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A Veterinary Science Initiative: An Analysis of Impact and Future Directions for Humane Education and Collaborative Partnerships

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A Veterinary Science Initiative:
An Analysis of Impact and Future Directions for Humane Education and Collaborative
Partnerships

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Abstract

Humane education research is limited in its scope and structure and this has led to its inability to find a place in standard curriculum. As resources become scarcer for school districts and shelters, proving efficacy of programs is essential for successful partnerships and program achievements. VSI: Veterinary Science Initiative is a program developed by the education team at the Charleston Animal Society as a model for cooperative education between shelters, veterinarians, and other private organizations to collaborate with local school districts, while also conducting research about how this curriculum benefits student knowledge, organizational awareness, and community engagement.

The focus of this research is in two primary areas: to examine the efficacy of the program through changes in knowledge, attitudes, behaviors, and evaluation of student products, surveys and observations, and to look the impact of the program as a model from a collaborative leadership perspective. Insights from this analysis can shape science education, humane education, and collaborative educational initiatives. The multimodal research approach adopted in this dissertation includes: comparing pre and posttest participant and control groups, evaluating rubric-based student products, tracking behavioral changes between control and participant groups, and collecting student and teacher surveys.

Using these assessments, the VSI program produced significant changes in the participants' behavior, attitudes, and knowledge. This dissertation recommends that humane education shifts focus to a more behavior-driven model that can appeal to animal shelters, schools, and their students. Implications for best practices in curricular development and instruction are reinforced by the impact of individual teachers on the classroom and power of interdisciplinary authentic lesson plans that provide accessibility to a diverse student population. Larger sample size would allow for a more accurate and complex model of impact from the program based on multiple covariates such as pet ownership, ethnicity, and school. In the future, more elaborate analysis of factors impacting humane education, science attitudes, and long-term student behaviors would be beneficial.

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Chapter 1: Introduction

Background and Purpose

Producing food to supply a growing world, addressing animal overpopulation, controlling emerging zoonotic disease, establishing clean water resources, stopping antibiotic resistance, and protecting biodiversity in a changing world are all issues prominent in the world forum and top challenges of the current generation. The question many ask is who should be dealing with these complicated and troubling issues. The veterinarian is uniquely qualified to understand the intricate interactions between the environment, humans, and animals and relate that to the everyday person. By sharing the broad-ranging, interdisciplinary expertise of the field and an integrative perspective, veterinarians can help solve the complex problems facing the world. Providing a model for veterinarians to take initiative as leaders in education, subsequently allows the public to use veterinary science to see value in scientific curriculum. VSI: Veterinary Science Initiative hopes to reach students with these critical topics and engage them in real-world science.

Charleston Animal Society (CAS) is a large open admission shelter in Charleston, SC with a strong adoption, spay-neuter, and education program. CAS's educational program, particularly the new development of "VSI: Veterinary Science Initiative," approaches science education in a multimodal, multidisciplinary, multifaceted way.

After overwhelming response for science education programs for high school students interested in pursuing veterinary medicine, Charleston Animal Society identified the opportunity to reach more students than just the few that can come through the facility for an intense one-classroom program. To achieve this expansion, Charleston Animal Society proposed a curriculum that local teachers could use that would target general high school students via a multimodal approach, without using an unnecessary amount of staff time at the shelter (Figure 1.1).

VSI: Veterinary Science Initiative is a program developed by the education team at the Charleston Animal Society (CAS) as a model for cooperative education between shelters, veterinarians, and other private organizations to collaborate with local school districts, while also conducting research about how this curriculum benefits student knowledge, organizational awareness and community engagement. VSI includes a condensed curriculum focused on scientific concepts covered by national and state standards for science education while also integrating important principles from government, art, ethics, and humane education. VSI: A Veterinary Science Initiative includes an initial site visit, lesson plans for teachers, and capstone field trip to the Charleston Animal Society, which is described in more detail in the methodology chapter. To reach students not normally interested in science, an emphasis is placed on integrating concepts such as public health, disease, and parasitology with other disciplines including law, art, ethics, and communication. This combination makes science accessible on an individual student level, while the curriculum caters to all learning types and interests by using real-life situations and topics. This combination

drives students that might not normally be engaged in their science courses to embrace science and connect to the subject matter. By providing access to veterinary medicine using scientific equipment, cases, and scenarios, students are engaged in the activities while discovering important scientific concepts. Many students do not have access or exposure to information and experiences found at the shelter in their traditional classroom setting. The VSI program integrates shelter resources into the school system to the benefit of students, schools, animals, and the organization itself.

As Charleston Animal Society has expanded its educational programs, other humane education programs, such as the ASPCA (American Society for the Prevention of Cruelty to Animals), have dropped many of their educational initiatives and grants. This is most likely due to the lack of concrete research illustrating the positive effects of humane education on animal welfare and shelters. Therefore, while executing this program, the benefits to students, teachers, the shelter, animals, veterinarians, and the community are assessed. It is the evaluation of this program that has the most potential for impact, as it can convince other communities and shelters to invest in humane and veterinary education programs. VSI presents scientific and ethical concepts that are easily transferrable and appeal to a variety of students. By utilizing a format with only two of seven lessons requiring CAS instructors, CAS can reach more students with less staff and resources. Furthermore, this project can create a model for other professional areas (lawyers, medical doctors, nurses, businesses) to create their own partnerships within the local community. Showing benefits on multiple levels allows support in

business and budget-minded organizations that find it difficult to fund a program based only on its educational potentials.

An extensive evaluation of the program is essential to document benefits, enabling implementation and financing on a broad scale. Benefits are hypothesized in a variety of areas including economic, societal, veterinary, school-based, and student-focused. The shelter hopes to see increases in volunteers, adoptions, fosters, spay-neuter surgeries, and donations. Knowledge increase is expected for students involved including awareness of animal welfare issues, real-life science, and understanding of the animal shelter in general. Positive experience with the program will be documented for teachers and students. Categories evaluated include multidisciplinary learning of students, awareness of shelter, shelter involvement parameters, teacher satisfaction, long-term community changes, humane education success, and overall program effectiveness. As indicated above, documenting the positives of the humane education programs can possibly return funding to initiatives cut in organizations like the ASPCA and convince other groups in the area of the mutual benefits that community education partnerships can provide. CAS believes that the model created in the “VSI – a Veterinary Science Experience” can be employed in communities across the country. At the Association of Professional Humane Educators (APHE) Conference 2012, a lecture on VSI curriculum resulted in interest in attending a training workshop in Charleston in 2013 to train humane educators to execute the program in other communities. There is a need, a model for implementation, and an impetus for research in this area at this critical time in the development of the humane education programs.

Not only does this program encourage youth to engage with veterinary science, it emphasizes ethical and human issues that plague our society. Students are persuaded to examine their own moral and ethical points of view. By discussing animal welfare, cruelty, overpopulation, and animal safety students become enlightened members of their community who can also act as animal advocates. This study addresses knowledge gain, attitudinal changes, and behavioral changes through volunteer, foster, and adoption programs, perception by team members, student products, and direct impacts on the organization including perceptions in the community.

Diverse Benefits of VSI Program

VSI: Veterinary Science Initiative is designed to benefit multiple groups with its multidisciplinary curriculum and target areas. This should help increase impact and support for this type of education. An overview of the benefits of the VSI program is provided in Figure 1.3 and each area is discussed in detail below.

Societal Changes in Animal Attitudes: Traditional Humane Education Benefits

Humans and animals have evolved together over thousands of years. From food sources to companions, the fate of both has been intertwined and the development of civilization has morphed their interactions. Animals are critical for normal human development (Poresky, 1996) (Melson G. F., 1990). In addition, abuse of animals has a direct link to human abuse. It has been proven that violence towards animals has a direct correlation with violence on people (Arluke A. , Levin, Luke, & Ascione, 1999). Empathy and proper treatment of animals are concepts that can be learned in humane

education curriculum. Humane education teaches students how to interact, communicate, and engage with animals in their daily lives. It creates an emotional connection that can translate science and improve societal issues. The VSI program emphasizes pet care, the role of the shelter, compassion, safety, disease, and preventing suffering. Humane education has a limited body of research documenting the positive effects of such programs (Unti & DeRosa, 2003). Many students in other CAS school outreach programs do not know how to take care of an animal, be safe, read behavior, provide care, or find their animal if it gets lost. Simple recognition of the purpose of an animal shelter and the issues surrounding animal welfare can be a huge leap in community engagement and access to care and resources. The next time a student walks by a dog that spends its life chained in a yard, they might feel compassion for this animal that previously might have elicited fear or no emotion at all. By teaching children to be compassionate towards animals, humans and animals are beneficiaries.

Hypotheses:

- Students will increase their knowledge of CAS and shelters in general.
- Students will score higher on empathy assessments after the program's completion.
- Student perceptions of animals will change during program.
- Students that have pets will score higher initially during the program for empathy and animal knowledge.
- Students will be more likely to take action to support the shelter after the program's completion.

Student Benefits to Cooperative Education

CAS is exposing general high school students to a higher science and inspiring them to become part of the scientific community, many of which are not especially interested in science as a career. These students are engaging in a "real life" science program with new technology and non-traditional experiences. The program integrates science, emotional intelligence (specifically empathy), and humane education. Research has shown field trips/informal education is invaluable and students remember these experiences for rest of their lives (Meldrum, 2006). CAS is creating a foundation for valuable integration of required science curriculum in a way that is meaningful to students. The program should increase scientific knowledge, increase awareness of animal welfare issues, increase in the ability to engage multidisciplinary study, increase connection with the shelter, and fostering service learning.

