial Fulfillment of the

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of

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This thesis is dedicated to my family and friends who have been there to support me through the years. God has truly blessed me with an amazing group of people to call my friends and family. To my parents, John and Marilyn for their continued love, guidance, and support throughout my life, I would not have been able to achieve so much without you. The values and morals that you have instilled in me have molded me into the person I am today.

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ABSTRACT

Platt, Jenise C., M.S., Purdue University, August, 2006. An Evaluation of Digital Versatile Disc (DVD) Instruction, Live Instruction, and Live Animals in Third Grade Classrooms. Major Professors: Dr. Mickey A. Latour and Dr. Clinton P. Rusk.

The purpose of this study was to evaluate the performance of third grade students receiving instruction from a teacher in the classroom, along with hands-on learning materials including live animals, versus the same instruction taught from a recorded lecture on a Digital Versatile Disc (DVD) without live animals in the classroom. Six schools were randomly assigned to either DVD or live instruction teaching method. Eight of the classrooms utilized DVD instruction and six were live instruction classrooms. The students were evaluated using a thirty-question pre and post-evaluation instrument. Overall and regardless of instruction there were no differences in composite scores. DVD classrooms had a pre-evaluation composite mean score of 61.9% and 80.5% on their post-evaluation and represented an increase of 18.4%. Live instruction classroom had a pre-evaluation mean score of 63% and a post-evaluation mean score of 84.8% and represented an increase of 21.8%. Under further investigation an apparent trend began to emerge between the two classroom types within certain categories of questions. Live instruction classrooms were more successful at selecting a correct answer on their post-evaluation in a majority of the question categories when compared to the DVD instruction classrooms. That is, it was more likely that students in live instructed classrooms change to the correct answer compared to their pre-evaluation choice, when compared to students in DVD classrooms. The following conclusions were drawn from this study:

allowing the students to have the experience to see, touch, and hear the chicks may have been the most engaging part of the curriculum, and what influenced their motivation to learn as observed on their changes in post-evaluation. Therefore, suggesting that further studies should be conducted to investigate the motivation of learning when animals are in the classroom or how DVD can be improved to motivate students.

CHAPTER ONE: INTRODUCTION

In the beginning, God created man and woman. He also created the animals for man to name. (Genesis 1:1) Perhaps God created animals for man to learn from and about, as there are many references to animals in the Bible. Animals have been important throughout history where they have been used as beasts of burden, companions, or creatures for learning. Many questions arise when you combine animals and education. Is it human nature to be drawn to animals? Why are we attracted to puppies and kittens in a store window? If animals are integrated into a classroom, are the students more motivated to learn? Do students understand more of the material if they are allowed to visualize and touch the animals?

At Purdue University, the Animal Sciences Department is required by the Purdue Animal Care and Use Committee to justify using animals in the classroom or as a part of trips to the Animal Science Research and Education Center (ASREC). Faculty have often questioned, "Are students really gaining anything by having animals as a part of the curriculum, or are they an unnecessary expense?"

Curriculums have routinely involved animals in the classroom at the collegiate, high school and elementary school levels. With assistance from the Purdue University Cooperative Extension Service, many elementary school

classrooms in Indiana have been able to have incubators in their classrooms to hatch chicken eggs. Purdue University's Poultry Research Unit provides incubators to classrooms interested in hatching out chickens. Often times the county Extension Educator facilitates the connection between elementary school teachers and Purdue University. One county Educator in particular has built a positive rapport with most of the elementary teachers in her community, who have come to count on this educator's connections and enthusiasm to incorporate Extension curriculum in their classrooms. Many of the teachers in this community utilize the National 4-H Cooperative Curriculum System's manuals. With this unit, teachers may utilize the following manuals: "Poultry 1-Scratching the Surface," "Experiments in Poultry Science," and "Hatching Classroom Projects." These manuscripts were developed for use by Cooperative Extension Services at all land-grant universities. The National 4-H Cooperative Curriculum System's mission is, "to provide high quality, experientially-based curriculum for 4-H and other non-formal youth development organizations" (National 4-H Cooperative Curriculum System, 2003). Indiana 4-H programs use these manuals for specific projects available to youth. Each project has a set of three to four manuals written for specific age groups, which make the manuals especially useful for teachers seeking curriculum to supplement their classroom teaching.

Statement of Concern

After completing various Animal Science courses at Purdue University and discussing the benefits of visiting the livestock units, the researcher and Dr.

Mickey Latour began discussing whether there was truly a benefit from using live animals in a course or if students would learn just as much from viewing the animals on tape with the use of multimedia equipment. Because of the extensive reporting required by Purdue's Animal Care and Use Committee, Animal Science instructors were questioning whether students really learned more when live animals were incorporated into the curriculum.

Purpose of Study

The researcher taught third grade students a three-day chicken embryology curriculum. Some classrooms received recorded teaching from a Digital Versatile Disc (DVD), while others received live teaching from the researcher. The purpose of this study was to determine whether students learned more information by having a live teacher with live animals in their classroom, or if they learned equally well from a DVD with recorded teaching and footage of live animals.

Hypothesis and Research Objectives

This research tested the difference in learning from having live teaching and actual animals in the classroom versus a DVD with equivalent information. The possible outcomes for this research are:

- Students learn equally well, with or without animals in the classroom.
- Students learn better, with or without animals in the classroom.
- Overall satisfaction is higher, with or without animals in the classroom.
- Overall motivation is higher, with or without animals in the classroom.
- Student attention spans are longer, with or without animals in the classroom.

The key objective for this research is to determine whether students learn more when live animals are present in their classroom.

Assumptions

The researcher made several assumptions in this study. The first was that all participants in the study could read at a third grade level. Part way through the data collection process the researcher was told that some of the students could not read. The second assumption was that all of the words in the curriculum would be recognizable by third graders and that the students would understand their meaning without assistance. There were several "big" words in the evaluation tool. Some of these words were terms used routinely in the poultry industry. The final assumption was that teachers would allow the DVD to play and not have to explain the material to their students.

Limitations

Certain limitations for this study were out of the researcher's control. The researcher was originally going to teach the curriculum in at least 20 classrooms. However, several issues arose to hinder this decision. Some teachers were hoping to have the curriculum taught right away. A few schools had corporation policies that restricted research in their school systems or timing issues would not allow the curriculum to be taught.

The second limitation resulted from the use of a DVD to present the curriculum in certain classrooms. The lesson plans were scripted PowerPoint presentations with uniform information. However, this method of presentation limits the amount of student-teacher interaction that occurs in DVD taught classrooms.

The next limitation was the possibility that participants may have already had incubators in their classrooms prior to this study. Particularly in Vermillion County; several kindergarten, first, and second grade classrooms had previously

experienced chicken incubators in their classrooms. This limitation will be taken into account when analyzing the results of this study.

The final limitation was the background and prior experience of the teachers participating in the DVD classrooms. The teachers' knowledge, or lack of knowledge, about chickens may have helped or hindered the students' learning process. For example, if teacher "A" had no prior experience with chickens or incubators, he/she would not be able to field questions from students as well as teacher "B" who grew up on a poultry farm.

CHAPTER TWO: LITERATURE REVIEW

The literature review for this study was completed using research articles, professional journals, books, magazines, and thesis documents. These resources were found using key words and phrases such as: animals in the classroom; chicks in the classroom; children, teaching and animals; classroom motivation; eggs; embryology; experiential learning; human models; incubators in the classroom; interactive classrooms; learning with animals; livestock models; and using animals in teaching.

Animals

Animals have long provided positive benefits to individuals in a variety of situations, such individuals as hospital patients, nursing home residents, prison inmates, and disabled individuals All, Loving, and Crane stated (as cited in Weigel, Caiola, & Pittman-Foy, 2002). Fairy tales, stories, educational programs, and research contain animals as reference points. "Animals can also play an important role in adolescent development" (Weigel, Caiola, & Pittman-Foy, 2002, ¶ 1).

"Children tend to identify as much, or more, with animal figures than with human figures, and this process of animal identification decreases with age" (Boyd & Mandler, 1955, p. 367). In this study conducted by Nancy Boyd and George Mandler, the researchers investigated third grade students' reaction to human and animal pictures. The students were told stories and shown pictures

of either animals or humans, who were allowed to be the main characters. The students were asked questions about what they had heard and seen. The students were then asked to look at a picture and tell a story about what happened before the picture was taken, what was happening in the picture at the time and what will happen in the future. Boyd and Mandler (1955) found that 74 percent of "all the students had a preference for animal stories over human stories. [Their] results support the hypothesis that animal pictures facilitate the expression of ego-involvement, particularly of negative involvement" (Boyd & Mandler, 1955, p. 371). It appears from this study that students are more intrigued by animals than they are by humans. However, the following question remains unanswered: do students gain more knowledge when animals are present in a classroom?

According to an article retrieved on April 29, 2005 from the People for the Ethical Treatment of Animals (PETA) Media Center, "there are far more constructive ways to learn about living beings than by holding animals captive in school, where they are vulnerable to hazards and neglect" (2005). This article discusses the negative side of having animals in the classrooms. PETA feels that programs such as hatching eggs in the classroom can be replaced by films, videos, computer simulations and models.

Borchard (1988) conducted a survey in one of his veterinary pharmacology courses to find out how students felt about the use of live animals in the classroom. After proper instruction, several animals were used to give students hands-on experience with animal restraint, drug administration, and

dosage calculation. The students worked in groups to perform laboratory procedures throughout the semester. At the end of the semester, they were asked three questions pertaining to their opinion about the use of live animals in the classroom, whether the animals suffered from being used in the classroom, and whether the knowledge and experience gained by the students justified the use of the animals. From the survey, Borchard concluded "the use of live animals provides an incalculable source of experience which is necessary to their education" (Borchard, 1988).

Ryan Meunier, from Purdue University, conducted an evaluation of educational materials developed for the "Incubators in the Classroom" program to determine the effectiveness of agricultural literacy materials designed for the program (Meunier, Talbert, & Latour, 2002). The students in Meunier's study were taught 30 minute daily lessons for five days regarding the Purdue University Poultry Extension program called "Incubators in the Classroom." Meunier used a pre and post-test to evaluate the knowledge of the students. He found that the "Incubator in the Classroom" materials were "effective in increasing the knowledge about agriculture-related science concepts" (Meunier, et al., 2002) with his subject matter.

The following statement came from a student who had been suspended for actions in another class, "Okay, suspend me from school, but let me go to Biology, my chicken needs me" (McGiffin & Brownly, 1980, p. 19). This quote shows the level of compassion a particular student felt towards his chicken in the Biology class. This article also stated that many minority students enrolled in

inner city schools frequently see rodents, dogs, and roaches competing for their food supply. Having friendly animals such as goldfish, frogs, birds, and gerbils in the classroom, redirected negative feelings about lower creatures. By caring for these friendly animals, students develop a passion for working with animals. This article came from *Animals in Education*, a book edited by Heather McGiffin and Nancie Brownly, that is a compilation of articles concerning the use of animals in high school science classrooms. The articles throughout the book affirm the benefits of working with animals in the classroom and the positive atmosphere it creates for students. "Youngsters need to become actively involved in the learning/discovering process. The use of live materials sustains greater interest, provides greater motivation, and assures more permanent retention" (McGiffin & Brownly, 1980, p. 46).

In society today, most children are not exposed to the farm and agricultural lifestyle. As a result, there has been an increased push for agricultural farm days which allow hands-on activities involving animals. Boleman and Berrell (2003) conducted a study to determine the impact of a Dallas Farm Day, assuming students would gain knowledge by participating in the event. The students were given a pre and post-test that included 10 questions on agriculture related material and two questions on perceptions of agriculture in their daily lives. The results of the study showed that student knowledge increased on 9 out of 10 questions relating to agriculture and two questions on their perception of how agriculture affects their daily lives. Eighteen percent of the students requested more hands-on activities.

Cooperative Extension Services in many states offer workshops, similar to the Dallas Farm Day, that vary in content and audience. For example, the University of Tennessee Extension conducted a workshop for their cattle producers that provided educational information about current issues in the industry. The information was presented in various forms such as live demonstrations, videos, speakers, and handouts on topics that covered grading, bull fertility, hay quality, and herd health. Jenkins et al. (2000) evaluated the University of Tennessee Extension's program delivery methods for this workshop by sending out surveys to all participants. Sixty-two of the 92 surveys they sent out were returned. Following are some of the significant finding from this study:

> ...Person-to-person contact at the meeting was the most effective method of getting producers to seek additional information.
>
> Producers participating in the session with live animal demonstrations were more likely to adopt new practices than those who participated in sessions without animals.
>
> Producers rated programs presented by 'unbiased professionals' higher than programs presented by individuals selling a product.
>
> Telephone calls to the Extension office were effective ways for producers to get answers to specific questions.
>
> Extension circulars and newsletters were effective ways to communicate with producers (Jenkins et al., 2000).

Besides workshops for adults, state Extension services often provide workshops for youth. In Indiana, Purdue University has held Animal Sciences

workshops every summer since 1972 for 4-H members enrolled in livestock projects. "Their goal is to educate youth about animal production practices, while stimulating their minds to think about new and improved ways of raising animals" (Rusk & Machtmes, 2002). These workshops include hands-on activities with animals and visits to Purdue University's Animal Science Research and Education Center. Delegates at the 2000 Animal Sciences Workshop for Youth were surveyed to determine their feelings related to various aspects of the workshop. Besides answering statements on a Likert-type scale, delegates were asked three open-ended questions. Following are some of the qualitative responses from the survey:

> The best part of the workshop was going to the beef farm and doing an ultrasound.
>
> I liked meeting new people and learning up-to-date techniques for working with animals.
>
> It was fun to watch the necropsy of a pig.
>
> The best part was getting to do hands-on activities with the sheep.
>
> I learned a lot from the dissection of a broiler and a layer.
>
> The best part of the workshop for me was getting to artificially inseminate a gilt.
>
> I would prefer to visit a dairy goat farm rather than have at the goats brought to campus.
>
> I would like to have more hands on activities with the horses, like getting to ride a little (Rusk & Machtmes, 2002).

From these statements, it is obvious that this group of students truly enjoyed any type of interaction with animals.