Benefits of the program also extend to different socioeconomic groups and ethnicities, specifically in the North Charleston area. Charleston Animal Society has selected North Charleston (3724 total students in high schools) as its initial target community for implementation of the "Shadowing at the Shelter" expansion. South Carolina in general has one of the highest unemployment rates of 11.7% (March 2010) and per capita income is \$3792 less than the national average. In general, poverty is higher and educational attainment lower. In North Charleston, statistics are worse, with one area code in North Charleston (29405) having 26.68% of the population living at or below poverty level and only 10% of the population being college graduates. Of the 88,477 residents of the entire North Charleston area, 18,536 (20%) live at or below

poverty level (Charleston Animal Society, 2010). Also, North Charleston high schools primarily consist of minority students (62.5% African American, 5.8% Hispanic, 28.7% White, and 3.5% Other) (North Charleston Area School District, 2011).

These students are at risk within the educational system and are less likely to pursue careers in areas of science. Supplementing curriculum in these schools can have tremendous impact for students. Minorities use the high school years to make decisions about pursuing a career in science and also respond well to alternative education programs like field trips (Meldrum, 2006). This indicates that the VSI program has the potential to make an even more substantial impact for minority students and its varied curriculum, including the field trip, creates optimum educational environments. The potential for success in science summer and outreach programs that use science or technology that schools cannot provide is documented in earlier research (Hanesian & Perna, 1999). Educational literature and specifically Meldrum's study show that for minority students pursuing science, informal science education is a significant factor in their success. This program creates supplements to the curriculum that students would otherwise be unable to experience, especially with massive cuts in educational budgets. These cuts can often affect lower income school districts more severely, particularly with the arts and science. VSI provides a supplemental program that can increase engagement and create an experience otherwise unavailable at these at-risk schools.

Hypotheses:

- Students will be able to complete student products that demonstrate multiple levels of learning and knowledge.

- There should be larger impact for minorities and low socioeconomic status (SES) areas in both their attitudes and knowledge.
- Student perceptions of science will be more positive.
- Students will like different aspects of the program, not just one, as it caters to different learning styles.
- Students will have a positive perception of VSI.

Educator Benefits to Cooperative Education

Enhancing curriculum can be difficult and time consuming for teachers under pressure from districts to perform. Also, creating multidisciplinary curriculum without having to rely on other teachers is daunting, uncomfortable, and often discounted in the science classroom. Standards driven curriculum teaches to the test and teachers can have trouble adapting rote memorization for exams to more substantial and higher level thinking. Evaluation tools/standards are more difficult for complex projects and this can also be a deterrent. Excitement from instruction via outside sources is tangible for most teachers, but logistic and financials can be just as disheartening.

It is economically beneficial to create collaboration with outside sources, but can be complicated to execute. VSI strives to make implementing the program as painless as possible for the teacher by providing standards, rubrics, lesson plans, and even humane educator assistance on implementing the program in their classroom. Teachers are treated as part of a professional learning community team with CAS that focuses on creating a collaboration and partnership in the community for student learning.

Professional learning community (PLC) within the shelter humane education

department and school district classrooms to help synthesize the information gathered to make a more complete program assessment. The goals for establishment of this PLC include attempts to “systematically embed collaboration into routine practices ...[and]...provide the structure and parameters to ensure that the collaboration focuses on improving the learning of both students and adults” (DuFour, Eaker, & DuFour, 2005). This PLC allows instructors at CAS to effectively increase skill sets, evaluate, and change the VSI: Veterinary Science Initiative Program. Tools that can be utilized include the art-based leadership critique including all levels of criticism, evaluation, interpretation, analysis, and description (Feldman, 1995).

Teacher interviews and surveys are used to document the effectiveness of the partnership and their perceptions on the impact on students. Results from the course can be used to assess and make changes to the program to ensure it is optimally effective. Most humane education research does not include the teacher’s perceptions of the program and VSI strives to use this information to best evaluate the collaboration. Teachers know their students best and have a detailed perspective from which to evaluate curricular impacts. Also, their commitment to the program is integral in its success and valuing their opinions and using their insights increases the likelihood of a efficacious and productive partnership.

Hypotheses:

- Teachers will have a positive perception of VSI and real benefits described for students have been demonstrated during the program.

- Teachers will feel like part of a “team” with their interactions with the VSI staff and want to participate in the program again.

Direct Organizational Benefits

Although humane educators might focus on traditional benefits of empathy or knowledge gain in an educational program, more direct benefits and actions can be evaluated. When an organization conducts a program in the schools it can act as an advertisement for those students. Note only does such a program demand their complete attention, but they will remember and talk about the institution afterwards, engaging the audience in a depth impossible for a simple billboard or commercial. This extends not only to shelters, but also to other businesses that might want to run an educational outreach program in their school district. Programs like this indirectly act as advertising for the shelter and create a good vision for the public about the intentions of the shelter in the community. Other tangible short-term shelter benefits include increase in adoptions, foster families, traffic into the shelter, and volunteers. These more easily tracked parameters might serve to convince boards for funding more readily than long-term benefits that are difficult to document. Volunteers are the backbone of many nonprofits and a consistent and devoted volunteer force can save lives and improve animal welfare.

Shelters also have an obligation to and vested interest in addressing the issues critical in animal shelters and welfare in the community. As discussed before, North Charleston has a low socioeconomic group with a high number of minority students. The lack of financial resources in the community is inextricably linked to the inability of

residents to afford care and surgery for their animals. It creates a situation where a large number of cruelty cases and the largest amount of animal intakes originate in North Charleston for the Charleston Animal Society. North Charleston is only a small part of the landmass covered by the shelter, yet 35% of animal intakes come from this area, more than any other region that the facility covers (Charleston Animal Society, 2010). Consequently, almost 4,000 animals per year are taken into the shelter from North Charleston and most arrive having never seen a veterinarian. Because of the numerous free-roaming and “yard” dogs, many youth grow up in fear of these animals. CAS can help to change these attitudes of improper animal care, negative contact with animals, and the idea that animals are disposable by direct contact with area youth.

Animal overpopulation is an enormous societal issue, with over half of the animals entering the shelter system being euthanized because homes cannot be found (American Humane Association). With over 10,000 animals in 2011 entering Charleston Animal Society, the solution to this crisis is not just adoption programs, a Band-Aid for the problem of overpopulation. CAS has already identified North Charleston for high intensity spay-neuter initiatives to curb the intense overpopulation problem. Grants for this area enable residents to receive free sterilization surgery on their animals. The changes in attitudes towards spay-neuter can improve individual animal health and decrease the overpopulation problem. By pairing adoption programs (outs), spay-neuter programs (ins), and educational initiatives, a “tripod” of support is created that helps solve the problem in the community for the short-term and long-term (Figure 1.2). Often reasons for not spaying or neutering a pet lie with lack of education or cultural

differences. By involving North Charleston in the program, students most in need are educated about these critical issues of animal welfare in their community and are given access to the CAS spay-neuter program. Education is the critical “third leg” helps generate stability in the local area and creates comprehensive approach to overpopulation.

Shelters are strapped for money and resources and must carefully evaluate their efforts. There is hope that societal issues like overpopulation and animal cruelty can be alleviated by education within these high-risk communities. This includes addressing the serious overpopulation problem, especially in the North Charleston area that has costs in lives and in money to the taxpayer. It is not cancer, disease, or cars that kill the most animals per year; it is euthanasia for population control (Griffin, 2003). The overpopulation problem in this country is an epidemic and this program seeks to forge connections with students critical in the societal changes needed to combat this problem. Education hopes to create long-term changes in society values, decreases in cruelty, and increases in spay-neuter in the next generation. Also, these programs establish a reciprocal relationship with communities rather than just a view of the shelter as a resource for getting or surrendering pets.

In summary, students can be advocates within their family for the care of their animals. Efforts to curb overpopulation save innumerable lives and increase the quality of life for many animals. Animals also benefit from increase in volunteers, adoptions, fosters, and donations. VSI should help save lives by adoption, care, and funding,

subsequently decreasing euthanasia, while also increasing personnel, which creates mental stimulation and improves animal welfare within the shelter environment.

Hypotheses:

- Students will have a more awareness of CAS and shelter issues in general.
- There will be an increased percentage of volunteers, fosters, adoptions, spay-neuter surgeries, and visits after the program.
- Students will have changed their perception and understanding of shelter issues such as cruelty, euthanasia, five freedoms, spay-neuter, and overpopulation.

Benefits to Veterinary Field (Veterinary Role in the Classroom/Society)

The world today is plagued by a plethora of challenges with veterinary relevance from food shortages and species extinction, to pandemics of the avian flu. The veterinary professions ability to influence these urgent issues is compromised by the public's poor understanding of these problems and the veterinarian's inability to take a prominent role. Education plays a vital role in the transfer of ideas and is a fundamental tool available to the veterinary profession to better position itself as a public good.

Nelson Mandela said "Education is the most powerful weapon which you can use to change the world," and this principle remains true in the veterinary medicine.