Dr. Gail Melson (2001) has devoted an entire book to the connection children have with animals. *Why the Wild Things Are: Animals in the Lives of Children* is a book devoted to how children relate to pets, farm animals, zoo animals and even cartoon animals. "Whether they see themselves as King of the Wild Things or protector of Toto, children live in a world filled with animals-both real and imaginary" (Melson, 2001, p. 1). Melson discussed animal use throughout certain periods of time. When it comes to pets, species have not mattered in some cultures. For examples, wolves, raccoons, and bears were pets for Native Americans, while Australian aborigines kept opossums, wallabies, and even dingoes for pets. In 1885, "farm animals and farm chores were means of teaching the ABC's" (Melson, 2001, p. 27). The 4-H programs takes pride in using animals to educate children.

> 4-H leaders, judges, parents, and recent participants all emphasize a list of 'positives' to be gained from animal production projects ranging from responsibility, planning, family involvement, and camaraderie to, as one county Extension agent in Georgia put it, 'more about physiology than children will ever get in a classroom (Melson, 2001).

Many other programs use animals as learning devices, but very few evaluate the actual impact on children. "Whenever children encounter animals-in the backyard, on a vacant lot, beside the creek, or in the drainpipe-they raise questions about animal welfare, humane treatment of other species, and

environmental conservation. Involvement with animal life, whether inside or outside school walls, has the potential to confront children's moral sensibilities and prompt then to consider their own place as humans within the ecosystem" (Melson, 2001). Melson continued to explore areas where children and animals interact. She finished her book by making the point that although the fascination with animals may seem childish, it is important for all people to respect animals for the existence and future of earth.

Motivation

Keeping students engaged in classroom activities has always been a challenge. National surveys indicate that student motivation is a principal concern of teachers (Williams & Stockdale, 2004). When motivation is measured by "school performance, researchers studying school motivation look at factors such as the choices students make about which academic activities to participate in, their persistence in continuing the activities, and the degree of effort they expend" (Wigfield, Eccles, & Rodriguez, 1998). Researchers have found that motivation can be divided into two categories; intrinsic and extrinsic. Intrinsic motivation is when individuals are engaged in activities for their own sake because of an interest in the activity. Intrinsic motivation is self-determined. Extrinsic motivation occurs when individuals are engaged for external consequences, such as rewards. (Wigfield et al., 1998; Williams & Stockdale, 2004). Students who are intrinsically motivated get an internal excitement and satisfaction out of what they are doing. Extrinsic motivation rewards students for doing an activity by providing them with grades, prizes, or points. When individuals have a positive sense of their ability to complete a task, they are more likely to choose to do the task, persist at it, and maintain their effort. (Wigfield et al., 1998; Williams & Stockdale, 2004). Wigfield et al. (1998) expanded the extrinsic-intrinsic motivation to the discussion of internalizing, by transferring

behavior from outside to inside the individual. Internalization has the following levels: external, introjected, identified, and integrated. Externalization occurs when the regulation comes from outside the individual. Introjected is the internal regulations based on an individual's feelings that he or she should or has to engage in the behavior. Identified is the internal regulation of behavior that is based on the utility of that behavior, such as studying hard to get into college. Integrated is the regulation based on what the individual thinks is valuable and important.

Unfortunately there are many outside factors that can alter an individual's motivations, such as: teachers, parents, peers, time of day, time of year, and many others. According to Turner and Patrick (2004), research involving student motivation has occurred in two areas: characteristics of individuals and classroom environment. Ultimately, each student will vary in their motivation and how they react. Many times this motivation will change throughout the day. However, Turner and Patrick found that the most positive student outcomes occur in classrooms with high mastery goal structure. Educators should strive to motivate and educate all students; recognizing that students are motivated in a variety of ways.

Bandura (1986) wrote "there is a major difference between a motive, which is an inner drive to action, and an interest, which is fascination with something" (p. 243). A person's background knowledge and current interests cause them to be temporarily motivated to participate in activities. Individual and personal factors interact with situational factors to create interest, or lack of interest. Bergin (1999) categorized the factors that influence interest into

belongingness, emotions, competence, utility-goal relevance, and background knowledge.

Belongingness is broken into an individual's cultural value, identification, and social support. Cultural values are influences that are valued and practiced by groups, and in turn influence the interests of children and adults. Identification is being able to target an individual's personality, characteristics, and values. These traits are often based on gender, ethnicity, religion, geographic region, and many other factors. Social support is socializing with friends and how these folks help develop who an individual is.

Emotions are the second factor that influences a person's interest. Emotions can have a positive or negative effect on everything a person does. They can alter a person's opinion and interest because of the experience tied to an activity or issue. Emotions can also alter a person's interpretation of certain information.

Competence is the third factor recognized by Bergin as a contributor to a person's interest. People are more interested in a topic they perceive themselves to be competent in, which relates to their ego. If a situation emphasizes competitive objectives, then people without the ability to compete are more likely to disengage. However, "situations that emphasize task mastery and the development of competence without concern for appearance relative to others are more likely to result in people engaging a task even if they lack competence (Bergin, 1999, p. 91).

The fourth area that influences a person's interest is utility-goal relevance. Students are generally interested in an activity if there is a goal to achieve. This becomes problematic when the goal is an extrinsic motivation and the only reason they are interested is to get a reward. A person's goals can be represented by a hierarchy which ranges from ultimate goals to immediate goals. Every person has different goals.

Background knowledge is the final factor that influences a person's interest. People tend to be more engaged in and intrigued to learn about topics they have prior information about. Prior knowledge about a topic gives a person a vested interest in what they are learning (Bergin, 1999).

Mankin et al. (2004) surveyed Kansas State University students to determine what factors motivated them to learn. The researchers found that the students were motivated by energetic, enthusiastic, and exciting teachers. Students appeared to interact more in classroom discussions when they were not judged for being right or wrong (Mankin et al., 2004). The researchers administered a qualitative questionnaire to 606 students from diverse groups and different disciplines. Their results were as follows:

> Interaction and discussion were stronger for students with a higher rank and higher GPA, who perhaps had more self-confidence in their knowledge and felt their contributions were more valuable in the classroom. Students with a lower GPA were less motivated by this mode of teaching. This finding should be considered by instructors seeking a teaching method to increase student participation, such as cooperative

learning. Lower-GPA students were motivated by hands-on environments with more entertainment. This finding reinforces the belief that lower-GPA students are more extrinsically motivated in the classroom. The hands-on assignments provided real-life experiences and allowed instructors to help students see the tie between their assignments and the skills they would need in their chosen professions. This may be even more critical for lower-GPA students, who have more difficulty making connections between theory and practice. Lower-GPA students also expressed preference for classes with fewer students, which may relate to their level of self confidence. Higher-GPA students were motivated by class material that related to assignments and exams that resulted in grades being assigned. These students appeared to be results oriented, and grades were the most easily identified results (Mankin et al., 2004).

Mankin et al. (2004) concluded that the best way to find out how to motivate students is to ask them directly what motivates them.

Experiential Learning

Kolb (1984) described three characteristics of experiential learning. First, learning is best conceived as a process where concepts are derived from and modified by experience, not in terms of outcomes. Next, learning is a continuous process grounded in experience. Third, the process of learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world.

Motivation of a student is often related to the teaching style of the instructor and the preferred learning method of the pupil. Studies indicate that

experiential learning increases student motivation and comprehension (Khan, 1994). Experiential education is the process that links education, work, and personal development (Wulff-Risner & Stewart, 1997). Experiential learning activities could include livestock judging skills, planting a garden, and presenting a demonstration. Any situation that has the 'do, apply, reflect' process would be considered experiential learning. "I hear and I forget, I see and I remember, I do and I understand" (Chinese Proverb).

"Some students learn best by doing-putting theory into practice-which is exactly why curriculum in the sciences has laboratory work done in conjunction with the conceptual work done in the classroom" (Smith & Reese, 2003, p. 35). Students who have difficulty understanding certain concepts on paper may be better able to understand kinesthetically by touching, feeling, thinking and manipulating. Smith and Reese (2003) determined that hands-on work captivates students and holds their attention in a manner that book learning cannot duplicate. They designed a 3D computer program to use as an alternative to traditional hands-on methodology. Their program was incorporated in a high school physics class that was building its own catapults. With this project, the students, who were working in groups of four, had to interact with each other. They learned how to work as a team to get the job done (Smith & Reese, 2003). After the students designed their catapults, the program could be connected to milling equipment that would cut out the designs. Smith & Reese's (2003) research introduced physics and chemistry into the freshman and

sophomore Science and Engineering Technology Program and allowed the physics instructors to teach physics in an interesting and entertaining way.

Wulff-Risner and Stewart (1997) conducted a study comparing two experiential teaching methods designed to educate 8 to 18 year-old students. The lesson plan taught livestock evaluation skills for conformation and performance classes, as well as the preparation and presentation of oral reasons. The first teaching method included live animal comparisons, while the second method used classroom instruction with charts, photographs, video tapes, and slides. The researchers found that students learned conformation and performance judging skills equally well, if not better, using audio-visual aids, including video tapes and slides, as compared to live animal judging. Researchers found that the 12 to 18 year-old students learned judging conformation skills more quickly than 8 to 11 year-old students.

Marshall et al. (1998) assessed the perceived value of using live animals to teach beef cattle science at the University of Florida. The researchers mailed a survey to students who took the course from 1983 to 1996. The results of the survey revealed that the majority of students took the course primarily to get hands-on experience with beef cattle. Thirty-nine percent of responders indicated they took the course to enhance their College of Veterinary Medicine application. Researchers concluded that the experiential learning course effectively provided hands-on experience with livestock and developed subject matter competence.

4-H is a national organization that prides itself in the 'learning by doing' theme. 4-H engages its members and leaders in a variety of learning experiences. Forty-two states are members of the 4-H Cooperative Curriculum System that utilizes the experiential learning model and focuses on teaching life-skills. The base of the experiential learning model has five steps: 1) Experience, 2) Share, 3) Process, 4) Generalize, and 5) Apply (Woffinden & Packham, 2001). One example of the five-step learning model used bananas and colored water to allow 4-H members to practice giving subcutaneous and intramuscular injections. Youth gained experience by: watching leaders give injections, sharing what they learned with one another, learning the injection process, generalizing what was happening and then applying what they learned by injecting the banana themselves (Woffinden & Packham, 2001).

The responsibility of an educator is to provide experiential learning opportunities that enhance the educational process. Oakes (1986) described the traditional model of educational design as industrial, where the business of learning is additive and largely determined by people and events that are beyond the learners. The control objectives define the end product of learning in this model. The learner is the recipient, moving through an assembly line of learning experiences where the teacher's role is to give information in clusters that are keyed to objectives.

Experiential learning programs typically include classroom components and work components, which are jointly and cooperatively supervised by school

and work site personnel. Reflection can occur on-site through activities where students solve problems and design new approaches (Miller, 2001). Miller (2001) asked, "Why have experiential programs, [to which he answered]...to promote real learning by students" (p. 13). It is not just work for the sake of experience, but rather a way to provide "connectedness" between theory and practice.

In order to understand experiential education, Joplin (as cited in Doebbert, 1994) explained that a person must understand eight characteristics which are reflected in experiential learning: student-based rather than teacher-based, personal not impersonal nature, process and product orientation, evaluation for internal and external reasons, holistic understanding and component analysis, organized around experience, perception-based rather than theory-based, and individual-based rather than group-based. Doebbert (1994) states that the term "student-based" means the program focuses on the needs of the student, giving students a chance to plan and express what they need. Personal nature allows members to have a connection with the instructor and other members of the group. Process and product orientation gets the members acquainted with the materials and issues at hand. Evaluation for internal and external reasons gives the group feedback on all aspects of the program. Holistic understanding and component analysis supports the curriculum by integrating the development of personal values with an understanding of technology, general education skills, and awareness. Organizing around experiences allows the program to work with

unique situations to the members involved. Perception-based rather than theory-based allows the program to be easily understood by all members. Experiential education focuses on the learning of individual students by building a link from a present perception to a future understanding that reflects awareness of others' views. Individual-based rather than group-based allows the program to benefit the needs of the individual rather than the needs of the group (Doebbert, 1994).

Comparing Teaching Methods

World Wide Web – Internet

With the expanded use of computers and the World Wide Web, many instructors are forced to incorporate the use of the internet into their classroom to more closely meet the needs of their students. Corno and Snow (as cited in Ross & Schulz, 1999) said "The success of education depends on adapting teaching to individual differences among learners" (p. 123)

Some students use the internet to supplement lectures, but other students rely on it to understand the material being presented in class. The key is getting instructors to understand how their students learn best. For visual learners, instructors can provide web animations, clickable diagrams, and video clips. Providing students with notes before a lecture is taught will also help visual learners. For auditory learners, the web can provide audio recording of lectures, which will allow students to hear the material over and over. For kinesthetic learners, the internet can provide engagement activities that allow students to manipulate the material in a way that helps them understand it, and provides

them an opportunity for hands-on learning. Social learners can take advantage of online chat rooms, forums, emails, and message boards that allow interaction with a large group of people and collaboration with many minds. (Ross & Schulz, 1999).

Multimedia

Multimedia computer programs have been used to teach students in a variety of settings. Students at Iowa State University use computer-based tutorial systems to learn about natural resources (McAndrew, Mullen, Taylor, Dobill, & Green, 2004). The program, originally developed to enhance students' understanding of Agronomy, allows students to combine a variety of learning tools and proceed through the material at their own pace. This program was incorporated into both the on-campus and distance learning Agronomy courses, thus allowing constructive and engaging learning for both groups of students.

A similar multimedia tool was used in the Horticulture Department at Southern Illinois University (SIU) (Henry, Mideen, & Lieske, 2004). Researchers compared compact disk (CD) based software to traditional instruction. A control group was taught landscape material using lectures and overheads. The treatment group was taken to a computer lab and allowed to view the program for two hours, the same duration as the lecture. The researchers used a pre and post-test to measure the effectiveness of the two teaching methods. The researchers did not find a significant difference between the control and treatment groups, and thus, they concluded that from the treatment group that

students learned equally well with both methods of teaching. The only negative feedback was students preferred to read the instructions themselves versus being read to by an automated voice. Students in the control group felt that the lecture material was covered too quickly (Henry et al., 2004).

An evaluation of the performance and acceptance of undergraduate and graduate instruction using teleconference technology in the classroom was conducted by Latour and Collodi (2003) at Purdue University. An Animal Sciences course was taught on the main campus at West Lafayette and at the regional campus in Fort Wayne at the same time using two-way videoconferencing. A comparison was done on student performance on exams. The researchers found that there was no difference in performance between the two groups of students. However, the students in Fort Wayne (IPFW) wanted more 'hands-on" experiences, wished they could have conversed more easily with the instructor, and said they felt disconnected with the course.

Child Development

Cognitive development and the learning processes of children are important elements to understand when working with youth in an educational setting. Jean Piaget began studying the intellectual development of children in the 1920s. Piaget determined that there are four major periods of cognitive development: sensorimotor stage (birth to age 2), preoperational stage (ages 2 to 7), concrete operations stage (ages 7 to 11), and the formal operations stage (ages 11 to 12 or older) (Sigelman & Rider, 2003).

The sensorimotor stage is the infantile period when a child mentally develops through patterns of action and reflective adaptation to their

environment. Children begin by mouthing words, grasping objects, and solving problems using their actions versus their minds. As they continue to develop, children become very reflective about their environment and utilize objects to check for a response. For example, when they are in water they slap it to see its reaction. As infants approach 24 months-of-age, they begin to solve problems mentally and maneuver objects with the use of other objects (Sigelman & Rider, 2003).

During the preoperational stage between ages 2 and 7, the speech of a child continues to improve and they are capable of expressing their needs and thoughts. They can refer to the past and the future. Preoperational children spend a lot of time pretending. Their minds are developed enough to logically think and find the correct answer when problem solving. Many children are egocentric in this stage; meaning they have a difficult time viewing another person's perspective (Sigelman & Rider, 2003).

During the concrete operational stage between the ages of 7 and 11, children learn to master the logical operation process. Children also learn to understand reversibility, transformational thought, and other's perspectives. The biggest limitation in this stage is the child's inability to comprehend abstract ideas (Sigelman & Rider, 2003).

The formal operational stage in child development coincides with the formation of advanced thought processes that will take youth into adulthood. The mastering of abstract and hypothetical ideas represents the biggest cognitive development during this stage. Children are able to grasp if-then thinking, (if you

ingest poison, then you will die; Steve drank poison therefore he will die) and the trial and error method of problem solving (Sigelman & Rider, 2003).

CHAPTER THREE: METHODS TO RESEARCH

Curriculum Design

The curriculum was designed after reviewing Ryan Meunier's (2000) thesis, *Evaluation of the Educational Materials Created for the Incubators in the Classroom Program*. Three main topics were chosen for the three-day curriculum used in this study. In addition to Meunier's MS thesis, the researcher utilized National 4-H Curriculum and various poultry websites to design the curriculum.

The curriculum, included in Appendix A, was taught over a three day period. Each day's lesson included lecture material and hands-on activities (Appendix B). On Day One, the curriculum focused on eggs. The researcher began by asking questions of the students and talking about animals that lay eggs. A transition was then made to discussing eggs that can be purchased from a store. A diagram was used to point out the parts of an egg. The DVD classrooms had the diagram of an egg on screen. Each part of the egg would appear and then a description of that part would be given. The same description was used in the live classrooms; however, a poster sized egg was used with pull-a-part pieces. In order to actually visualize the parts in a real egg, the research cracked open three eggs to point out the parts. Three eggs were also used to demonstrate the different grades of eggs.

Assuming that many children consume egg products, the researcher felt it was important to include a section on the nutritional value of an egg. Third grade students were shown a comparison of an egg and an item from each of the food groups, as well as a comparison with candy.

At the conclusion of the first day's lesson, students were asked to: color the four main sections of an egg, cut out the top three sections, glue these sections together and then label the parts of an egg. These hands-on activities helped students to visualize the parts of an egg and allowed them to properly place the parts within the shell.

Day Two began with a recap of key points from the first day's lesson. One difference between the DVD and live classrooms was that the researcher was able to do a more extensive and interactive review of the previous day's lesson in the live classrooms. Each student was asked to name one thing they learned the previous day. If students could not think of an item, they would then be asked a question. Consequently, the only recap that could be done in the DVD classrooms was to restate the facts discussed the previous day.

The lesson topic on Day Two was incubation. Students were given a definition of an incubator by the researcher, who also pointed out each part of the incubator and explained its function. This explanation allowed the participants to see exactly how an incubator operates. The researcher found that the students asked several questions about the parts of an incubator. An often asked question was, "how do you know the eggs are going to hatch?". This question led right into the next topic, regarding fertile and non-fertile eggs. The researcher

explained the difference of each type of egg. The development of the chick within the egg was the next topic for discussion. Because it would have taken too long to explain all 21 days of chick development, the researcher decided to cover five important days in detail. Each classroom was supplemented with an Avian Embryology poster and a Chick Development CD-ROM purchased from Carolina Biological Supply.

Talking about chick development lead to a discussion on how a chick gets out of the egg. The researcher decided to also discuss the possible reasons why an egg might not hatch. After all of the questions were answered, it was time for Day Two's hands-on activity. The students were given a handout with a five square chart (Appendix B: Day 2) and told to draw and color days 2, 7, 14, 19, and 21. The students were given the option of using their imagination and the description given by the researcher, or using the supplemental chart.

The researcher began Day Three the same way as she did Day Two; reviewing the previous day's information. After completing the review, the researcher began a discussion about handling chicks. This lesson was followed by a session on germs, their locations, and how to remove them. This discussion was supplemented with a demonstration using Glo Germ^{tm} in lotion, gel, and powder forms. In the DVD, the researcher's hands were coated with Glo Germ^{tm} prior to touching several items, to demonstrate the transfer of "germs." In the live classroom, the researcher covered tennis balls with Glo Germ^{tm} and passed them around the teaching circle. During this time, students were asked to name their favorite or least favorite part of the program. After each of the students had

spoken, a black-light was used to detect where the "germs" were on their hands. Students were then sent to the bathroom to wash their hands. Before the students returned to the classroom, the black-light was used again, if the student's hands were clean, they passed. If their hands still glowed, they were sent back to the bathroom to rewash their hands. This activity was also done in DVD classrooms, but it was administered by the classroom teacher.

The order of topic being presented on Day Three was slightly different between the DVD and live classrooms. In the DVD classrooms, the researcher started Day Three by revisiting how chicks hatch and showing pictures of a chick hatching. The researcher then discussed the handling and holding of chicks, prior to offering a review session of the entire program. After the review, the classroom teacher was to administer the germ activity.

In the live classroom, students participated in the germ activity and then discussed the handling of chicks. The researcher also discussed again how the chick gets out of the egg. The students had many questions because the incubator was in their classroom, which gave them first-hand experience seeing the chicks hatch. After the questions were answered, the students were allowed to hold the chicks.

The week following the three-day curriculum being presented in the DVD classroom, an incubator was brought into the classroom. The researcher intended for the classroom teacher to briefly review some of the facts surrounding the incubator with the students. This may or may not have been done in all classrooms.

Development of the Instrument

The evaluation instrument was based around the actual curriculum (Appendix C). Question one asked students about their prior knowledge of chickens. Questions two through seven, as well as question 30, were qualitative questions used to evaluate motivation and feelings towards the topics presented in class. Questions 8 through 29 were fact questions taken directly from the curriculum. The researcher decided it would be easiest to give the third grade students a choice of responses to evaluate their thoughts on the material presented.

Having insight from the classroom teachers was important to the researcher, since the teachers were with the students each day during the program. The researcher wanted to gather thoughts from the teachers, so they were asked to complete open ended questions regarding curriculum (Appendix D).

Identification of Participants

A total of 292 third grade students from six different schools and 15 classrooms were the participants in the study. The following schools participated in the study:

- Central Elementary School
- Clinton Central Elementary School
- Clinton Prairie Elementary School
- Oaklawn Elementary
- Van Duyn Elementary School
- Woodlawn Elementary School

Procedure

Schools were selected in following manner: the researcher contacted Purdue Cooperative Extension Service 4-H Youth Development Educators located in the area surrounding Purdue University to determine whether they currently had school enrichment programs similar to the one proposed in this study. The following Educators were contacted:

- Keli Brubaker - White County
- Roberta Crabtree - Tippecanoe County
- Matt Deppe - Fountain County
- Becky Holbert - Vermillion County
- Amy Kinsler - Clinton County
- Kelly Pearson - Warren County
- Jeff Pell - Park County
- Rose Scherer - Benton County

The researcher contacted the Educators, explained the study, and asked the Educators to help identify third grade teachers and or schools that might be willing to participate in the study. Many of the Educators contacted the teachers themselves. The researcher asked for assistance from County Youth Educators to avoid potential conflict with school enrichment programs that were already underway. For some of the Educators, this was an opportunity to gain access into their local schools and classrooms. Because of time conflicts and or other issues in the eight counties contacted, only three counties were able to participate.

Data Collection & Analysis

The intent of this curriculum, "Embryology in the Classroom", was to determine whether students learn equivalently with live animals present in the classroom as they do without animals in the classroom. The researchers were also interested in determining whether students learn equally well with a teacher presenting material in the classroom as they do from a presentation on a DVD. Students were taught a three-day curriculum on chicken embryology. Half of the schools received an incubator containing fertile eggs and live teaching. The other half of the schools were taught the same material, with the use of DVD. The week following the DVD instruction, those schools had an incubator integrated into their classrooms. The possible outcomes for this research are:

- Students learn equally well, with or without animals in the classroom.
- Students learn better, with or without animals in the classroom.
- Overall satisfaction is higher, with or without animals in the classroom.
- Overall motivation is higher, with or without animals in the classroom.
- Student attention spans are longer, with or without animals in the classroom.

Each classroom was given pre-evaluations before any lesson was taught, in order to determine participant knowledge prior to the program. Each classroom was given a post-evaluation on Day Three of the program. In order to assess whether the incubator made a difference in the classroom, the DVD classrooms were given a final evaluation the final day the incubator was in their classroom.

At the completion of the program, the researcher sorted the evaluations by classroom and paired them according to students' names, which allowed an accurate comparison of each student's knowledge gain. Any student who did not have all of their evaluation forms in the set was removed from the study, which reduced the number of usable responses to 245 students. One classroom was removed from the study due to a lack of pre and post-evaluations. This resulted in eight classrooms with DVD instruction and six classrooms with live instruction.

Once the researcher finished teaching the curriculum and gathering the data, the results were entered and analyzed using the Statistical Package for the Social Sciences (SPSS 12.0 for Windows, 2003). Frequencies and percentages were used for analysis, and then transferred into Microsoft Excel© to compare the change in responses. Each question in the evaluation was analyzed to determine the percentage of change from pre to post-evaluation within each method of teaching. After composite scores from DVD and live classrooms were analyzed using a t-test in SPSS, each individual question was analyzed with a t-test in Microsoft Excel©.

Human Subjects Committee Approval

The Purdue University Institutional Review Board (IRB) deemed "An Evaluation of Digital Versatile Disc (DVD) Instruction, Live Instruction, and Live Animals in Third Grade Classrooms" to be exempt on November 2, 2005. The reference number for this study is Ref. #0510003041.

CHAPTER FOUR: RESULTS

Children tend to identify as much, or more with animal figures as they do with humans and this process of animal identification decreases with age (Boyd & Mandler, 1955). The aforementioned researchers investigated third grade students' reaction to human and animal pictures and found that 74 percent of all students had a preference for animal stories over human ones. Animals have long provided positive benefits to individuals in a variety of situations, such as hospital patients, nursing home residents, prison inmates, and disabled individuals (All et al., 1999). Melson (2001) devoted an entire book to how children relate to pets, farm animals, zoo animals, and cartoon animals. She also illustrated how they see themselves as "King of the Wild Things" or protector of "Toto". In short, children live in a world filled with animals, both real and imaginary. Moreover, when it comes to pets, species have not mattered in some cultures where pets include wolves, raccoons, bears, opossums, wallabies, and even dingoes. The range of possibility is quite vast.

Animals can also play an important role in adolescent development (Weigel et al., 2002). Melson (2001) said, "farm animals and farm chores are means of teaching". National 4-H programs take pride in using animals to educate children. In addition to educational purposes, children are concerned about animal welfare. More specifically, whenever children encounter animals in

the backyard, on a vacant lot, beside a creek, or in a drainpipe; they raise questions about animal welfare and humane treatment (Melson, 2001). Involvement with animal life, whether inside or outside school walls, has the potential to confront children's moral sensibilities and prompt them to consider their own place as humans within the ecosystem (Melson, 2001).

Cooperative Extension has used animals for many educational events throughout the Land Grant System. The goals then and now are to educate youth about animal production practices, while stimulating their minds to think about new and improved ways of raising animals (Rusk and Machtmes, 2002). Meunier (2002) evaluated educational materials developed for the "Incubators in the Classroom" program to determine the effectiveness of agricultural literacy materials. The students in this study were taught thirty-minute daily lessons for five days regarding the Extension program called "Incubators in the Classroom". In that study, the "Incubator in the Classroom" materials, which included newly hatched chicks, were found to be effective in increasing students' knowledge about agriculture-related science concepts (Meunier, 2002). However, the notion of putting live animals in a classroom is not supported widely, because the use of animals must be carefully monitored from both a human risk standpoint, as well as factors which may cause harm or unwanted stress to the animals. Therefore, accountability of animals and their welfare must be carefully planned with all learning materials, procedures for proper human to animal handling and general husbandry guidelines.

The purpose of this study was to evaluate third grade student performance using live, in-person instruction supplemented with hands-on learning materials, which included live animals; versus the same instructional materials presented through a Digital Versatile Disc (DVD).

Materials and Methods

This study, conducted in the fall of 2005, utilized 245 third grade students from 14 classrooms in six schools selected specifically to be demographically similar. The six schools were randomly assigned either DVD instruction or live teaching. Due to an uneven number of students in the schools, eight classrooms were provided with DVD instruction, while the remaining six classrooms received live instruction. The distance between schools receiving specific types of instruction, was sufficient to prevent interaction between students receiving different instruction.

Curriculum

The curriculum was taught over a three-day period. Regardless of instructional format, lessons included lecture material and hands-on activities which lasted approximately one hour per day for three consecutive days. On Day One, the curriculum focused on general egg related topics, such as: animals that lay eggs, parts of an egg, grading eggs, and egg nutrition. Following instruction, students were asked to color the four main sections of an egg, cut-out the top three sections, glue these sections together and then label the parts of an egg. On Day Two, chicken incubation was covered, as well as changes in

embryonic development. Incubator function, the types of eggs that can be incubated (fertile versus non-fertile eggs) and embryonic development were the main points of discussion. The hands-on activities for Day Two included sectional charts where students were asked to draw and color chicken embryos on days 2, 7, 14, 19, and 21 of development. On Day Three, the theme was to highlight safe handling of eggs and chicks to help students learn about germs. The hands-on activity featured a demonstration using Glo Germ™ in lotion, gel, and powder forms to highlight the wide spread of germs and the importance of proper hand cleaning. For this activity, a tennis ball was coated with Glo Germ™ and passed around a teaching circle. A black-light was then used to detect where the "germs" were located on the students' hands. Next, the students were sent to the restroom to wash their hands, which were reexamined upon their return. Students who failed to properly wash their hands were sent back to the restroom for additional cleaning. Although these instructions were provided to DVD instructed classroom teachers, they may have used slightly different procedures.