Education is critical in many veterinary contexts, including academic, public, and policy, and yet it is not discussed frequently as a primary objective in the field. Beyond personal appointment attention, or handouts on particular conditions, veterinarians often shy away from talking to the general public about veterinary issues. The general public is unaware of the importance of a veterinary perspective on human health, pet

health, ecosystem health, and food resources. There are very few efforts that exist in the education system that target adolescents as their adult ideology is developing. This program can encourage veterinarians to be better educators and increase diversity in the veterinary field. Fostering veterinary learning in the general public has long-lasting benefits on trying to solve the issues facing the world today. This also creates a public more willing to take their animals to the veterinarian, pay for their care, and trust recommendations for spay/neuter, prevention, and other treatments. Also, veterinarians are a resource that is commonly consulted by the medical field, government organizations, public health, national security, and legislation. To converse with these varying fields, veterinarians have to be able to articulate ideas in an effective way. Students learn that it is this ability to translate science that makes it valuable and shapes policy in the real world. Exposure to veterinary medicine will convince others to consult with the field more often, which in turn can develop the most informed policy on urgent animal-society issues currently facing the world.

Career focused programs have been documented to help recruit students into a given profession. For example, in a nursing summer health care program, 70% of students were tracked into a health profession with 50% in nursing (Bumgarner, Means, & Ford, 2003). This program was also evaluated primarily by survey (Bumgarner, Means, & Ford, 2003). Another program for ultrasound careers used a survey to show that students felt an increased level of knowledge after the program with 90% indicating an increase in knowledge and 60% indicating interest level in pursuing a related career

(Merton, 2011). In this program scanning demonstrations were found to be particularly effective (Merton, 2011), and all data collection was completed via survey.

Finally, lack of diversity is a particularly prominent issue in veterinary medicine where the vast majority of students are white and middle to upper class. Also the majority of students are female (50% of the profession, but 80% of vet students) (Lincoln, 2010). Expanding the field and increasing interested and supportive of veterinary medicine, creates a more constructive, beneficent veterinary field and better reflects the population of this country. Kansas state reports that the current veterinary medical student population is comprised of only 5% Hispanic, 2% African American, 1% Asian/Pacific Islander and less than 1% Native American with the balance of more than 90% being Caucasian (Kansas State University College of Veterinary Medicine, 2009). Reasons for this are multifold, but one of the probable causes is lack of exposure to science and veterinary medicine in the school system and culture. More minority representation also facilitates cultural adaptation within veterinary medicine, which is essential in a country where minority populations will soon outnumber Caucasians. It is a priority within the field to integrate and involve more minorities in the veterinary field. By targeting North Charleston, an area with a large minority population, this program can seek to diversify the field of veterinary medicine and other higher sciences. Supporting diversity in science and academia creates more of a well-balanced scientific community that can offer more to society in general. VSI can also inspire those that might otherwise enter into human medicine or other careers to see veterinary medicine as a viable, vibrant career field.

Hypotheses:

- Students will have a more positive view of the veterinary profession.
- Students will be more likely to consider a career in veterinary medicine, especially minority students.
- Students will see veterinary care as more important after the program.

Summary

In summary, VSI: Veterinary Science Initiative is a program developed by the education team at the Charleston Animal Society as a model for cooperative education between shelters, veterinarians, and other private organizations to collaborate with local school districts, while also conducting research about how this curriculum benefits student knowledge, organizational awareness and community engagement. The program has benefits to multiple parties including students, teachers/districts, shelters, animals, veterinary medicine, and the community. An extensive evaluation of concrete parameter changes for the shelter, learning for the students, teacher satisfaction, community changes, and humane education goals, will come together for an overall assessment of program effectiveness. Instrumentation used includes surveys, shelter parameter data collection, pre/posttests, rubrics on projects, feedback forms, interviews, etc. Data will be analyzed via varied statistical analysis to confirm statistically significant differences in participants of the VSI program. A multimodal mixed methods approach to the value of science outreach in humane education is critical to proving the merit of funding community education programs to other organizations.

Overall Hypotheses Summary:

The above hypotheses from each target area above have been grouped into five main categories for analysis. The following five categories are used to structurally organize the evaluation tools and can be viewed below.

1. Change in Knowledge

- a. Students will increase their knowledge of CAS, science, and shelters in general.
- b. Students will have a more awareness of CAS and shelter issues in general.

2. Change in Attitudes

- a. Students will score higher on empathy assessments after the program's completion.
- b. Student perceptions of animals will change during program.
- c. Student perceptions of science will be more positive.
- d. Students will have a more positive view of the veterinary profession.
- e. Students will have changed their perception and understanding of shelter issues such as cruelty, euthanasia, five freedoms, spay-neuter, and overpopulation.
- f. Students will be more likely to consider a career in veterinary medicine, especially minority students.
- g. Students will see veterinary care as more important after the program.

3. Change in Behaviors/Actions

- a. Students will be more likely to take action to support the shelter after the program's completion.
- b. There will be an increased percentage of volunteers, fosters, adoptions, spay-neuter surgeries, and visits after the program.

4. Creation of Student Products

- a. Students will be able to complete student products that demonstrate multiple levels of learning and knowledge.

5. Views on VSI Team

- a. Students will like different aspects of the program, not just one, as it caters to different learning styles.
- b. Teachers will have a positive perception of VSI and real benefits described for students have been demonstrated during the program.
- c. Teachers will feel like part of a “team” with their interactions with the VSI staff and want to participate in the program again.
- d. Students will have a positive perception of VSI.

6. Differences in Groups

- Students that have pets will score higher initially during the program for empathy and animal knowledge.
- There should be larger impact for minorities and low socioeconomic status (SES) areas in both their attitudes and knowledge.



Figure 1.1 - The VSI logo used on program materials.

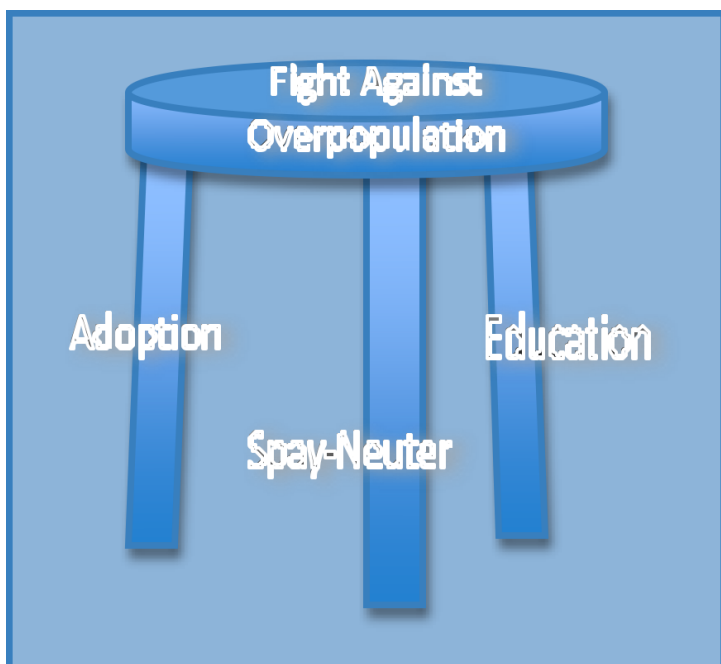


Figure 1.2 - The tripod of support for fighting overpopulation.

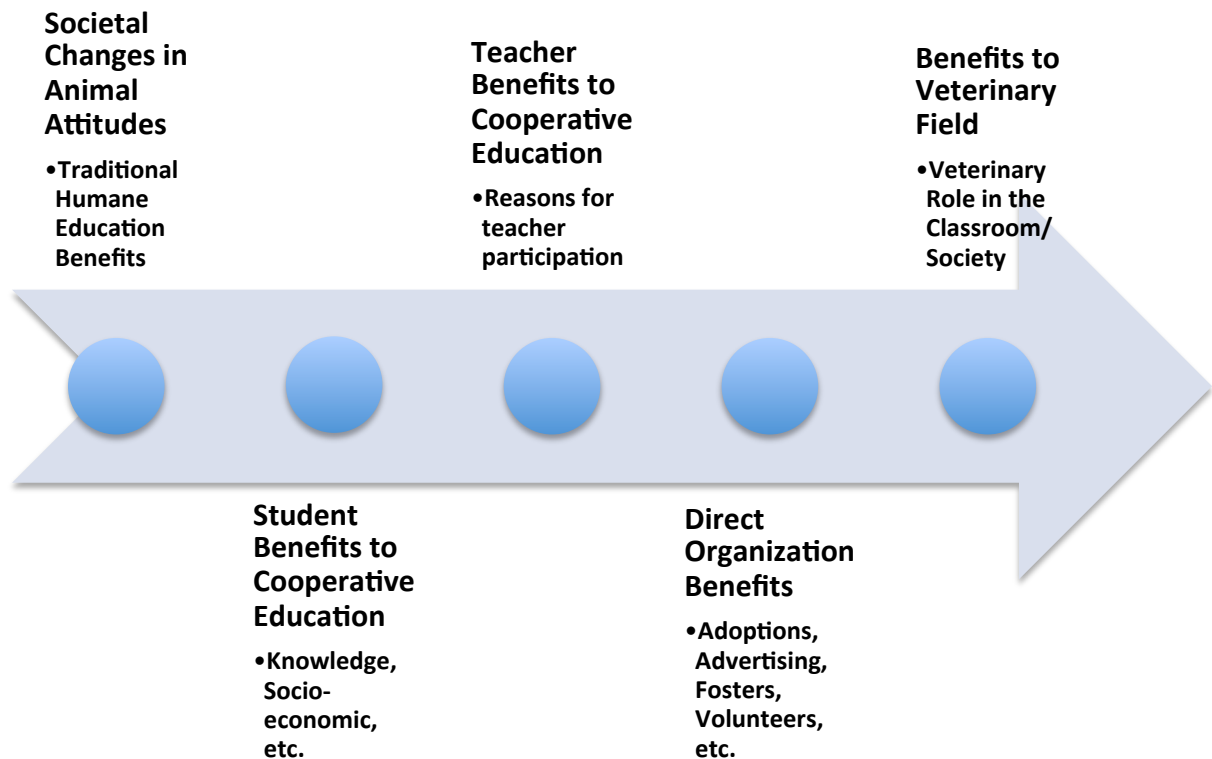


Figure 1.3 – A summary of the diverse benefits of the VSI program.