Pre and post-evaluations were used for student assessment (Table 1). Question one asked students about their knowledge of chickens. Questions two through seven and question thirty were qualitative in nature and used to evaluate motivation and feelings toward the topics being taught. Questions eight through twenty-nine were fact-based and taken directly from the curriculum being used. Before any lessons were taught, students were given the pre-evaluation (Table

1). On Day Three, following the hands on activity, students were given the same test to evaluate a change in their understanding of the materials.

The evaluation instrument was beta tested for readability using third grade students unknown to the project. The Purdue University Institutional Review Board (IRB) approved the protocol entitled "An Evaluation of the Use of Live Animal Models in the Classroom," reference #0510003041.

Statistical Analysis

The absolute composite score, as well as the relative difference within questions were monitored. Within each question, a student could either get the question correct, wrong or choose "I do not know." These were the same choices available on the post-evaluation. Therefore, this study examined how the student changed his or her choice within questions between the pre-evaluation and the post-evaluation that followed the two delivery methods (DVD or live instruction). All scores were analyzed (t-test) using the Statistical Package for the Social Sciences (SPSS® 12.0 for Windows, 2003), as well as Microsoft Excel©. Significant differences were set at $P \leq 0.05$ unless otherwise noted.

Results

No differences were found between the classrooms when comparing overall composite mean scores. The DVD classrooms had a pre-evaluation mean score of 61.9% and a post–evaluation mean of 80.5%, which represented an increase of 18.4%. The live instruction classrooms had a pre-evaluation mean score of 63% and a post-evaluation mean score of 84.8%, for a net increase of 21.8%. Students independently changed their answers on certain

questions from the pre to post-evaluation. In the qualitative portion of the evaluation, students were asked which day they learned the most. Regardless of instruction method, students clearly favored Day Three (Table 2). However, a higher percentage ($P \leq 0.05$) of students in live instruction classrooms indicated they learned more on Day Three (79.83%) than the percentage of DVD instructed students (54.76%). Within the DVD classrooms, there was no difference in students' perception of learning between days one and two, but more students felt they learned the most on Day Three (Table 2). Conversely, in the live instruction classrooms, there were daily increases ($P \leq 0.05$) in the percentage of students who indicated they learned more on a particular day with the highest ($P \leq 0.05$) percentage of students choosing Day Three (Table 2).

The response to statement two, varied by classroom instruction. Students in live instruction classrooms displayed an increase ($P \leq 0.05$) from pre to post-evaluation in their choice of 'always' as the response to the statement "I am able to focus more when I can see what is being taught." (Figure 1). However, there was no difference from pre to post-evaluation in the percentage of DVD classroom students who chose 'always' as a response to the same statement. Regardless of classroom instruction, the trend for choosing 'sometimes' and 'I do not know' as responses to statement two displayed a sharp decrease ($P \leq 0.05$) from pre to post-evaluation (Figure 1). When faced with the statement, "I am able to focus more when I can see what is being taught," a higher percentage ($P \leq 0.05$) of DVD classroom students chose 'never' as a response on their post-evaluations than the same students did on their pre-evaluations. Numerically,

the live instruction classroom students decreased their choice of 'never' as a response to this same statement from pre to post-evaluation.

When given the statement, "I understand a topic more just by hearing and seeing the information with no live animals," 'sometimes' was the most frequent response from both DVD and live instruction classrooms. However, only DVD classroom students displayed a sharp increase ($P \leq 0.05$) in this response from pre to post-evaluation (Figure 2). A larger number of DVD classroom students chose 'always' as a response to this statement on their post-evaluation than they did on their pre-evaluation. On the contrary, a lower number of live instruction classroom students chose 'always' on their post-evaluations than the same students did on their pre-evaluations. Twenty-eight percent of the students in the DVD classroom answered 'I do not know' to statement three on their pre-evaluation and the percentage who chose this same response dropped ($P \leq 0.05$) sharply on the post-evaluation (Figure 2). The live instruction classrooms had only a numerical decrease from pre to post-evaluation for 'I do not know' as a response to question three (Figure 2). There were no differences between pre versus post-evaluation scores within or across classrooms for the choice of 'never' as a response to statement three.

Statement four was, "I feel that I understood the material better because I could see the incubator and chicks." Both live instruction and DVD classroom students had a higher ($P \leq 0.05$) response of 'always' on the post-evaluation than they did on the pre-evaluation for statement four (Figure 3). However, a higher percentage ($P \leq 0.05$) of live instruction classroom students chose 'always' as

their response to the statement four on the post-evaluation than did DVD classroom students. For the response 'sometimes', only the live instruction classrooms post responses were lower ($P \leq 0.05$) when compared to pre-evaluation responses with no differences in DVD classrooms (Figure 3). Both classrooms displayed decreases ($P \leq 0.05$) in post-evaluation scores compared to pre-evaluation scores for the answers 'I do not know', with no differences in the response of 'never'. However, a higher percentage of DVD classroom students chose 'I do not know' as a response to statement four, on both the pre and post-evaluation, than did their live instruction counterparts (Figure 3).

Students seem to enjoy hands-on activities. Students in this study were asked to respond to the statement, "Hands-on activities keep my attention for a longer period of time." Both the DVD and live instruction classrooms were clearly skewed towards the 'always' response. Within the DVD classrooms the 'always' response showed the greatest increase ($P \leq 0.05$) in frequency of selection from pre to post-evaluation, compared to a simple numerical increase for live instruction classrooms (Figure 4). For both DVD and live instruction classrooms the 'sometimes' answer showed only a numerical change from pre to post-evaluation. The 'I do not know' response decreased ($P \leq 0.05$) from pre to post-evaluation among DVD classroom students. There was a numerical increase in the 'I do not know' response among live instruction classroom students from the pre to post-evaluation (Figure 4). Both DVD and live instruction classrooms had a modest decrease in students that chose 'never' as a response to, "hands-on activities keep my attention for a longer period of time" (Figure 4). On statement

seven, "I enjoy learning with animals," the majority of students in both DVD and live instruction classrooms indicated they 'always' enjoy learning with animals (Figure 5). Comparing the pre and post-evaluation responses on statement seven of the DVD and live instruction classrooms, there were no differences regardless of answer choice, but nearly all (99%) of the responses were either 'always' or 'sometimes' (Figure 5).

The remaining quantitative statements and questions were grouped according to content into four categories: egg, incubator, food safety, and general questions. Comparisons were designed to understand how student responses changed from pre to post-evaluations between classroom instruction types. Statements and questions 8, 13, 14, 19, 20, 21, 23, and 26 were grouped into the egg category. In general, live instruction students improved their post-evaluation scores on egg type statements more than DVD instructed students. On question eight, a higher percentage ($P \leq 0.05$) of live instruction students selected the right answer on the post-evaluation after selecting the wrong answer on the pre-evaluation, than did DVD classroom students (Table 3). However, there were more ($P \leq 0.05$) students in the DVD classrooms that went from 'I do not know' on the pre-evaluation to choosing the wrong answer or 'I do not know' on the post-evaluation than students in live instruction classrooms (Table 3). When identifying yolk function, a higher ($P \leq 0.05$) percentage of live instruction students changed from the right answer on the pre-evaluation to the wrong answer on the post-evaluation than did DVD students (Table 3). In terms of knowing whether brown eggs or white eggs are nutritionally better, live instruction

classrooms had greater ($P \leq 0.05$) change from 'I do not know' on the pre-evaluation to the right answer on the post-evaluation. A higher ($P \leq 0.05$) percentage of live instruction students also improved from the wrong answer on the pre-evaluation to the right answer on the post-evaluation, compared to DVD students (Table 3). DVD students more ($P \leq 0.05$) consistently chose the wrong answer to whether Brown eggs are better to eat than white eggs (Table 3). A higher ($P \leq 0.05$) percentage of live instruction students were able to correctly identify which kind of eggs would hatch into chickens, than DVD students (Table 3).

Identifying parts of an egg posed a challenge for all students. In fact, the choices by students across both classrooms appeared completely random for question twenty (Table 3). When asked what the chalazae does, live instruction students were more ($P \leq 0.05$) likely to choose the wrong answer on both the pre and post-evaluation than DVD students (Table 3). When asked where the yellow belongs on the egg, DVD classrooms were more ($P \leq 0.05$) successful at choosing the right answers on both the pre and post-evaluation than live instruction students (Table 3). When asked what the germinal disk is, live classroom students were more ($P \leq 0.05$) likely to switch from answer B on the pre-evaluation to the correct answer on the post-evaluation, than DVD students (Table 3). Live instruction students were also more ($P \leq 0.05$) likely to switch from 'wrong answer D' on the pre-evaluation to the right answer on the post-evaluation, when asked how long a chicken egg needs to be incubated before it hatches (Table 3).

Questions 15, 24, and 25 were categorized into food nutrition and food safety. When asked whether grade B eggs are fresher than grade AA eggs, live classroom students were more ($P \leq 0.05$) likely to switch from 'I do not know' on the pre-evaluation to the correct answer on the post-evaluation, than DVD students (Table 4). Conversely, DVD classroom students were more ($P \leq 0.05$) likely to choose another incorrect answer on the post-evaluation as opposed to getting the question correct. When asked to determine which of four foods has the most calories, DVD students were more likely ($P \leq 0.05$) to switch from wrong answer A (Apple) on the pre-evaluation to the right answer (Snickers Candy) on the post-evaluation compared to live instruction students (Table 4). Question twenty-five did not show any differences ($P \leq 0.05$) between DVD and live instruction students' probability of in changing answers from the pre-evaluation to the post-evaluation.

Questions 16, 17, and 29 could not be categorized as egg, food safety or incubator questions and were thus, considered general questions. When asked why it is important to wash your hands after touching chickens, most students chose the correct answer on both the pre-evaluation and the post-evaluation. However, DVD students had a higher ($P \leq 0.05$) probability of choosing the right answer on both evaluations than live instruction students (Table 5). Live instruction students were more ($P \leq 0.05$) likely to change their answer from 'I do not know' on the pre-evaluation to the right answer on the post-evaluation, than DVD students (Table 5). When faced with the statement, "chicks are very delicate," DVD students were more ($P \leq 0.05$) likely to change their answer from

'I do not know' on the pre-evaluation to the correct answer on the post-evaluation, than live instruction students (Table 5). Question twenty-nine did not show any differences between DVD and live instruction classrooms (Table 5).

Questions 9, 10, 22, and 27 were categorized as incubator questions. Live instruction classrooms were more ($P \leq 0.05$) likely to know that humidity is important in an incubator than DVD classrooms on both the pre-evaluation and the post-evaluation (Table 6). However, DVD students were more ($P \leq 0.05$) likely to choose a wrong answer on the pre-evaluation and then pick the right answer on the post-evaluation than live instruction students. DVD students were more ($P \leq 0.05$) likely than live instruction students to incorrectly identify 102 degrees Fahrenheit as the right temperature in an incubator on their post-evaluation, after saying this same temperature was either too hot (the correct answer) or just right (the wrong answer) on their pre-evaluation. When asked what an incubator does, live instruction students were more ($P \leq 0.05$) likely to change from the correct answer on the pre-evaluation to the incorrect answer on the post-evaluation, than DVD students. When asked what happens on day nineteen of incubation, live instruction students were more ($P \leq 0.05$) likely than DVD students to choose a correct answer on the post-evaluation, regardless of whether they chose the wrong or right answer on the pre-evaluation (Table 6).

Discussion

The similarity of results between DVD and live instruction classrooms could be the result of several factors. Technology has become very important in most students' lives. The DVD instructed students may have been intrigued by the idea of learning by watching a 'movie'. However, the use of a new media may have set-up unrealistic expectations. Students today are more exposed to media technology than at any other period in history. Consequently, the students in this study may have expected something "interactive" as opposed to a static movie. The use of multimedia will potentially be more cost effective for teachers. The preparation for animal-based lessons will be less intense. With the use of an interactive multimedia product, students will be able to learn at their own pace and at there own level. Fewer animals will have to be harvested after the DVDs are produced. Due to bio-security issues, animals have to be harvested if they come in contact with the general public. The farms that provide the animals would not have to export animals off the farm.

Several factors may have contributed to the differences between the DVD and live instruction classrooms' feelings about which day they learned more. Day One materials may have flooded the students with information in both the DVD and live instruction classrooms. However, students within live instruction classrooms had several factors competing for their attention, such as a new instructor and an incubator. Day Two materials related to eggs. The percentage of students who indicated they learned the most on Day Two was similar for both live instruction and DVD classrooms. Day Three included hatching chicks. Over

half of the students in both the live instruction and DVD classrooms indicated that they learned the most on Day Three. However, a higher percentage of live instruction students (79.83%) marked Day Three as the day they learned the most, compared to 54.76% of DVD students who said they learned the most on Day Three. The most likely factor that explains this difference between the two groups on Day Three would be the chicks actually being in the classroom coupled with the sounds they were making. Students in the live instruction classrooms were able to physically touch and hold the chicks on Day Three unlike the DVD classrooms. This response is somewhat expected, because animals have long provided positive benefits to individuals in a variety of situations, such individuals as hospital patients, nursing home residents, prison inmates, and disabled individuals (All et al., 1999). Perhaps the experience of touching the chicks and being able to see them caused a higher percentage of students in the live instruction classrooms to feel they learned more on Day-3. Comparing responses within DVD classrooms, it is possible that Day Three numbers were higher on the post-evaluation due to the student excitement about chicks hatching on the DVD. In addition, students learned about germs and had the most intensive hands-on activity on Day Three.

The results from pre to post-evaluation in both DVD and live instruction classrooms showed an increase in the percentage of students who felt they could focus more when they were able to see what was being taught. The lack of an incubator in the classroom may have contributed to the above response in DVD classrooms, where students may have realized they would have been able to

focus more had the incubator been in their classroom. The live instruction classrooms were able to see the incubator everyday throughout the curriculum, which may have allowed them to remain more focused. Jenkins et al. (2000) found that adults felt that person-to-person contact at meetings was the most effective method to get producers to seek additional information. Third grade students may be the same way, with a need to see the information in more than just written form. McGiffin and Brownly (1980) stated that youngsters need to become actively involved in the learning/discovering process. The use of live materials sustains greater interest, provides greater motivation, and assures more permanent retention (McGiffin & Brownly, 1980). These facts could have played a role in this study.

When faced with the statement, "I understand a topic more just by hearing and seeing the information with no live animals," a majority of the students in both the live instruction and DVD classrooms marked 'sometimes'. It depends on what topic is being taught but, not every educational lesson can incorporate animals. The students who did not know or felt they understood information better when they could see the incubator and chicks, may have answered 'sometimes' because they were unfamiliar with an incubator.

Experiential education is the process that links education, work, and personal development (Wulff-Risner & Stewart, 1997). Experiential learning activities include livestock judging, planting a garden, and presenting a demonstration. Any situation that has the 'do, apply, reflect' process is considered experiential learning. "I hear and I forget, I see and I remember, I do

and I understand" is a famous Chinese Proverb that may partially explain the differences observed in this study between live instruction and DVD classrooms. Students enjoy being able to use their hands to learn. Younger kids also enjoy having something to take home to show what they have learned.

In both DVD and live instruction classrooms, a majority of the students indicated that they 'always' enjoy learning with animals. These results validate that children respond in a positive manner to animals. Similar to previous results, students in live instruction classrooms had higher responses when compared to DVD classroom students. Most likely the improvement was due to the fact that live classroom students were able to experience real eggs and live chicks as teaching tools. An additional factor could be that in the live instruction classrooms the material was related more easily than it could be in DVD classrooms. Students who have difficulty understanding certain concepts on paper may be better able to understand kinesthetically, e.g., touching, feeling, thinking, and manipulating. Smith (2003) found that hands-on work captivates students and holds their attention in a manner that book learning cannot duplicate. Clearly, the students in DVD classrooms did not have the same experience and that may have lowered their scores.

Regardless of classroom instruction, there were only minor differences in the responses to food nutrition and food safety questions. However, live instruction did have slightly higher scores on questions 15 and 24 on choosing a right answer on their post-evaluation and this may be related to experience. Motivation of a student is often related to the teaching style of the instructor and

the preferred learning method of the pupil. Khan (1994) stated that experiential learning increases student motivation and comprehension. National surveys indicate that student motivation is a principle concern of teachers (Williams & Stockdale, 2004). Educators should strive to motivate and educate all students. At the same time, educators must recognize that students are motivated in a variety of ways. To keep up with the educational expectations of today's youth, teachers are called upon to use innovative teaching techniques (DeBord, 1989). Incorporating technology and electronics will help engage twenty-first century students. Some students learn best by doing, putting theory into practice (Smith & Reese, 2003). The live instruction students in this study may have been motivated to learn because of the incubator and chicks being in their classroom. DVD classroom students might have been just as motivated to learn if the incubator and chicks had been in their room.

Regardless of classroom instruction, question 20 gave students a challenge. The responses from students appeared to be completely random across all choices, which may have been due to the complexity of the word "chalazae". The researchers determined that more time should be allocated to explain complex words.

Knowing the correct temperature for chicken incubation was important for students to understand. The temperature that was given may have been too close to the actual range of temperatures required for proper growth of newly hatched chickens. The narrow choices may have confused kids which caused them to choose an incorrect answer.

After careful analysis of the responses to the questions in each category, it appears that live instruction students who chose the wrong answer to some of the pre-evaluation statements and questions, had a higher percentage of choosing the correct answer on the post-evaluation, than DVD students. There are several factors that could help explain this improvement by live instruction students. These factors include enthusiasm of the instructor, the incubator being in the classroom, the involvement of the classroom teacher, and prior chicken knowledge of both the teacher and the students.

TABLE 1. Pre and post-evaluation instrument used in third grade classrooms receiving either live instruction or instruction through the use of Digital Versatile Disc.

Questions	Answers			
1. I have chickens at home.	Yes	No		
2. I am able to focus more when I can see what is being taught.	Always	Sometimes	Do Not know	Never
3. I understand a topic more just by hearing and seeing the information with no live animals.	Always	Sometimes	Do Not know	Never
4. I feel that I understood the material better because I could see the incubator and chicks.	Always	Sometimes	Do Not know	Never
5. The hands on activities keep my attention for a longer period of time.	Always	Sometimes	Do Not know	Never
6. I felt that I learned more on day:	Day 1- Incubation	Day 2- Eggs	Day 3- Hatching	None
7. I enjoy learning with animals.	Always	Sometimes	Do Not know	Never
8. Non-fertile eggs will hatch into chicks.	A) Yes, they will hatch	B) No, they will not	C) I do not remember	
9. Humidity is important in an incubator.	A) Yes, it is very important	B) No, it is not important	C) I do not know	
10. 102 degrees Fahrenheit in an incubator is:	A) Too hot	B) Too cold	C) Just right	
11. Eggs must be turned while they are in an incubator because:	A) They will stick to the sides	B) Nothing will happen	C) I do not know	
12. Holes in an egg will allow:	A) You to see the chick	B) Bacteria to pass through	C) The chick to breath	D) I do not know
13. The yolk is the chicken's first food source.	A) No, they eat corn	B) Yes, it is good for them	C) No, they are too little to eat	D) I do not know
14. Brown eggs are better to eat than white eggs.	A) No, that is not true	B) Yes, that is true	C) I do not know	
15. Grade B eggs are fresher than Grade AA eggs.	A) Yes, that is true	B) No, that is not true	C) I do not know	
16. Washing your hands is important after touching chickens.	A) Yes, because of germs	B) No, chickens are clean	C) I do not know	
17. Chicks are very delicate.	A) No	B) Yes	C) I do not know	
18. What animal does not lay eggs?	A) Crocodile	B) Platypus	C) Bears	D) Chickens
19. What kind of eggs will hatch into chickens?	A) Fertile	B) Non-fertile	C) Reptile eggs	D) Eggs from the store

TABLE 1. Continued: Pre and post-evaluation instrument used in third grade classrooms receiving either live instruction or instruction through the use of Digital Versatile Disc.

Questions	Answers			
20. What does the chalazae do?	A) Gives the chick its first meal	B) Keeps the yolk in the middle of the egg	C) Protects the chick from bacteria	D) The spot where the chick grows
21. What is the yellow part of an egg called?	A) Albumen	B) Shell	C) Yolk	D) Chalazae
22. What does an incubator do?	A) Home for the chicks	B) Provides an environment for the egg to develop	C) Place to store chicken food	
23. The germinal disk is:	A) The spot where the chick grows from	B) Protects the chick from bacteria	C) Gives the chick its first meal	D) Keeps the yolk in the middle of the egg
24. Which food has the most calories?	A) Apple	B) Corn	C) Snickers candy	D) Egg
25. Which food has the most grams of fat?	A) Corn	B) Cheese	C) Egg	D) Snickers candy
26. How many days does a chick egg need to be incubated before it hatches?	A) 18 days	B) 26 Days	C) 21 days	D) 9 days
27. What happens on day 19 of incubation?	A) Eggs stop being rotated	B) The yolk goes into the chicks belly	C) The chick begins to develop	
28. How does the chick get out of the egg?	A) They use their claws	B) They use their tooth	C) They use their wings	
29. How do we get rid of germs on our hands?	A) Wash our hands	B) Wipe them on our pants	C) Lick them off	D) Give them to someone else
30. I like learning about chickens.	A) Yes, I do	B) No, I do not	C) I do not know	

TABLE 2. Percentage of answers to the question, "I felt that I learned more on day?" from third grade students receiving either live classroom instruction or digital versatile disc (DVD).

	DVD (%)	Live (%)
Day 1-Incubation	$22.22^{a,y}$	$5.88^{b,x}$
Day 2-Eggs	19.05^{y}	14.29^{y}
Day 3-Hatching	$54.76^{b,z}$	$79.83^{a,z}$
None	$3.97^{a,x}$	$0.00^{b,w}$

SE* ± 0.05 (rows) ± 0.04 (columns)

[a,b] Percentages within a row for each parameter with no common superscript are significantly different ($P \leq 0.05$) by T-test.

[x-z] Percentages within a column for each parameter with no common superscript are significantly different ($P \leq 0.05$) by T-test.

*Standard error (SE) based on pooled estimate of variance.

TABLE 3: Percentage of responses to egg-type statements and questions posed to third grade students receiving instruction by either live demonstration or the same materials presented through digital versatile disc (DVD).

8: Non-fertile eggs will hatch into chicks.	DVD	Live	SE*
Wrong - Wrong	0.10	0.08	± 0.01
Wrong (Yes, they will hatch) – Right (no, they will not)	0.12[b]	0.29[a]	± 0.12
Wrong - I do not know	0.02	0.05	± 0.02
Right - Right	0.05	0.02	± 0.02
Right - Wrong	0.24	0.22	± 0.01
Right - I do not know	0.00	0.01	± 0.01
I do not know – Wrong (Yes, they will hatch)	0.06[a]	0.02[b]	± 0.03
I do not know - Right	0.28	0.28	± 0.00
I do not know - I do not know	0.13[a]	0.03[b]	± 0.07

13: The yolk is the chicken's first food source	DVD	Live	SE*
Wrong A - Wrong A	0.00	0.00	± 0.00
Wrong A - Right	0.06	0.02	± 0.03
Wrong A - Wrong C	0.00	0.00	± 0.00
Wrong A - I do not know	0.01	0.00	± 0.01
Right - Wrong A	0.00	0.00	± 0.00
Right - Right	0.44	0.47	± 0.02
Right (Yes, it is good for them) - Wrong C (they are too little to eat)	0.00[b]	0.03[a]	± 0.02
Right - I do not know	0.01	0.01	± 0.00
Wrong C - Wrong A	0.00	0.01	± 0.01
Wrong C - Right	0.08	0.05	± 0.02
Wrong C - Wrong C	0.02	0.02	± 0.00
Wrong C - I don't know	0.02	0.01	± 0.01
I do not know - Wrong A	0.02	0.05	± 0.02
I do not know - Right	0.29	0.30	± 0.01
I do not know - Wrong C	0.02	0.01	± 0.01
I do not know - I do not know	0.03	0.02	± 0.01

TABLE 3: Continued: Percentage of responses to egg-type statements and questions posed to third grade students receiving instruction by either live demonstration or the same materials presented through digital versatile disc (DVD).

14: Brown eggs are better to eat than white eggs.

	DVD	Live	SE*
Right – Right	0.35	0.44	± 0.06
Right - Wrong	0.15	0.08	± 0.05
Right - I do not know	0.06	0.04	± 0.01
Wrong (Yes, that is true) – Right (No, that is not true)	0.03[b]	0.11[a]	± 0.05
Wrong - Wrong	0.08[a]	0.03[b]	± 0.04
Wrong - I do not know	0.00	0.00	± 0.00
I do not know – Right (No, that is not true)	0.14[b]	0.24[a]	± 0.07
I do not know - Wrong	0.08	0.03	± 0.03
I do not know - I do not know	0.11[a]	0.03[b]	± 0.06

19: What kind of eggs will hatch into chickens?

	DVD	Live	SE*
Right (Fertile) – Right (Fertile)	0.44[b]	0.62[a]	± 0.13
Right - Wrong B	0.08	0.03	± 0.03
Right - Wrong C	0.00	0.01	± 0.01
Right - Wrong D	0.00	0.00	± 0.00
Wrong B - Right	0.24	0.16	± 0.06
Wrong B - Wrong B	0.06	0.02	± 0.03
Wrong B - Wrong C	0.00	0.00	± 0.00
Wrong B - Wrong D	0.00	0.00	± 0.00
Wrong C - Right	0.06	0.04	± 0.02
Wrong C - Wrong B	0.03	0.02	± 0.01
Wrong C - Wrong C	0.01	0.01	± 0.00
Wrong C - Wrong D	0.00	0.01	± 0.01
Wrong D - Right	0.05	0.08	± 0.03
Wrong D - Wrong B	0.01	0.00	± 0.01
Wrong D - Wrong C	0.00	0.00	± 0.00
Wrong D (Eggs from the store) - Wrong D (Eggs from the store)	0.02[a]	0.00[b]	± 0.02

TABLE 3: Continued: Percentage of responses to egg-type statements and questions posed to third grade students receiving instruction by either live demonstration or the same materials presented through digital versatile disc (DVD).

20: What does the chalazae do?	DVD	Live	SE*
Wrong A (Gives the chick its first meal) - Wrong A (Gives the chick its first meal)	0.01[b]	0.05[a]	± 0.03
Wrong A - Right	0.13	0.09	± 0.03
Wrong A - Wrong C	0.05	0.05	± 0.00
Wrong A Wrong D	0.05	0.03	± 0.02
Right - Wrong A	0.02	0.02	± 0.00
Right - Right	0.10	0.13	± 0.02
Right - Wrong C	0.02	0.01	± 0.01
Right - Wrong D	0.02	0.04	± 0.01
Wrong C - Wrong A	0.03	0.03	± 0.00
Wrong C - Right	0.15	0.20	± 0.04
Wrong C - Wrong C	0.06	0.06	± 0.00
Wrong C - Wrong D	0.01	0.03	± 0.01
Wrong D - Wrong A	0.05	0.04	± 0.00
Wrong D - Right	0.17	0.14	± 0.02
Wrong D - Wrong C	0.05	0.04	± 0.00
Wrong D - Wrong D	0.08	0.04	± 0.03

21: What is the yellow part of an egg called?	DVD	Live	SE*
Wrong A - Wrong A	0.00	0.01	± 0.01
Wrong A - Wrong B	0.00	0.01	± 0.01
Wrong A - Right	0.00	0.00	± 0.00
Wrong A - Wrong D	0.00	0.00	± 0.00
Wrong B - Wrong A	0.00	0.00	± 0.00
Wrong B - Wrong B	0.00	0.00	± 0.00
Wrong B - Right	0.02	0.02	± 0.00
Wrong B - Wrong D	0.00	0.00	± 0.00
Right - Wrong A	0.02	0.02	± 0.00
Right (Yolk) - Wrong B (Shell)	0.00[b]	0.03[a]	± 0.02
Right (Yolk) – Right (Yolk)	0.93[a]	0.86[b]	± 0.05
Right - Wrong D	0.00	0.00	± 0.00
Wrong D - Wrong A	0.00	0.01	± 0.01
Wrong D - Wrong B	0.00	0.00	± 0.00
Wrong D - Right	0.02	0.04	± 0.01
Wrong D - Wrong D	0.01	0.00	± 0.01

TABLE 3: Continued: Percentage of responses to egg-type statements and questions posed to third grade students receiving instruction by either live demonstration or the same materials presented through digital versatile disc (DVD).