Chapter 2: Review of Literature

Animals, Society, and Humane Education

Animals and Their Value To Society

Humans and animals have evolved together via dependent relationships and the impact of animals on humans should not be underestimated. Specifically, the field of anthrozoology studies the association between humans and animals and discusses motivations and expectations, including benefits, within their relationship (Mariti, Papi, Mengoli, Moretti, Martelli, & Gazzano, 2011). The majority of households in the western world have some sort of pet (Rost and Hartmann 1994) from (Bjerke, Odegardstuen, & Kaltenborn, 1998)). In the United States in particular, 70% of households with children age six and under and 78% of all households with children over the age of six had pets (AVMA, 1997). Both children and teenagers are drawn to animals (Thomas & Beirne, 2002), and dog owners are more empathetic and prosocially oriented than non-owners (Vidovic, Stetic, & Bratko, 1999). Many studies have explored the effect of animals on development in children (Melson G. F., 1990) (Poresky, 1996) (Covert, Whiren, Keith, & Nelson, 1985) (Poresky & Hendrix, 1989) (Poresky & Hendrix, 1990). Using a parental and in-home study of 3-6 year old children, researchers showed that intellectual, motor, and social development are associated with companion animals, and the bond with these animals is associated with empathy in children

(Poresky, 1996) (Melson G. F., 1990) (Vidovic, Stetic, & Bratko, 1999). The benefits to young children from interactions with pets are especially important in social development including empathy, attitudes toward pets, and social competence (Poresky & Hendrix, 1989). Preschoolers that have companion animals in the household have higher scores for empathy than preschoolers without pets in their home (Poresky, 1996) (Poresky & Hendrix, 1990) (Poresky, Hendrix, Mosier, & Samuelson, 1987). Children that have pets viewed animals more positively than children without pets (Poresky, 1996) (Bjerke, Odegardstuen, & Kaltenborn, 1998). The quality of the child's relationship with their pet affects their development. Using a CABS (Companion Animal Bonding Scale), children with higher bonds to their animals actual have higher scores in social competency and empathy (Poresky & Hendrix, 1990) (Vidovic, Stetic, & Bratko, 1999). A better bond with their pet also translates to greater empathy toward other children (Ascione F. R., 1992). This effect is also documented in adolescents, where a relationship is shown between pet ownership and self-esteem (Covert, Whiren, Keith, & Nelson, 1985). In a study of 9-15 year olds in Norway, 71% had animals in their household, participated in activities with animals including fishing (72%), feeding birds (74%), and reading about animals (66%). Even a previous allergic reaction or injury did not affect the subjects' feelings toward animals (Bjerke, 2001). However, after age 15, interest in animals has been documented to wane as age increases (Bjerke, 2001) (Bjerke, Odegardstuen, & Kaltenborn, 1998). A retrospective study showed that adult attitudes toward pets were not dependent on whether they owned a pet currently, but on their retrospective childhood Companion Animal Bonding Scale (CABS) score

(Poresky & Hendrix, 1988). Also, children with higher levels of attachment rated family climates better (Vidovic, Stetic, & Bratko, 1999) and a relationship with an animal can even serve as a bridge between a therapist and child (Fawcett & Gullone, 2001).

Researchers have tried to frame children's relationship with animals through different developmental concepts. One particular lens is described by Rejeski and focuses on the development of ecological concepts. Essentially children at young ages (6-7 years) are interested in their immediate environment (Literalism). As they get older (9-10 years) they begin to be able to reduce complexity of the environment by natural laws (Organization), eventually (13-14 years) being able to see the basic ecosystem, how humans are a part of it, and investigate ecologic and moral issues (Moralism) (Rejeski, 1982). Because of this progression, it has been suggested that perhaps older children (10-15) should be the primary targets of humane education-type programs (Bjerke, Odegardstuen, & Kaltenborn, 1998). An attitude typology developed by Kellert and Westervelt in 1983 for 2nd-11th graders can also be used to describe youth development and their relationships with animals using nine attitudes (Bjerke, Odegardstuen, & Kaltenborn, 1998) (Kellert & Westervelt, 1983). The youngest children were particularly utilitarian, dominionistic, and did not have concern for the rights of animals, some even having negativistic attitudes of fear, indifference, and avoidance. The negativistic, utilitarian, and dominionistic scale decreased as children aged with ecologicistic, moralistic, and naturalistic attitudes increasing especially from 8th-11th grades. From the age of 7 to 11 expansions in emotional concern/affection increased and from 13-16 years old expansions in ecological and ethical concerns

occurred (Kellert & Westervelt, 1983). This is consistent with the developmental concepts regarding the advent of moralism in older children. When focusing particularly on 9-15 year olds, Bjerke found ecogistic, naturalistic, and dominionistic decreased with age. Urban students had higher moralistic attitudes and rural students showed higher dominionistic attitudes (Bjerke, Odegardstuen, & Kaltenborn, 1998).

Empathy and prosocial behavior are recognized as vital, but in general western society does not promote these behaviors in the development of children (Thompson & Gullone, 2003). The raising of children focuses on independence, initiative, and assertiveness, and caring for others is not seen as a crucial element of education by many parents or teachers (Melson G. F., 1990). Individualism is so highly valued that the development of empathy can be at risk (Thompson & Gullone, 2003). When trying to develop empathy and social development, most teachers feel that live pets contribute significantly to student achievement (Daly & Suggs, 2010). At no other time in recent history has society, especially in the West, been devoid of healthy interactions between individuals and the environment (Bustad, 1996), and increased human-animal interactions in the classroom or otherwise might help fill the roles lost in the evolution of civilization.

Also, health parameters have been used as objective indicators of the influence of animals on people. Pet owners have fewer risk factors for cardiovascular disease including high blood pressure, triglycerides, and cholesterol, with improved survival after heart attacks (Garrity & Stallone, 2000). Even the observation of animals can cause reduced physiological responses to stress and increase positive moods (Fawcett &

Gullone, 2001). Other associations include improvement for elderly quality of life (Robb, 1987) (Stallones 1990), consistency in foster children (Hutton, 1985), reduction in demand for patient services (Siegel, 1990) (Siegel 1993).

Pets are also an equalizer for contact and care between genders. Children view child-care as “for females” whereas animal care was shown to be gender neutral (Melson & Fogel, 1989). In western society, men respond to touch and initiate contact with other humans less frequently than women. However, there was no difference in the amount of contact with animals in the waiting room of veterinary offices (Bustad, 1996) (Katcher, 1981). This could indicate that critical intimate contact for males might be gathered through animal contact. Conversely, Nicoll et al. notes gender does affect children’s attitudes toward animals with girls viewing animals more favorably (Bjerke, Odegardstuen, & Kaltenborn, 1998) and female owners being more emotionally involved with their pets (Selby & Rhoades, 1981). In either case, relationships with animals create unconditionally positive emotional investment without possibility for negativity or rejection (Fawcett & Gullone, 2001).

Interactions with animals are very attractive to children and should logically have an impact on their development. The evolution of humans has created a dependence on animals as companions, food sources, laborers, and symbols and this might also be reason for children’s affinity toward animals (Serpell J. , 1999). Even infants show compelling preferences toward live animals. Nine month olds presented with a live dwarf rabbit, unfamiliar adult female, and wooden turtle with moving parts choose to interact with the live dwarf rabbit than any of the other choices (Ricard & Allard, 1992).

When given the choice between stuffed animals and live animals, 80% of 2-6 year olds ignored the stuffed animals (Nielson & Delude, 1989). Dogs and birds were especially powerful with 74% of children touching the dog, 21% kissing the dog, and 66% talking to the bird (Nielson & Delude, 1989). Even after exposure to a dead animal and dissection, students in a study in the early part of the 20th century had more sympathy, gave more consistent care to living animals, and had less experimental cruelty (Isaacs, 1930). It was hypothesized that the aim of understanding and the goal of learning and watching were enhanced and the animal became less objectified (Isaacs, 1930).

The human-animal bond has been affected by decreases in contact with natural surroundings due to urbanization, industrialization, and mechanization (Bustad, 1996). Animals are an “intermediate boundary” zone between humans and inanimate objects, creating inconsistencies in attitudes and behaviors which can allow humans to both associate animals with being part of the family or “quasi-human”, but also exploiting them in daily life (Serpell J. A., 2009). This places animals in a unique position and has both positive and negative effects. As a society, this forces a compartmentalization that creates favorites or feeling moral obligations to some species or not to others creating many welfare problems seen today (Serpell J. A., 2009). For example, chondrodystrophy is a severe disability in humans, yet bulldogs are bred for those qualities (Serpell J. A., 2003). This ability to rationalize has also been used in the persecution of humans (Bandura, 1999) and perhaps is reflected in the correlation between violence in animals and people.