23: The germinal disk is:	DVD	Live	SE*
Right - Right	0.09	0.15	± 0.05
Right - Wrong B	0.06	0.06	± 0.00
Right - Wrong C	0.02	0.02	± 0.00
Right - Wrong D	0.06	0.03	± 0.02
Wrong B (protects the chick from bacteria) – Right (the spot where the chick grows from)	0.07[b]	0.22[a]	± 0.10
Wrong B - Wrong B	0.10	0.08	± 0.01
Wrong B - Wrong C	0.03	0.05	± 0.01
Wrong B - Wrong D	0.04	0.04	± 0.00
Wrong C - Right	0.06	0.05	± 0.01
Wrong C - Wrong B	0.04	0.03	± 0.01
Wrong C - Wrong C	0.02	0.00	± 0.01
Wrong C - Wrong D	0.05	0.04	± 0.00
Wrong D - Right	0.10	0.08	± 0.02
Wrong D - Wrong B	0.13	0.08	± 0.04
Wrong D - Wrong C	0.04	0.01	± 0.02
Wrong D - Wrong D	0.09	0.06	± 0.02

26: How many days does a chick egg need to be incubated before it hatches?	DVD	Live	SE*
Wrong A - Wrong A	0.02	0.01	± 0.01
Wrong A - Wrong B	0.00	0.01	± 0.01
Wrong A - Right	0.25	0.18	± 0.05
Wrong A - Wrong D	0.00	0.00	± 0.00
Wrong B - Wrong A	0.02	0.00	± 0.01
Wrong B - Wrong B	0.02	0.01	± 0.01
Wrong B - Right	0.16	0.16	± 0.00
Wrong B - Wrong D	0.00	0.00	± 0.00
Right - Wrong A	0.01	0.01	± 0.00
Right - Wrong B	0.02	0.00	± 0.01
Right - Right	0.32	0.34	± 0.02
Right - Wrong D	0.00	0.00	± 0.00
Wrong D - Wrong A	0.02	0.02	± 0.00
Wrong D - Wrong B	0.00	0.01	± 0.01
Wrong D (9 days) - Right (21 days)	0.14[b]	0.24[a]	± 0.07
Wrong D – Wrong D	0.02	0.01	± 0.01

[a,b] Percentages within a row for each answer without common superscripts are significantly different ($p \leq .05$) by T-test.

*Standard error (SE)

TABLE 4: Percentage of responses to food nutrition and food safety statements and questions posed to third grade students receiving instruction by either live demonstration or the same material presented through digital versatile disc (DVD).

15: Grade B eggs are fresher than Grade AA eggs	DVD	Live	SE*
Wrong - Wrong	0.08	0.04	± 0.03
Wrong - Right	0.08	0.08	± 0.00
Wrong - I do not know	0.02	0.00	± 0.01
Right - Wrong	0.03	0.04	± 0.01
Right – Right	0.16	0.16	± 0.00
Right - I do not know	0.03	0.01	± 0.02
I do not know – Wrong (Yes, that is true)	0.17[a]	0.08[b]	± 0.07
I do not know – Right (No, that is not true)	0.20[b]	0.50[a]	± 0.22
I do not know - I do not know	0.23[a]	0.09[b]	± 0.10

24: What food has the most calories?	DVD	Live	SE*
Wrong A - Wrong A	0.00	0.00	± 0.00
Wrong A - Wrong B	0.01	0.00	± 0.01
Wrong A (Apple) – Right (Snickers®)	0.17[a]	0.08[b]	± 0.07
Wrong A - Wrong D	0.00	0.01	± 0.01
Wrong B - Wrong A	0.00	0.01	± 0.01
Wrong B - Wrong B	0.00	0.01	± 0.01
Wrong B - Right	0.04	0.03	± 0.01
Wrong B - Wrong D	0.00	0.00	± 0.00
Right - Wrong A	0.01	0.01	± 0.00
Right - Wrong B	0.01	0.00	± 0.01
Right – Right	0.60	0.61	± 0.00
Right - Wrong D	0.00	0.01	± 0.01
Wrong D - Wrong A	0.01	0.01	± 0.00
Wrong D - Wrong B	0.00	0.00	± 0.00
Wrong D - Right	0.13	0.20	± 0.05
Wrong D - Wrong D	0.02	0.02	± 0.00

[a,b] Percentages within a row for each question and parameter without common superscripts are significantly different ($p \leq .05$) by T-test.

*Standard error (SE)

TABLE 5: Percentage of responses to general statements and questions posed to third grade students receiving instruction by either live demonstration or the same materials presented through digital versatile disc (DVD).

16: Washing your hands is important after touching chickens.

	DVD	Live	SE*
Right (Yes, because of germs) – Right (Yes, because of germs)	0.98[a]	0.92[b]	± 0.04
Right - Wrong	0.00	0.00	± 0.00
Right - I do not know	0.00	0.00	± 0.00
Wrong - Right	0.00	0.02	± 0.01
Wrong - Wrong	0.00	0.00	± 0.00
Wrong - I do not know	0.00	0.00	± 0.00
I do not know – Right (Yes, because of germs)	0.02[b]	0.06[a]	± 0.03
I do not know - Wrong	0.00	0.00	± 0.00
I do not know - I do not know	0.00	0.00	± 0.00

17: Chicks are very delicate.

	DVD	Live	SE*
Wrong (No) – Wrong (No)	0.01[b]	0.05[a]	± 0.03
Wrong - Right	0.06	0.11	± 0.04
Wrong (No) - I do not know	0.00[b]	0.03[a]	± 0.02
Right - Right	0.02	0.03	± 0.01
Right - Wrong	0.75	0.66	± 0.06
Right (Yes) - I do not know	0.01[b]	0.04[a]	± 0.02
I do not know – Wrong (No)	0.00[b]	0.03[a]	± 0.02
I do not know – Right (Yes)	0.12[a]	0.02[b]	± 0.07
I do not know - I do not know	0.03	0.03	± 0.00

[a,b] Percentages within a row for each question and parameter without common superscripts are significantly different ($p \leq .05$) by T-test.
*Standard error (SE)

TABLE 6: Percentage of responses to incubator statements and questions posed to third grade students receiving live instruction or the same material presented through digital versatile disc (DVD).

9: Humidity is important in an incubator	DVD	Live	SE*
Right (Yes, it is very important) – Right (Yes, it is very important)	0.45[b]	0.67[a]	± 0.16
Right - Wrong	0.02	0.02	± 0.00
Right - I do not know	0.03	0.03	± 0.00
Wrong (no, it is not important) – Right (Yes, it is important)	0.06[a]	0.02[b]	± 0.03
Wrong - Wrong	0.01	0.00	± 0.01
Wrong - I do not know	0.00	0.00	± 0.00
I do not know - Right	0.29	0.25	± 0.03
I do not know - Wrong	0.02	0.00	± 0.01
I do not know - I do not know	0.12[a]	0.03[b]	± 0.06

10: 102 degrees Fahrenheit in an incubator is	DVD	Live	SE*
Right - Right	0.21	0.30	± 0.06
Right - Wrong B	0.00	0.01	± 0.01
Right (Too hot) - Wrong C (Just right)	0.26[a]	0.07[b]	± 0.14
Wrong B - Right	0.01	0.02	± 0.01
Wrong B - Wrong B	0.00	0.00	± 0.00
Wrong B - Wrong C	0.02	0.00	± 0.01
Wrong C – Right	0.11	0.36	± 0.18
Wrong C (Just right) - Wrong B (Too cold)	0.02[a]	0.00[b]	± 0.02
Wrong C (Just right) - Wrong C (Just right)	0.37[a]	0.24[b]	± 0.09

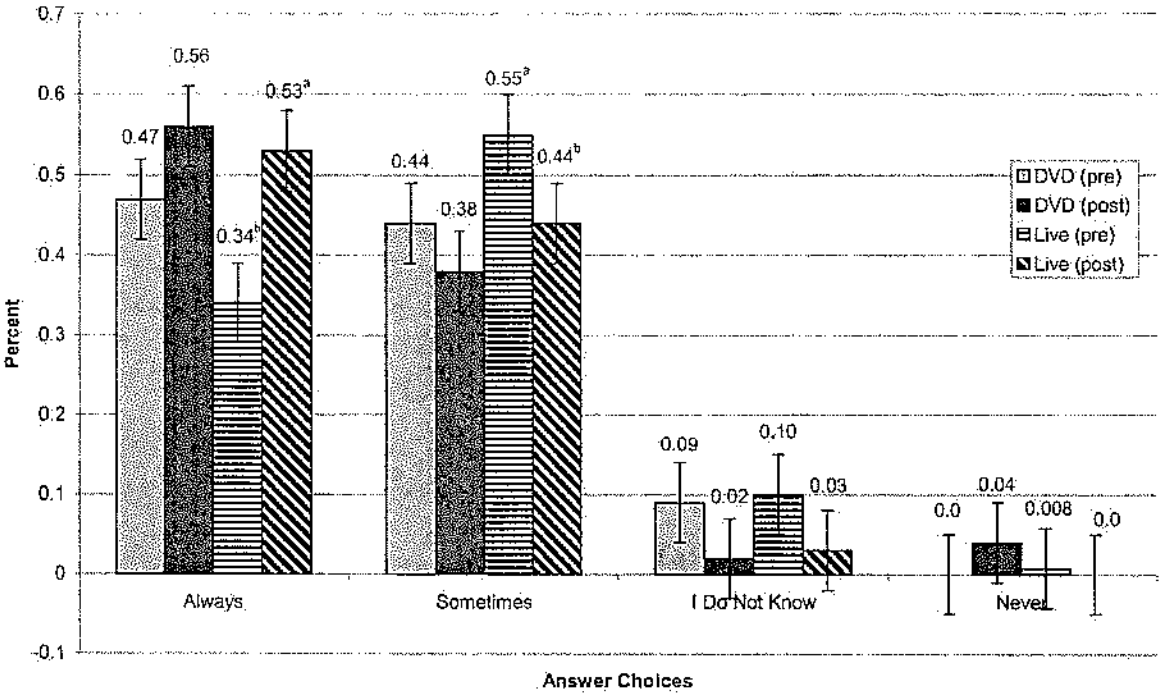
22: What does an incubator do	DVD	Live	SE*
Wrong A - Wrong A	0.02	0.05	± 0.02
Wrong A - Right	0.18	0.11	± 0.05
Wrong A - Wrong C	0.01	0.01	± 0.00
Right (Provides an environment for the egg to develop) - Wrong A (Home for the chicks)	0.02[b]	0.11[a]	± 0.06
Right - Right	0.66	0.64	± 0.01
Right - Wrong C	0.01	0.02	± 0.01
Wrong C - Wrong A	0.01	0.03	± 0.02
Wrong C - Right	0.06	0.03	± 0.02
Wrong C - Wrong C (Place to store chicken food)	0.03[a]	0.00[b]	± 0.02

Table 6 Continued: Percentage of responses to incubator statements and questions posed to third grade students receiving live instruction or the same material presented through digital versatile disc (DVD).

27: What happens on day 19 of incubation	DVD	Live	SE*
Right A - Right A	0.02	0.02	± 0.00
Right A - Right B	0.08	0.08	± 0.00
Right A - Wrong	0.06	0.02	± 0.03
Right B - Right A	0.02	0.04	± 0.02
Right B (The yolk goes into the chick's belly) - Right B (The yolk goes into the chick's belly)	0.06[b]	0.13[a]	± 0.04
Right B - Wrong	0.03	0.01	± 0.02
Wrong (the chick begins to develop) - Right A (Eggs stop being rotated)	0.05[b]	0.13[a]	± 0.06
Wrong - Right B	0.48	0.45	± 0.02
Wrong (the chick begins to develop) – Wrong (the chick begins to develop)	0.20[a]	0.12[b]	± 0.06

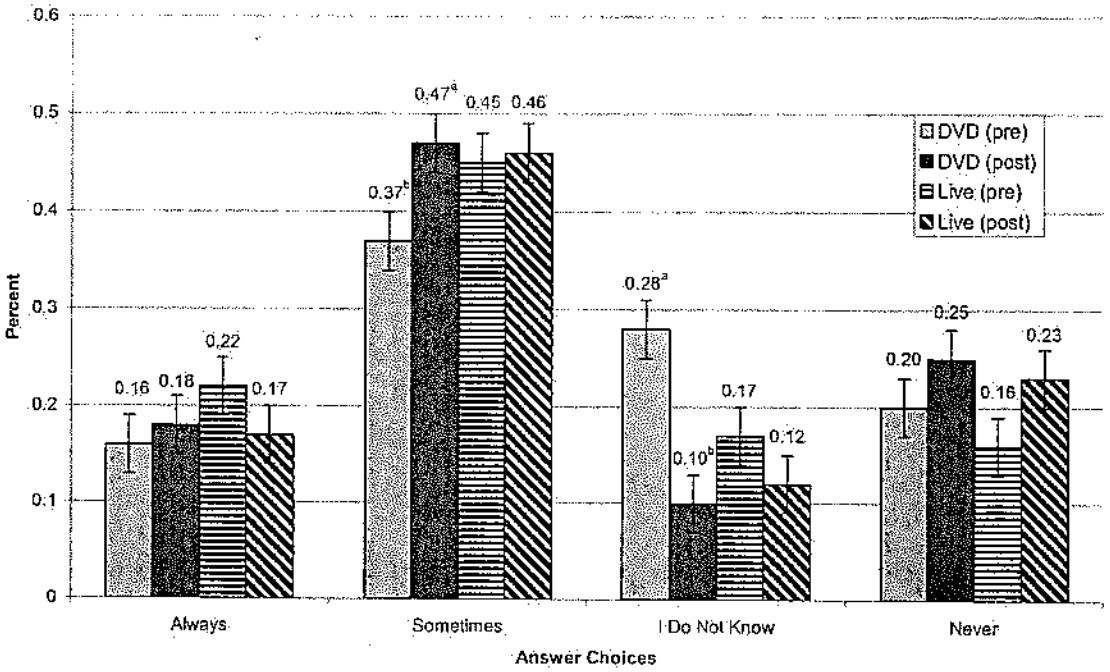
[a,b] Percentages within a row for each question and parameter without common superscripts are significantly different ($p \leq .05$) by T-test.

*Standard error (SE)



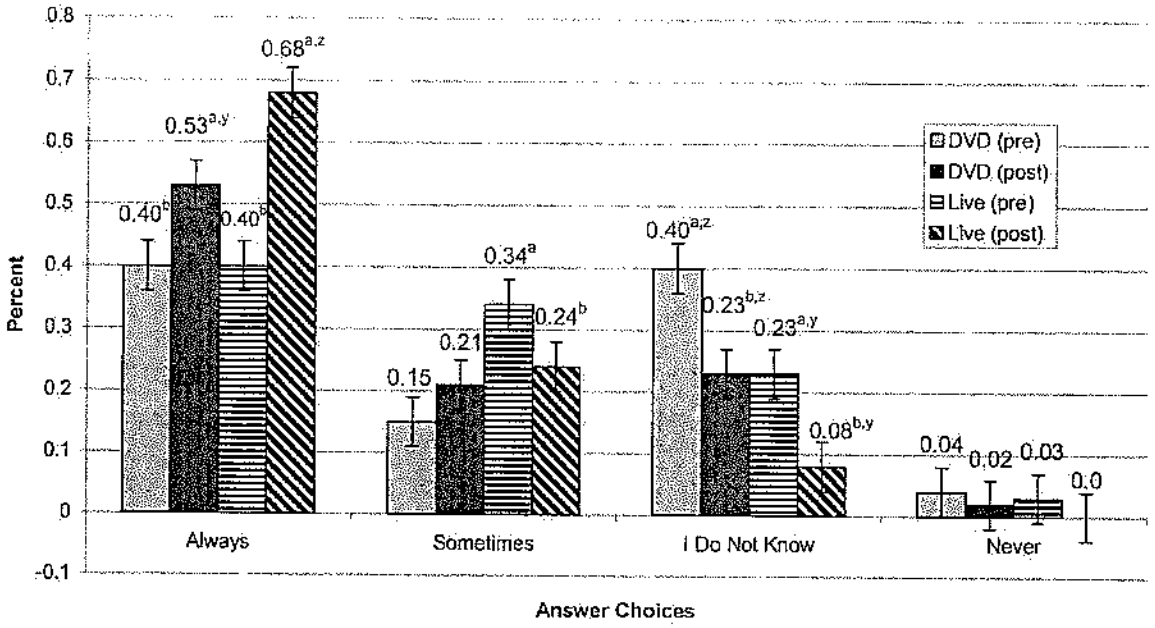
[a,b] Percentages within each teaching method that compare pre and post-evaluation responses and have different superscripts are significantly different ($P \leq 0.05$) by T-test.
Note. Standard error ± 0.05 based on pooled estimate of variance.

Figure 1. Percentage of responses to the statement, "I am able to focus more when I can see what is being taught," from third grade students receiving live instruction or the same material presented through digital versatile disk (DVD).



[a,b] Percentages within each teaching method that compare pre and post-evaluation responses and have different superscripts are significantly different ($P \leq 0.05$) by T-test.
Note. Standard error ± 0.03 based on pooled estimate of variance.

Figure 2. Percentage of responses to the statement, "I understand a topic more just by hearing and seeing the information with no live animals," from third grade students receiving live instruction or the same material presented through digital versatile disk (DVD).

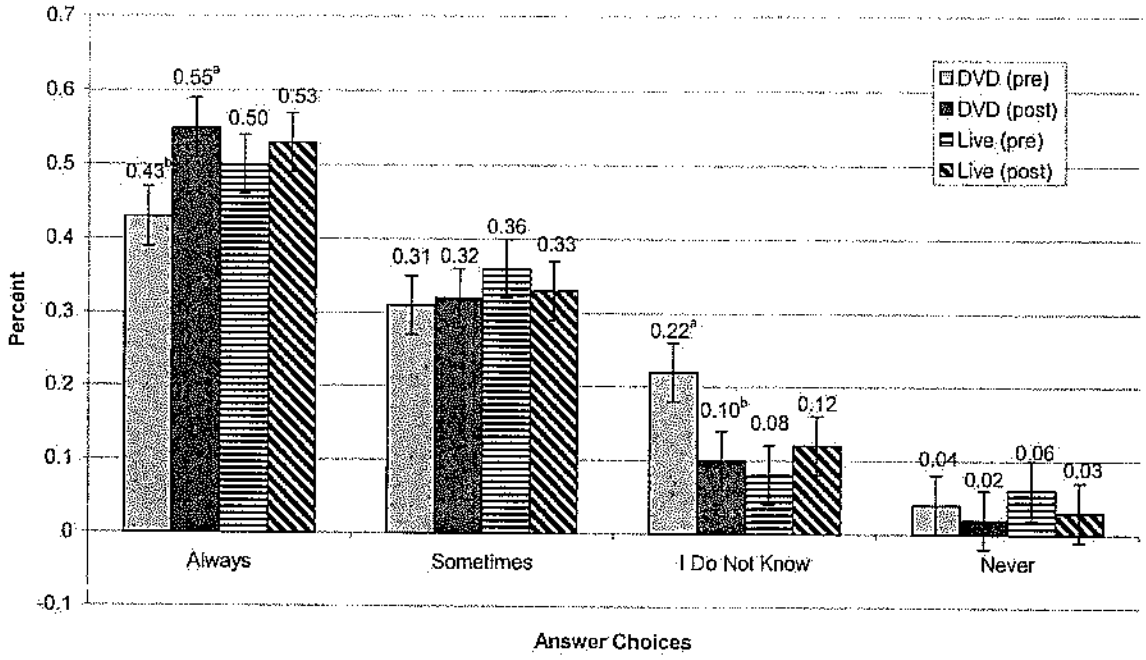


[a,b] Percentages within each teaching method that compare pre and post-evaluation responses and have different superscripts are significantly different ($P \leq 0.05$) by T-test.

[y,z] Percentages across teaching methods that compare pre and post-evaluation responses and have different superscripts are significantly different ($P \leq 0.05$) by T-test.

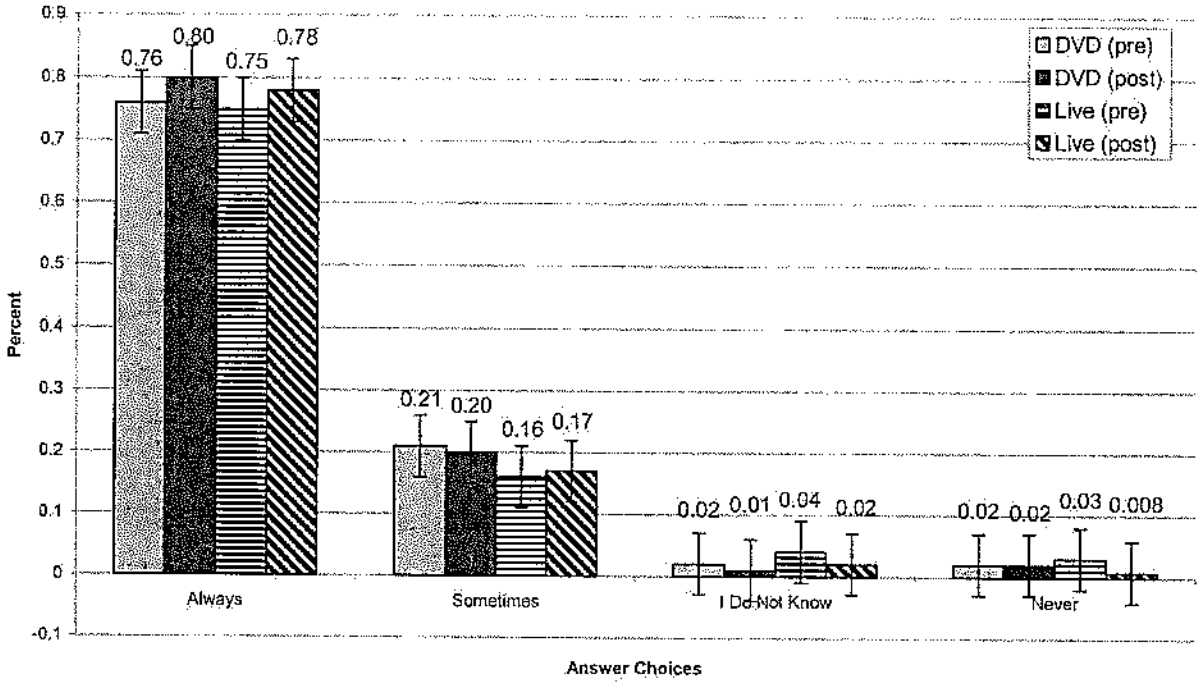
Note. Standard error ± 0.04 based on pooled estimate of variance.

Figure 3 Percentage of responses to the statement, "I feel that I understand the material better because I could see the incubator and chicks," from third grade students receiving live instruction or the same material presented through digital versatile disk (DVD).



[a,b] Percentages within each teaching method that compare pre and post-evaluation responses and have different superscripts are significantly different ($P \leq 0.05$) by T-test.
Note. Standard error ± 0.04 based on pooled estimate of variance.

Figure 4. Percentage of responses to the statement, "Hands-on activities keep my attention for a longer period of time," from third grade students receiving live instruction or the same material presented through digital versatile disk (DVD).



Note. Standard error ± 0.05 based on pooled estimate of variance.

Figure 5. Percentage of responses to the statement, "I enjoy learning with animals," from third grade students receiving live instruction or the same material presented through digital versatile disk (DVD).

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The purpose of this study was to determine whether students learn more information by having a live teacher with live animals in their classroom, or if they learn equally well from a Digital Versatile Disc (DVD) with recorded teaching and footage of live animals. The composite scores suggest that there was no difference between the DVD and live instruction classrooms. Upon investigation of categorical questions, a difference was found; that is, an apparent trend began to emerge between the two classroom types within certain categories of statement and questions. The live instruction students who chose the wrong answer to pre-evaluation statements and questions had a higher probability of choosing the correct answer on the post-evaluation than DVD students. These students were able to look at real eggs and identify on the evaluation the parts of an egg much more accurately when compared to DVD students. Live instruction students had access to a poster size egg that could be taken apart, allowing them to identify the specific parts of an egg. The egg discussion was taught on Day One. However, on days two and three the instructor reflected back on previously taught materials in the live classroom, which provided reinforcement of the materials. This additional explanation for live instruction students provided an opportunity to revisit the information daily, as well as an opportunity for

students to ask questions. It is possible that this reinforcement made live instruction students more likely to choose the correct answers on the post-evaluation than DVD classroom students. Furthermore, the fact that live instruction students had an incubator and live chicks in their classroom made their learning experience much more hands-on than that of DVD students. In the food nutrition and food safety statements and questions, there was virtually no difference between DVD and live instruction classroom scores. Since there was only a small number of questions (three) in this category it was difficult to detect a real difference. This might suggest that more effort needs to be placed in both classroom types and the students reexamined. The general questions category only had three questions as well; however, the DVD classrooms were more likely to have a correct answer on both the pre and post-evaluation than live classroom students. As the instructor in the live classrooms, who was not present in the DVD classrooms, it is difficult to explain this outcome. It is possible; however, that some of the teachers in DVD classrooms may have clued-in the students to a correct answer without intending to give away the answer. Conversely, in the live instruction classrooms, the instructor consistently explained the words in the evaluation instrument during the pre and post-evaluation.

As the instructor, on the DVD and in the live instruction classrooms, the researcher visited both classroom types and found that students enjoyed the interaction with live animals. This was not surprising, given the popularity of "Incubators in the Classroom." Many of the DVD students commented to their classroom teacher that they wished the instructor on the DVD could have come

to their classroom and presented the materials. Once again, having the ability to see, touch, and hear the chicks may have been the most engaging part of the curriculum and may have influenced some students' motivation to learn. As a treat to the DVD students, an incubator and chicks were placed in their classroom the week following the chicken curriculum. The researcher had verbal conversations with DVD classroom teachers, who confirmed that their students had more questions about the incubator and chicks hatching than they did during their DVD lessons. Even though the DVD classroom students had the same hands-on activities, the absence of live instruction and an incubator affected their learning experience. The interaction that was practiced in the live instruction classroom involved the students congregating on the floor in a circle and having fruitful discussion. This format permitted students to work together and learn new material by comfortably asking questions at anytime, which elevated the learning experience. Live instruction students responded well to the new instructor and the three-day curriculum. The instructor felt the students were engaged in the learning process.

In conclusion, it appeared that live instruction coupled with learning materials improved the learning environment and stimulated motivation factors. Alternatively, the decrease in correct responses in certain categories of statements and questions by DVD instructed students may have been influenced by DVD quality (students today may have a much higher expectation) or this may have been the first time they were expected to "learn" information from video instruction.

Recommendations

The present study validates the need for further research to be done with live animals in the classroom, as well as the use of digital media to bring animals into the classroom.

Secondly, an in-depth inquiry should be done to assess specific questions related to motivation. The best way to learn how to motivate students is to ask them directly, which may lead to some very interesting findings (Mankin et al., 2004). Taking time to meet with each student to find out what motivates them would have strengthened questions about student motivation. Since this was not the focus of this study, motivation research was not conducted. However, to educate students to the best of their ability, researchers should give students input on how they learn best.

The final area to improve would be the DVD. Changing the DVD to an interactive program would allow students to manipulate the content and material. An interactive DVD would give students a chance to investigate areas and topics that may have been difficult for them to grasp. As technology becomes more advanced and relevant in everyday lives, educators are forced to adapt and intrigue students with activities in order to hold their attention.

There are several perspectives to consider when answering the question, 'Is it worthwhile to provide animals in the classroom.' As an instructor, it would be easy to allow a media device to teach lessons without incorporating live animals. However, the lack of interaction between students and animals might hinder students' excitement about the topic. The researcher's recommend that

the teachers use live animals in the classroom, purely for the satisfaction and excitement they bring to students. Since educators have the ability shape the minds of young people, why not incorporate with the use of animals.

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APPENDICES

Appendix A: Teaching Curriculum

Day 1
Eggs

- Which animals lay eggs?

Oviparous is the scientific term for animals that lay eggs with a shell from which offspring emerge. Not only do many reptiles fall in this category, but also birds and even platypus are oviparous. The eggs of most reptiles have a leather-like shell that thins as the hatch date looms near. Some reptiles, such as turtles and tortoises produce eggs with hard shells. Eggs of reptiles come in all different sizes and shapes to best accommodate the size and shape of the offspring.