Although some investigation can be completed, research on children and companion animals is still limited in both number and quality of study (Melson G. F., 2003). In fact in other studies, no differences in CABS scores were noted between students that owned pets and those who did not (Daly & Morton, 2003). There could be a bias against the value of non-human/animal interactions and their link to human well-being and this can explain some of the lack of interest in the area (Fawcett & Gullone, 2001). Also, pets although beneficial in some of the circumstances documented above, in other situations they can cause stress or a decrease in moral (Beck & Katcher, 2003). Studies rarely integrate evaluation of animal and human relationships together (Melson G. F., 2003). Research focusing on improvements in physiological or psychological parameters after animal contact is important to health and animal organizations and is often cited, but in reality has been documented in few studies (Beck & Katcher, 2003). Other potential issues in past research include not integrating negative and positives of owning pets in the same analysis, not evaluating the child/pet relationship in light of family dynamics (especially deflections), and not looking at differences in cultural responses to animals (Kruger, Trachtenberg, & Serpell) (Melson G. F., 2003). It is also unclear whether this increase in attention to animals is due to past instincts to hunt and whether farm animals and wildlife has the same impact as pet contact (Beck & Katcher, 2003).

Violence, Animals, and Society

Not only do animals have great influence on childhood development and societal norms and culture, but also cruelty against them has an inextricable link to violence perpetrated in humans. Ted Bundy, Albert De Salvo, and Jeffrey Dahmer each had different motivations and horrific crimes, but all of them had a history of torturing, mutilating, and killing animals during their childhood (Brown Thompson 1996) (Wright Hensley 2003). Animal cruelty is defined as, “socially unacceptable behavior that intentionally causes unnecessary pain, suffering, or distress to and/or death of the animal” (pg 228) (Ascione & Weber, 1996). Comorbidity is seen between human-directed and animal-directed violence, and late in the 19th century these movements were connected together, only later separating into different structures (Faver & Strand, 2003) (Arkow P. , 1999). Research shows a connection between animal abuse and interpersonal violence (Ascione F. R., 2005) (Faver & Strand, 2008), with incidences of animal abuse found in correspondence with domestic violence in heterosexual and lesbian partners, child physical abuse, and sibling abuse (Thomas & Beirne, 2002) (Ascione F. , 2001) (Ascione, Weber, & Wood, 1997). Animal abuse might also “socialize children” to engage in violence, because it enables them to rehearse the beliefs that support this abuse, which can create more accepting attitudes toward other violence (Flynn, 1999). The percentage of children witnessing animal cruelty ranges from 37.5% to 77.6% indicating that there is a need for children to learn about how to treat an animal properly (Faver, 2010).

There is a debate in the literature about how and why these connections occur between the graduation hypothesis and deviance generalization hypothesis (Arluke A. , Levin, Luke, & Ascione, 1999) (Faver, 2010). The graduation hypothesis states that animal abuse is generalized to humans later in life, whereas the deviance generalization hypothesis says that the abuse is correlated because it emerges from common factors in childhood (Faver, 2010) (Arluke A. , Levin, Luke, & Ascione, 1999). Both hypotheses support the idea that animal cruelty can indicate family violence or antisocial behavior (Faver & Strand, 2003). Deliberate abuse of animals is in the history of 25-66% of violent criminals (Ascione F. , 2001). In incarcerated males a higher rate of animal abuse was found in violent human-related offenses versus non-violent crimes (Merz-Perez, Heide, & Silverman, 2001). In studies on criminals, 37% of violent offenders have a record of animal abuse versus 7% in populations with other antisocial crimes (Arluke A. , Levin, Luke, & Ascione, 1999). A quarter of aggressive criminals report five or more incidences of animal cruelty versus only 6% in a moderate or non-aggressive criminal (Kellert & Felthous, 1985). Adolescents who witness animal abuse on at least one occasion were more likely to engage in animal abuse (Thompson & Gullone, 2003). Males have animal abuse rates four times higher than females (Flynn, 1999), although both show a strong correlation with abuse. In an unpublished data set, 34.8% of 2-12 year old abused boys had been cruel to animals versus only 4.9% of non-abused boys (in abused girls 27.5% versus 3.3% non-abused) (Faver & Strand, 2003). Deliberate harm of animals is an early sign of antisocial behavior and is even included as diagnostic criteria for some psychopathology including Conduct Disorder (American Psychiatric Association

(APA, 1994) (Frick, et al., 1993) (Miller C. , 2001). A survey of university students indicated that college students that abused an animal sometime in their lives (1 out of 6 participants, 1 out of 3 males) were more likely to support corporal punishment and a husband hitting a wife (Flynn, 1999). It is also shown that wife batterers often threaten to hurt or kill family pets possibly to control their partners (Faver & Strand, 2003). In survey of women from a shelter, 74% of the households had companion animals. When asked about their pets, 71% of those women said their animals were threatened by the abuser, which resulted in many of the women delaying seeking the safety of the shelter out of concern for their pets (Faver & Strand, 2003) (Ascione, Weber, & Wood, 1997).

Animal abuse has also been connected to bullying, which continues to receive a great deal of attention within the news media and school districts themselves. Bullying is defined as “involving a desire to hurt, power imbalance, repetition, unjust use of power, evident enjoyment by the aggressor, and a general sense of being oppressed on the part of the victim” (Rigby, 2002) or intentional, repetitive and negative actions that cause physical or psychological discomfort on the recipient (Olweus 1991). Since 1974, in 70% of school shootings examined the attackers reported being bullied (Fried and Fried 2003) Within a year, 10% of high school students brought a gun or knife to school for protection and 16% had participated in a fight of some kind (CDCP 1996).

Witnessing or participating in animal cruelty is associated with bullying (Gullone & Robertson, 2008), and males were more likely than females to engage in bullying (Baldry, 1998), a similar situation as animal cruelty. For 12-16 year olds, 20.6% reported abusing animals themselves, 37.3% witnessed abuse by an adult, and 17.8% reported bullying

(Gullone & Robertson, 2008). Age was an important quality for being able to understand bullying and its sources and leading by example to prevent/stop bullying (Higgins-D'Alessandro & Choe, 2006), indicating target and specific education might be more beneficial at older ages.

In the US, respondents had a more negativistic/fearful attitude towards animals than Canada and Norway (Bjerke, Odegaardstuen, & Kaltenborn, 1998). Decreasing this fear can be critical because fear also be correlated with cruelty to animals (Ascione F. R., 2005) (Pagani, Robustelli, & Ascione, 2007). There are many suggestions for how to address issues surrounding the connection between animal abuse and human abuse including media campaigns increasing awareness, safe havens for pets of abused women, cross-training with interdisciplinary teams, and reporting between human and animal welfare organizations (Faver & Strand, 2003). Human social workers in particular should be more aware of the importance of animals to the well-being of humans both in context of their bond and their plight (Faver & Strand, 2003). A lack of empathy for humans and animals could account for deliberate cruelty (Thompson & Gullone, 2003), and could be an indication for focusing more on empathy in education. Humane education can perhaps fulfill the role of potential mediator of violent behavior toward both animals and humans (Arbour, Signal, & Taylor, 2009).

Humane Education

Humane education has been utilized to address the integral nature of pets and society and their clear links to violence and bullying in others. Humane education is “a form of character education that uses animal related stories, lessons, and activities to

foster respect, kindness, and responsibility in children's relationships with both animals and people" (Faver, 2010). The goals include compassion and values such as integrity, honesty, and mercy (Daly & Suggs, 2010). Two components of humane education include the need for encouraging empathy in animals and also exploring the "sociological and psychological dimensions" of animal abuse (Thomas & Beirne, 2002). It hopes to intervene in the cycle of abuse, anticipating empathy will not only be directed toward animals, but humans (Thompson & Gullone, 2003). By teaching kindness toward animals in humane education, empathy and prosocial behavior toward animals will translate to human empathy, which will hopefully reduce and prevent violence and aggression in youth (Faver, 2010) (Nicoll, Trifone, & Samuels, 2008) (Thompson & Gullone, 2003).

This concept of humane education has resulted in a call for its inclusion in humanistic, environmental, and social justice frameworks (Thomas & Beirne, 2002). There are three different types of humane education organizations: national animal protection organizations (e.g. ASPCA), national non-profits created for the purpose of promoting humane education (e.g. National Humane Education Society, Institute for Humane Education), and community based animal welfare organizations (e.g. animal shelters and high schools) (Faver, 2010). Humane education has a long history in the United States, but did not continue to sell its importance to animal shelters after the depression era. Due to practical/financial burdens, animal control obligations, and law enforcement roles, limited resources were allocated for the humane education field and potential for impact is decreased (Unti & DeRosa, 2003). There has been limited success

in institutionalizing humane education in school curriculum, as it remains primary focus of local societies. (Unti & DeRosa, 2003). There are basic connections in humane education regarding transferring empathy to humans, but there is not enough to say definitively the quantity and quality of impact in children (Thompson & Gullone, 2003) (Nicoll, Trifone, & Samuels, 2008). Research must be rigorous and “methodologically sound” (Arbour, Signal, & Taylor, 2009). There are over 2000 modern programs for humane education in the United States (Kruger, Trachtenberg, & Serpell), but extremely limited research considering the number of projects and resources invested (Unti & DeRosa, 2003). Only 7% of these programs are evaluated in any way (Olin, 2002) and this gap in assessment severely compromises the field’s ability to distinguish successful and unsuccessful methodologies, inhibiting improvement in humane education and compromising the case to convince educators it is worthwhile (Unti & DeRosa, 2003).

The format of humane education programs varies drastically, from a single presentation from a local shelter to semester long courses (Ascione & Shapiro, 2009). There are three main methods for in-school based humane education: curriculum based lessons, literature with humane themes, and action to facilitate learning (Faver, 2010). The following will discuss the research completed on humane education and the differing indexes of success used in the literature including attitude changes (Cameron, 1983) (Fitzgerald, 1981) (Ascione F. R., 1992) (Nicoll, Trifone, & Samuels, 2008), empathy and social actions (Ascione F. R., 1992), prosocial behavior (Thompson & Gullone, 2003), and gains in knowledge (Holloway 1999, Beck 2001, Coleman 1008) (Jamieson, Reiss, Allen, Asher, Wathes, & Abeyesinghe, 2012). The humane education literature that

began in the late 1970's and early 1980's comprises a large percentage of the information cited today. One of the first studies evaluated what a positive change in attitude is toward animals in fourth grade students, using a direct approach with a live animal and found the adult and peer modeling is most effective (Kress, 1975). In 1980 Vockell and Hodell compared written materials (poster and printed materials), live presentation (by outside instructor) and written materials, using Fireman attitude tests to evaluate empathy. The control showed improvement versus the treatment, but treatments showed no differences between the methods (Vockell & Hodal, 1980). However, the control group had inconsistent scores and no pre-test information was provided to compare (Vockell & Hodal, 1980).

In another study, 5th and 6th graders were exposed to a control and three treatments: light (reading with no instruction), intensive (reading with instruction), and repeated (reading with instruction and four visits) (Fitzgerald, 1981). There was significant difference between the treatment groups and the control groups with the intensive being most effective (Fitzgerald, 1981). Cameron in 1983 looked at 8th grade students in three groups: printed and media based instruction, printed and lecture based instruction, and controls. All experimental groups showed improvement with the media based instruction having the greatest effect, however the instructor conducted the assessment and there was few examples of care and treatment of animals (Cameron, 1983) (Ascione F. R., 1992).

Davis 1983 used an interpersonal reactivity index (IRI) to addresses empathy as a complex construct with both cognitive and emotional elements that is used in later

studies. The five constructs include: Perspective Taking (PT- tendency to adopt the view of others), Fantasy (FS- tendency to transpose themselves into the roles of characters), Empathetic Concern (EC- feelings of sympathy/concern for others), Personal Distress (PD- personal anxiety due to situations), and intelligence (Davis, 1983). PT scores that were high were associated with better social functioning and higher self-esteem (Davis, 1983). This scoring system was later used to examine high school and college students, who had higher with increases in FS scores in high school versus college because they are at a mid-way point between childhood and adult empathetic communication (Galea, Hatcher, Marz, Nadeau, Reynolds, & Walsh, 1994).

Malcarne showed one-hour sessions with role-play and group discussion in 3rd and 4th graders resulted in more humane attitudes and empathy (using story resolution, fireman test, willingness to volunteer at children's hospital and animal hospital) versus a control, but no pretests were completed (Malcarne, 1981). Four humane treatments for 4th and 5th grade students included: repeated (6 lessons and materials with teacher and visiting educator/animal over several days), intensive (one time presentation by visiting educator/animal), light (reading materials without instruction), and control (Malcarne, 1983). The repeated treatment was most effective, intensive was also effective, but the light had no impact (Malcarne, 1983), indicating that printed materials alone are not sufficient for humane education initiative.

One of the more comprehensive program assessments involved the NAHEE instruments (Humane Education Evaluation Project) to show changes in knowledge, attitudes, behavior and changes to people (Unti & DeRosa, 2003). In this study humane

curriculum was paired with in classroom goals. Over 1800 students participated at ages running from kindergarten to sixth grade. After approximately 10 hours of instruction, younger levels showed more difference between attitudes and knowledge and older children showed a bigger behavioral difference. The curriculum enhanced children's attitudes toward the treatment of animals documented with pre and posttests (Ascione, Latham, & Worthen, 1985). In 1987, Hein documented a single presentation increasing humane attitudes, but conceded average students responses might be impacted by large changes in a few students and instructors teaching to the test.

In the 1990's and 2000's, research advances use differing scales of evaluation and linked human/animal empathy and long-term impacts. A 40-hour model including curriculum-blended materials used visual, aural, and behavioral modes of teaching with techniques including lecture, role-play, and written exercises (Ascione F. R., 1997). A change in empathy that was generalized to humans was documented in pre and post-tests with 4th grade students (although not in younger students) that persisted for one academic year after the program's completion. (Ascione F. R., 1992) (Ascione & Weber, 1993) (Ascione & Weber, 1996) (Paul, 2000). This study was one of the first to comment on the longevity of impact of humane education programs. It used the Intermediate Attitude Scale (IAS) and Bryant's Empathy Scale to evaluate empathy on humans and animals and then also compared these values to the CABS (Companion Animal Bonding Scale) (Ascione & Weber, 1996). Ascione commented on challenges in the field including the idea that instruction quality, developmentally sensitive curriculum, grade/age material suitability and assessment appropriateness can influence humane

attitudes (Ascione & Weber, 1996). Issues in the field include a lack of standard evaluation protocols, responses by students to please instructors, and limited samples of cultural and socioeconomic diversity, including the case above where 95% of the students were Caucasian (Ascione F. R., 1997) (Thompson & Gullone, 2003).

Instruments used should be common to many programs and ages. Ascione recommended the IAS (Intermediate Attitude Scale) because it was shown to be reliable with both older children (above 2nd grade) and adults (Ascione F. R., 1997) (Ascione F. R., 1992) (Ascione & Weber, 1993). Children that score higher on CABS (Companion Animal Bonding Scale) have higher empathy scores, implying that child/pet relationships have an impact on empathy in other children (Poresky, Hendrix, Mosier, & Samuelson, 1987) (Poresky, 1996). In another study, 3rd and 7th grade students were evaluated on a pre-/post-test, attitude transference and responses from students and teachers and significant gains in knowledge, attitudes, and behavior was noted for both groups (O'Hare & Montminy-Danna, 2001). Two different scales were used in one thesis by Sprinkle in 2008: the IECA (Index of Empathy for Children and Adolescents) was used to measure affective and emotional empathy in both children and adolescents (Bryant 1982) and the NOBAGS (Normative beliefs about aggression scale) for perceptions of aggressive behavior (Huesmann and Guerra 1997) (Sprinkle, 2008). The thesis discussed whether shelter dogs in a school-based violence prevention program could increase empathy and decrease aggressive beliefs and violent behaviors. Children from higher socioeconomic status had higher IECA and empathetic tendencies, though there was a

lack of control group for this study so decreases in aggression could have been from development or a combination of both (Sprinkle, 2008) (Arbour, Signal, & Taylor, 2009).

Also, a lack of affection for dogs corresponded with lack of affection for people (Brown, Shaw, & Kirkland, 1972), boys and biology majors had a higher interest in animals than girls and non-biology majors (Collins, 1976), 8th grade students had more concern for animals than 11th graders (as well as females, pet owners, and suburban students) (Sanders G. O., 1974). Secondary school students had limited ability to differentiate between teleological or anthropomorphic formulations and factual explanations (Bartov, 1981). Integrating dog safety into all programs via interaction with animals, role play, and visual aids can allow children who are fearful can feel less threatened and children who are overconfident can be more careful (Jalongo, 2006).

In an investigation about WLA! (We Love Animals!), increasing awareness of animals needs, quality of life, and building empathy were accomplished by using student activities, meaning many types of student learning are accessible and engaging (kinesthetic, visual, and auditory) (Nicoll, Trifone, & Samuels, 2008). First grade classes had visits from therapy animals over four months and also printed material (Kind News). The in-class program, but not the printed material, increased student's attitudes toward animals using the PAS (primary attitude scale), but did not change their attitude toward animals at home using the CABS (companion animal bonding scale) (Nicoll, Trifone, & Samuels, 2008). There was no long-term follow up for this study and it was difficult to distinguish which part of the program was most effective (Nicoll, Trifone, & Samuels, 2008). There was also a large gap between increases in attitudes versus increases in

behavior (Nicoll, Trifone, & Samuels, 2008). A different 10-week program with 5th-7th graders looked at knowledge, concerns, and interest in taking action with pre/posttests and a moral dilemma (Higgins-D'Alessandro & Choe, 2006). Thirteen out of seventeen students had positive results with a few differences between boys and girls. Older students were more convinced they could help others and lead by example (Higgins-D'Alessandro & Choe, 2006). This link to action is important because out of the classroom many students do not connect their individual actions to problems such as environmental conditions (Blumstein & Saylan, 2007). In animal related studies college students were shown to be supportive of animal welfare and rights issues, but their behavior indicated a disconnect between the two (Braithwaite & Braithwaite, 1982).

Arbour evaluated a humane education program executed in eight lessons over four weeks (that did not involve animals), which culminated in a class trip and found the results were significant, although he concedes that an animal might have made it more effective (Arbour, Signal, & Taylor, 2009). An increase in empathy, but not humane treatment was observed in boys, but no difference was seen in girls in a program that focused on general husbandry and care, animal safety, and cruelty and welfare (five freedoms) (Arbour, Signal, & Taylor, 2009). In a project conducted by university students, kindergarten classes had weekly lessons about dog safety, read stories, role played, drew, sang, and gave donations and pre/posttests showed students were more knowledgeable at the end of the program (Szecsi, Barbero, Del Campo, & Toledo, 2010). Other programs include HEAR (humane education ambassador reading program) and roots and shoots program (Faver, 2010). First grade students in another 10-session

program had no significant difference on tests, but answers were 78% richer with more concepts mentioned versus the control using a questionnaire (Aguirre & Orihuela, 2010). In another investigation, 9-10 year olds had questions with 20 identical items and 11 different items that tested knowledge, perception, and responsibility, documenting a reduction of fear, increase in knowledge and education, improved perception of animals and higher responsibilities as students show higher improvement without pets (Mariti, Papi, Mengoli, Moretti, Martelli, & Gazzano, 2011). Programs with 13-14 year olds and farm animal welfare aimed to show increases in consideration of animal welfare (citizenship), animals related informed purchasing decisions (consumerism), and proper animal treatment (husbandry) (Jamieson, Reiss, Allen, Asher, Wathes, & Abeyesinghe, 2012). The program used poultry as a proxy for general animals. Three assessment types were used: knowledge assessment (biology and welfare), attitude assessment (to see whether attitudes extended to other animals), and value of animal life (Fireman Test) (Fitzgerald, 1981) (Vockell & Hodal, 1980)) (Jamieson, Reiss, Allen, Asher, Wathes, & Abeyesinghe, 2012). This Fireman Test involves asking students which 4 out of 10 objects would they save in the fire (A- frog, chicken, cat B- stick insect, turkey, monkey, and Wii, stereo, family photographs, iPod, mobile phone, color TV, diary) (Fitzgerald, 1981) (Vockell & Hodal, 1980). Students were also asked to rank the importance of animal welfare considerations (five freedoms: freedom from hunger and thirst, pain/injury/disease, discomfort, to express normal behavior, fear and distress) on a scale from 0-10 for a frog, turkey, cat, and monkey (Jamieson, Reiss, Allen, Asher, Wathes, & Abeyesinghe, 2012). They also looked at self-reported intent to

distribute charity donations between human (children/elderly), environmental (rainforest), and animal interest (frog, cat, and turkey) groups, a technique developed by (Paul and Serpell 1993) (Jamieson, Reiss, Allen, Asher, Wathes, & Abeyesinghe, 2012). They found the event increased chicken knowledge and attitudes, but the concepts did not translate well to other species and more animals might need to be explored in programs to get generalized results. Also, cats were still ranked with higher needs than monkeys despite the higher needs of primates (Jamieson, Reiss, Allen, Asher, Wathes, & Abeyesinghe, 2012). Ideas for including students and encouraging action include: educational video for spay-neuter, promoting spay-neuter events, involving students in daily tasks, fundraising, and working off hours (Winiarskyj, 2002).

It is difficult to meet short-term needs of sheltering and animal control and the long-term goals of eliminating neglect and overpopulation, as humane education is not as tangible as an elaborate return to owner story (Unti & DeRosa, 2003). Humane education programs have been largely relegated to the earlier grades and programs are often constrained in educational institutions (Unti & DeRosa, 2003). Humane education should be universal and target all school age children, not just those who are young or “at risk” (Faver, 2010). As the character movement has taken off in education, it can be used as an opportunity for blending humane education curriculum into the schools by institutionalizing it (Unti & DeRosa, 2003). Humane education has a lot of restrictions on influence and penetration so it will make research and evaluation important to convincing schools to be the primary source of instruction (Unti & DeRosa, 2003). Also, partnering with schools, even providing workshops for teachers, instead of just allowing

teachers to stand aside for visits or tours encourages more valuable engagement (Unti & DeRosa, 2003). By linking lessons to educational standards, humane education can affect both empathy and academic skills to further character development (Faver, 2010). Questions that focus on critical discussion and academic challenges regarding ethics and values should be integrated into standard curriculum for history, social science, political science, biology, and math (Thomas & Beirne, 2002). Despite the fact that humane education can be integrated into secondary school standards with relative ease, very little is being done during middle school and high school (Thomas & Beirne, 2002).

Studies on humane education have largely poor designs with improper measures, lack of pretests, and no controls with involvement of many disciplines and methodologies (Arbour, Signal, & Taylor, 2009). Unfortunately, part of the challenge for the humane education world is that humane research often requires resources beyond the ability and training of most animal shelter personnel. To combat this issue, shelters can pair with a college or university, which can yield beneficial research studies and more funding for grants (Unti & DeRosa, 2003). More serious exploration into multicultural classrooms and diverse audiences and determination of empathy levels and impact of humane education is critical (Faver, 2010). There is no evidence that gains from these programs extend to adulthood or that they result in consistent behavioral changes toward animals (Unti & DeRosa, 2003). Determination of best practices in humane education is necessary and can address: topics covered, frequency and duration of instruction, curriculum-blended or separate, classroom instructors

versus humane educators, and whether animals are beneficial in programs (Faver, 2010) (Arkow, Signal, & Taylor, 2006). Current humane education curriculum uses animals as teaching tools (Daly & Suggs, 2010), but educators must ensure that there is not a negative impact to the animal participant (Serpell, Coppinger, & Fine, 2000). Welfare of animals should be especially concerning because studies have shown programs with (Nicoll, Trifone, & Samuels, 2008) (Sprinkle, 2008) and without (Ascione F. R., 1992) (Ascione & Weber, 1996) (Ascione F. R., 1997) animals can be effective (Faver, 2010). Some possible suggestions for the field include: seeking out collaborations in local communities, using existing structures, linking with animal abuse and aggression, emphasizing character education and empathy development, incorporating service learning, dog safety and books, preparing teachers for any disclosure of abuse or neglect, and building an evaluation into each program (Faver, 2010).

Most teachers have a positive attitude towards pets in the classroom, although 75.3% did not keep pets, 17.3% did keep pets, and 47% had pets visit (Daly & Suggs, 2010). A low percentage of teachers have classroom pets and there is some question as to whether they benefits outweigh the liabilities (Daly & Suggs, 2010). However, it is argued that excluding animals from humane education is a “social detriment” and animals contribute to character development (Thomas & Beirne, 2002). In a report on the use of animals in the classroom, it was shown that they reduce student stress and encourage the student to think about issues of animals and society (Nebbe, 1991). Dogs are particularly effective pets to change behaviors (Daly & Morton, 2003). Children have an affinity for animals and lessons with them can catch students’ attention (Thompson

& Gullone, 2003). Animals are great motivators; children are more emotionally involved and learning is optimized when involved in a meaningful relationship (Vygotsky, 1978) (Melson G. F., 2003).

Summary- Animals, Society, and Humane Education

As a comprehensive summary of humane education studies, remarkably little has been done in the field, and even less has been done in older children and adults. With only 7% of humane education programs being evaluated (Olin, 2002) and the number of studies being extremely limited, research and documentation of results in the field is critical. There are only a handful of studies that even involved high school age students, despite the fact that these students might be the most effective target for teaching complex ethical issues. Older children are in the “moralism” stage and this allows those individuals to be prepared to discuss complex ethical issues surrounding animal welfare. Age 13-16 years has ethical and ecologic concerns and this makes that age group a good target for VSI. In a country devoid of animal interaction, programs like this provide animal contact points and build relationships.

Partnerships and Collaboration: New and Old Idea for Humane Education

Collaboration is key to the success of most humane education programs. Social partnerships connect local community groups, education and training providers, industry, and government to work on local issues or community-building activities (Seddon & Billett, 2004) (Billett, Ovens, Clemans, & Seddon, 2007). Partnerships are important with government, private sector, and non-profits especially in funding and

research (Scherer, 2008). Some private sector alliances show increased efficiencies (Shah & Singh, 2001), and there is evidence that partnerships add value and individual partners are less likely to accomplish individually what they can do together (Scherer, 2008) (Barnes, Carpenter, & Bailey, 2000). Positive outcomes of partnerships have included disability advocacy, education, health clinics, access to prenatal care, housing for the mentally ill and physical exercise (Berkowitz, 2001). Specifically, education partnerships are encouraged with the National Science Foundation's Math and Science Partnership program calling for inter-institutional partnerships between higher education, local education, state education, for-profits and non-profits (Scherer, 2008). Members in K-12 humane education partnerships include researchers, faculty, administration at universities, service learners, K-12 teachers, administrators, and students, and other partnering organizations and community advocates, and members of the community (Scherer, 2008). Collaboration is the process by which individuals with different perspectives have common interests that can be strengthened by working together and take advantage of interdependency and joint ownership (Amey, Eddy, & Ozaki, 2007), which includes programs like outreach, service learning, interprofessional preparation, and strategic alliances (Russell & Flynn, 2000). External pressures from scarce resources, educational mandates, and institution goals as well as technology demands can be motivators (Sink, Jackson, Boham, & Shockley, 2004) (Amey, Eddy, & Ozaki, 2007) and academia can use these programs to meet state economic and education targets (Amey, Eddy, & Ozaki, 2007). Efficiency is a driving force to increase performance and decrease costs and institutions can take advantage of joint facilities

and resources (McCord, 2002) (Marra, 2004) (Sink, Jackson, Boham, & Shockley, 2004). Success in these partnerships includes traditional academic and organizational goals (grant/publications) and community goals (resources/knowledge gathering (Metzler, et al., 2003). Collaboration in different disciplines and organizational partnerships can use inquiry to research their relevance and real-world applications (Scherer, 2008). In person interviews with all partners, surveys, and observations can all be used to collect data (Scherer, 2008) (Billett, Ovens, Clemans, & Seddon, 2007). A Framework Model can be used to understand the value of partnerships at different phases: initiating collaborations (sharing vision and purpose and developing relationships) and defining relationships (five levels of a partnership) (Bergstrom, et al., 1995).

There is little research on how partnerships work and what their outcomes are (Marra, 2004), however it is critical they are evaluated because of the effort and resources needed in coordination like between higher education and K-12 (Scherer, 2008). Documentation of the start-up process, key elements, and immediate effects help to indicate outcomes and other questions include how effectively partners work together, the adequacy of the resources, and what existing resources are being utilized (Scherer, 2008). It is difficult to evaluate partnerships at the population level, with limited studies on community level outcome and contradictory and null results (Roussos & Fawcett, 2000). Partnerships are not well defined, studies are not well controlled, comparison communities are difficult to assess, long term effects are not easy to measure, political and financial pressures can mount, coalitions change and have high complexity all making research efforts challenging at best (Scherer, 2008) (Birkby, 2003).

Schools that create partnerships for educational research face many challenges including collecting evidence economically (time/effort), validating knowledge, disseminating it, and creating conditions that support the process (McLaughlin & Black-Hawkins, 2007). Other obstacles for coalition research are obtaining sample representativeness, controlling the independent (coalition), and extraneous variables, identification and interactions with extraneous variables, dependent variables (outcomes), measurement, change over time and politics (Berkowitz, 2001). Kubisch et al describe features that make these community initiatives difficult to evaluate as seen in the diagram. Board members can even become challenges, being skeptical of new programs and sensitive to resource and time issues (Lantz, Viruell-Fuentes, Israel, Softley, & Guzman, 2001). Prevalence of white investigators in areas of color, institutional racism, and overcoming trust issues with previous investigators can also be problems in research (Metzler, et al., 2003).

Partnerships are process-oriented and continually evolving (Essex, 2001) (Billett, Ovens, Clemans, & Seddon, 2007). Effective partnerships/collaborations have specific qualities including: establishing trust, relationships, and history, communication/sharing decision-making and connectedness, understanding the community/development, defining principles/goals/mission, identifying impetus/context/catalyst for the partnership, establishing research priorities/training/evaluation, securing funding/diversifying, identifying strong/committed/active leaders/political climate, assessing sustainability in the short and long term, diversity/inclusiveness and creating image of positive outcomes (Bergstrom, et al., 1995) (Amey, Eddy, & Ozaki, 2007)

(Metzler, et al., 2003) (Drug Strategies, 2001) (Billett, Ovens, Clemans, & Seddon, 2007) (Borden & Perkins, 1999) (Gardner, 1995) (Lantz, Viruell-Fuentes, Israel, Softley, & Guzman, 2001) (Russell & Flynn, 2000). Environmental, in-kind, financial, and human capital types are needed for success. They can be categorized into human capital types including bonding (homogeneous group), bridging (social ties in diverse group) and linking (via organizations) and are important for success along with using respect and diversity (Bergstrom, et al., 1995) (Healy). Dimensions of this capital include political participation, community involvement, information networks, trust, norms, and sanctions (Healy). Emphasis on business logic for an organization can be an asset (Clegg & McNulty, 2002). Leaders themselves need to be active and committed and help identify the link between action and outcomes and interpretation of these changes is going to be dependent on that leader (Fullan, 2002) (Eddy, 2003) (Lantz, Viruell-Fuentes, Israel, Softley, & Guzman, 2001). Trust is critical for growth and achievement (Scherer, 2008) (Lantz, Viruell-Fuentes, Israel, Softley, & Guzman, 2001). It is continually changing and evolving and participants might need to give away power to sustain trust (Seddon & Billett, 2004) (Billett, Ovens, Clemans, & Seddon, 2007). Actions of organizations change how people trust it and so it is important to document increased levels of the multidimensional aspects of trust including multilevel (workers and team organizations), culturally rooted, communication based, dynamic and multidimensional (Paine, 2003).

To evaluate programs, existing instruments can be used to show the characteristics, impacts, and relationships (Scherer, 2008). In the research there needs to be a clear purpose, developed relationship, communication, dissemination of

findings, resources (time/money) and continuing commitment of members (McLaughlin & Black-Hawkins, 2007). Eventually, organizations also need to look at long term viability with plans for exit of a critical person, reconciling different motivations and context, sustainability, and moving past a champion role (Amey, Eddy, & Ozaki, 2007). A three-stage partnership model used in Scherer can be used to evaluate partnership: Stage 1- strategic needs or types of resources or whether they are complementary, Stage 2- partnering activities including formations and behaviors, Stage 3- partnering outcomes for performance and process (Scherer, 2008). Conferences have been used to allow educators to discuss partnership and what has worked between public schools, universities, businesses, and students (Watson, 1993).

Need in the Education Community

Only 20% of the US public is scientifically literate (has a basic vocabulary of scientific terms/constructs and general understanding of nature and scientific inquiry), despite a perception of value for economics and life quality (Miller J. D., 2004). The perceptions and feeling about science are varied, but the ability to use scientific reasoning is far more important versus the common dogma of memorization of facts without manipulations or discussion (Alexander, Waldron, & Abell, 2011) (Blumstein & Saylan, 2007). Challenges for the public include audience (heterogeneous background), topics (connection), and language (be understandable) (Alexander, Waldron, & Abell, 2011). One of the reasons elementary school children report not liking science was because it was boring and had no place in their everyday lives (Hazen & Trefil, 1991).

Interdisciplinary coursework has very few studies have been executed at the middle school and high school level (Applebee, Adler, & Filihan, 2007). Supporters of the programs claim they have the potential to increase engagement, achievement, and invigorate teaching while reflecting real world problems from many disciplines/perspectives (Applebee, Adler, & Filihan, 2007) (Bean 1997) (Jacobs 1997) (Tehudi and Lafter 1996). Interdisciplinary programs between biology and math have been used to explore the natural interdisciplinary nature of science and the need for communication and ethics (Duncan, Bishop, & Lenhart, 2010). STEM (science, technology, engineering, and math) curriculum can be integrated with the arts and social sciences to make larger impact (Sanders M. , 2009) (Wynn & Harris, 2013). Because science and math are quantitative there can be a disconnect between academic and real-life situations and this can make these subjects hard to relate to for more artistic oriented people (Wynn & Harris, 2013).

Interdisciplinary learning highlights that learning is constructive, knowledge is contextual, motivation and social interaction is central to cognition (Sanders M. , 2009). Integrative instruction was shown to increase learning in one meta-analysis showing these types of programs create students that perform better on testing and were successful at all age levels, especially traditionally underachieving students (Hartzler, 2000). Scaffolding is encouraged by combining different subjects to make the information relatable to students (Lattuca, Voigt, & Fath, 2004). Also, these courses help students to critique arguments, understand ambiguity, develop sensitivity to ethical issues, encourage creative thinking, and increase the ability to listen (Lattuca,

Voigt, & Fath, 2004). There is enthusiasm from students exploring a new idea and power from multiple disciplines with a shared purpose (Applebee, Adler, & Filihan, 2007). Math and Science partnerships improve achievement and decrease achievement gaps in more diverse groups including ethnicity/race, socioeconomic status, gender, low-performing/at-risk, and disability (Haycock, Hart, & Irvine, 1992) (James, Laatsch, Boss Bosse, Rider, Lee, & Anderson, 2006). A case study team approach can also be used that can encourage critical thinking and communication and identify assumption/beliefs in an active way (Mabrouk, 2007). More examples of how faculty and members of different areas can interact and cooperate on interdisciplinary programs are needed (Friedow, Blankenship, Green, & Stroup, 2012) (Lattuca, Voigt, & Fath, 2004). Science programs can be lacking in interdisciplinary connections that can effect scientists' ability to use and share their knowledge and expertise with other people. In formal Master's in Public Health programs in Texas, only 36% of students met complete ethic competency. Examining ethical competency is a critical element for efficacy in both science and non-science careers.

Interdisciplinary importance easily translates between science and the arts. Two events led to the theories behind the importance of arts: Horace Mann with visual arts and music and Dewey with correlation between arts and cognition (Gullatt, 2008). Vygotsky also challenged the ideas of behaviorism and said that the active role and arts were integral to the process; also children learn more when emotionally invested and within meaningful relationships, both of which are encouraged with animal involvement in humane education programs (Vygotsky, 1978). Students need to create meaning for

themselves, which art can help facilitate, especially in the lens of diversity and multiculturalism (Gullatt, 2008). Arts programs need to: transform ideas/images/feelings into art, refine awareness of aesthetics, foster connection between content and form, look at the future, and recognize multiple perspectives (Gullatt, 2008) (Eisner 1999). Arts can be included as a core subject, integrated into curriculum, included alongside, outside the school setting, for careers, extracurricular and aesthetic education (Gullatt, 2008) (David 1999). If arts are integrated, they can have a larger effect on struggling students achievements (versus advances) (Gullatt, 2008).

Partnerships can be used to develop cooperative work experiences that encourage student learning (Chin, Bell, Munby, & Hutchinson, 2004) and by blending the school and work youth will better be prepared for their adult roles (School to work transition: Issues and legislation in the 2nd Session of the 103rd Congress, 1994). The Linked Learning Initiative in California used a model to improve high schools that included strong academics, technical education, and real-world experiences in areas such as engineering, arts, and health (Richmond, 2010). Engagement in a real-world context is relevant to both student engagement and motivation, with one study finding that only students that were determined to get a four-year degree were satisfied with topics unconnected to their career (Craine, 1999). Meaningfully linking theory and practice is done more easily when a program focused outside the school (Bragg, 2000). Work-based learning is complex, cognitive, and context