Chickens, crocodiles, alligators, platypus, reptiles, and ducks are examples of egg layers

- The difference between eggs purchased at the store and hatching eggs
  Eggs from the store are non-fertilized and will not hatch into chicks.
  Eggs that produce chicks are fertile
  Brown eggs versus white eggs - no difference except shell color, different diets, or different genetics
- Do "Eggsploring The Egg" activity (book grades 2-5, pages 14 & 15) reference
  - Parts of an egg
    Yolk-
    Chalaza-
    Vitelline Membrane-
    Germinal Disc-
    Air Cell-
    Inner membrane-
    Outer Membrane-
    Shell-
    Albumen or white-
  - Student involvement with card board cut-outs and/or string of each of the parts. On the back or on an attached sheet, have students read the purpose of each part.
- 'Give Eggs a Break" activity Part 2 Egg Grade (book grades 6-8, pages 16 & 17)
  Have all three types of eggs (if possible)
  Grade AA-very small air cells, Chalaza is easy to see
  Grade A- broken egg yolk sits up high and the white spreads very little. Thick white

is larger than the thin white.
Grade B- yolk is flat and most of the white is thin and spreads easily from the yolk

- What's in an egg? How is eating an egg good for our bodies?
  Eggs provide a high source of protein and essential amino acid

- Nutritional values of an egg and other food items.

	Egg 50g	Snickers Candy Bar 100g	Apple 113.4g	Corn Yellow canned whole kernel 1 cup	Bread 1 slice	Cheese Cheddar 1 cubic inch
Calories	75	479	63	133	67	68
Total Fat	6g	25g	.38g	1.64g	.90g	5.63g
Cholesterol	213mg	13mg	.00mg	.00mg	.25mg	17.83mg
Calcium	25mg	9%	.7%	.8%	2.7%	12.3%
Vitamins	A, D, E, B12	A ,C	A, C, E	A, C, E	A, C, E	A, C, E

Day 2
Incubation

What is an incubator?

Parts- Can't be a closed system, hence the holes
Glow Cone- Heat source
Can – Fan protector
Fan- Circulate air, runs all the time
Light- On when the glow cone is heating.
Waffer- Thermometer. Heat between wafer and connector
Pan of water- moisture
Rack- place to put eggs (must hand turn eggs)

EGGS

Fertile eggs vs. Non-fertile eggs (DEMO)
Fertile eggs are the ones that will hatch if incubated
Non-fertile- will not hatch

- What allows a fertile egg to develop into a chicken?
  - the right environment for growth
  - temperature, fertility, rotation
    -The inside of the incubator needs to be kept around 99 degrees Fahrenheit and not greater than 101 degrees Fahrenheit. Ninety-nine point five is the ideal temperature
    -Less than 98 degrees will delay hatch time. Greater than 101 degrees will harm/kill the embryo
    -Humidity in the incubator is also very important, otherwise the eggs will dry out
    -Days of incubation
    -Eggs must be rotated three times for the first 18 days of incubation
    -Rotating eggs prevents the developing chick from sticking to the side of the egg.
    -Once the egg begins to hatch, leave it alone and allow the chick to hatch on its own.
    -A chick has a special egg tooth that allows it to break out of the egg.
    -The egg tooth is a hard structure on the end of the chick's beak that enables it to break the shell. The egg tooth will fall off 12-24 hours after the chick hatches.
    -The chick only has enough energy to break out of the large end of the egg (air cell)
  - Why some eggs don't hatch?
    -The egg is not fertile.
    -Tiny holes in the egg will allow bacteria to enter.

-Temperature became too hot or too cold
-Eggs dried out, due to the lack of humidity

- Embryonic Development
    - before displaying the chart of embryonic development, have students draw what they think the egg/chick will look like on five different days of development (2, 7, 14, 19, 21)
      Give students 10-15 minutes to complete the chart, noting the labeled days
    - have students read the chart on the developmental process of the chick and display actual chart and compare

Day 3
Handling

Teach students the importance of scrubbing really well.
"Glitter bug Potion"
Games with tennis balls, hand shaking.
Use black light, describe germs
Have students wash their hands with antibacterial soap and dry them really well
Use black light again to see how well the students actually washed their hands.

Discuss the importance of washing hands and how germs are everywhere.

What have you noticed about the hatched chicks?

- Explain how they hatch.
  - Egg tooth, air cell, largest end of the egg, eating after hatching (review from first and second day)
- Caring and gentle handling. Sit in a circle and pass around something very delicate to observe handling skills.
- Touching session (if chicks have hatched), Allow a chance for those who want to hold chicks to do so.
- Recap of past three days. Ask kids questions.
  - What did you learn?
  - What was the best part of the program?
  - Would you like to do this again?

Appendix B: Hands-On Activities

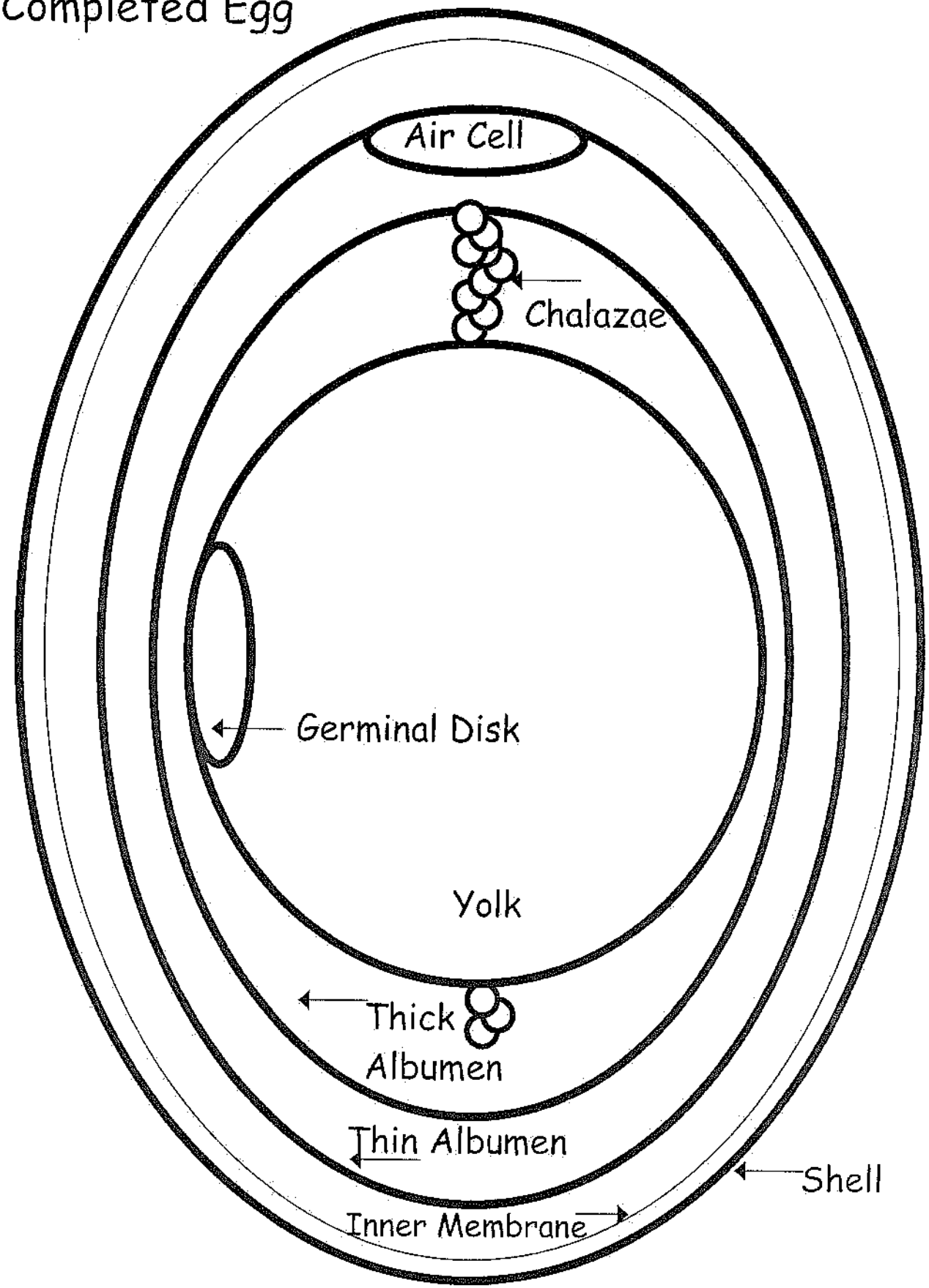
Day 1

- **Pre-Evaluations** can be given before DVD is started or pause at appropriate time
  - Please make sure students put their name and your name on the evaluation

- **Make Your Own Egg** Activity
  - Students are to color and label each part then cut out Thin Albumen, Thick Albumen, & Yolk (with Chalazae still attached) and glue in order to the shell.
  - Example egg has been included along with Diagram from video.

- **Snickers Candy**
  - Just a Treat
  - Alternative candy is for students who might be allergic to Snickers

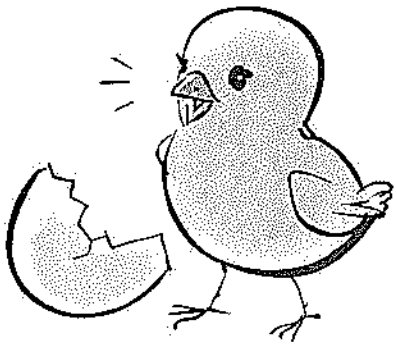
Completed Egg



Day 2

- **Development Chart**- Have students draw how they think the chicks will look on each day of development. I have included a description of what is happening inside the egg on those days. It is completely up to you if you leave the Avian Development Chart up and displayed. They may use it has a guide, if they don't have it they will have to use their imagination.

Name_____

Day 2	**Day 7**	**Day 14**
Day 19	**Day 21**	

Day 2
- Beginning formation veins, heart, ear pits and throat.
- First sign of embryo sac.

Day 7
- Digits on legs and wings become visible

Day 14
- Embryo turns its head toward the blunt end of the egg.

Day 19
- Yolk sac draws into the body cavity through the umbilicus.

Day 21
- Chick hatches

Day 3

- **Germ Activity-**
  - Each classroom has a tennis ball in a zip-lock bag. These tennis balls have been coated with Glo-Germ substance that will glow in a black light. For this activity, all the students need to touch the tennis ball. My suggestion is use the following questions as a discussion piece:
    What new things did you learn?
    What was the best part of the program?
    Would you like to do this again?
  - After all the students have touched the tennis, use the black light to show them how easy germs spread and that they can be everywhere.
  - Next have the student wash their hands, and then retest using the black light.
  - I have also included a salt shaker with the Glo-Germ powder. In case the tennis ball needs to be coated again. Or you can powder your hands and shake each student's hand. This will have the same affect.

- **Post-Evaluation-** After the Germ activity have the students take the post-evaluation.
  - Please make sure students put their name and your name on the evaluation
  - **While students are taking the evaluation, if you could write down comment that students had about the above questions that would be great.**

Appendix C: Evaluation Instrument

Name_____ Teacher Name_____

1. I have chickens at home.

Yes No

2. I am able to focus more when I can see what is being taught.

Always Sometimes Do Not know Never

3. I understand a topic more just by hearing and seeing the information with no live animals.

Always Sometimes Do Not know Never

4. I feel that I understood the material better because I could see the incubator and chicks.

Always Sometimes Do Not know Never

5. The hands on activities keep my attention for a longer period of time.

Always Sometimes Do Not know Never

6. I felt that I learned more on day:

Day 1- Incubation Day 2- Eggs Day 3- Hatching None

7. I enjoy learning with animals.

Always Sometimes Do Not know Never

8. Non-fertile eggs will hatch into chicks.

A) Yes, they will hatch
B) No, they will not
C) I do not remember

9. Humidity is important in an incubator.

A) Yes, it is very important
B) No, it is not important
C) I do not know

10. **102 degrees Fahrenheit in an incubator is:**
    A) Too hot
    B) Too cold
    C) Just right

11. **Eggs must be turned while they are in an incubator because:**
    A) They will stick to the sides
    B) Nothing will happen
    C) I do not know

12. **Holes in an egg will allow:**
    A) You to see the chick
    B) Bacteria to pass through
    C) The chick to breath
    D) I do not know

13. **The yolk is the chicken's first food source.**
    A) No, they eat corn
    B) Yes, it is good for them
    C) No, they are to little to eat
    D) I do not know

14. **Brown eggs are better to eat than white eggs.**
    A) No, that is not true
    B) Yes, that is true
    C) I do not know

15. **Grade B eggs are fresher than Grade AA eggs.**
    A) Yes, that is true
    B) No, that is not true
    C) I do not know

16. **Washing your hands is important after touching chickens.**
    A) Yes, because of germs
    B) No, chickens are clean
    C) I do not know

17. **Chicks are very delicate.**
    A) No
    B) Yes
    C) I do not know

18. What animal does not lay eggs?

A. Crocodile
B. Platypus
C. Bears
D. Chickens

19. What kind of eggs will hatch into chickens?

A. Fertile
B. Non-fertile
C. Reptile eggs
D. Eggs from the store

20. What does the chalazae do?

A. Gives the chick its first meal
B. Keeps the yolk in the middle of the egg.
C. Protects the chick from bacteria
D. The spot where the chick grows

21. What is the yellow part of an egg called?

A. Albumen
B. Shell
C. Yolk
D. Chalazae

22. What does an incubator do?

A. Home for the chicks
B. Provides an environment for the egg to develop
C. Place to store chicken food

23. The germinal disk is:

A. The spot where the chick grows from.
B. Protects the chick from bacteria.
C. Gives the chick its first meal
D. Keeps the yolk in the middle of the egg.

24. Which food has the most calories?

A. Apple
B. Corn
C. Snickers candy
D. Egg

25. Which food has the most grams of fat?

A. Corn
B. Cheese
C. Egg
D. Snickers Candy

26. How many days does a chick egg need to be incubated before it hatches?

A. 18 days
B. 26 days
C. 21 days
D. 9 days

27. What happens on day 19 of incubation?

A. Eggs stop being rotated
B. The yolk goes into the chicks belly
C. The chick begins to develop

28. How does the chick get out of the egg?

A. They use their claws
B. They use their tooth
C. They use their wings

29. How do we get rid of germs on our hands?

A. Wash our hands
B. Wipe them on our pants
C. Lick them off
D. Give them to someone else

30. I like learning about chickens.

A. Yes, I do
B. No, I do not
C. I do not know

Appendix D: Teacher Feedback Form

Teacher Feedback Form

Name_____ Date_____

Please give me any and all feedback that you feel needs to be brought to my attention. I appreciate you allowing me to bring this program to your classroom.

Thank you so much,
Jenise Platt

Student Comments/Reactions:

Teacher Input/feedback: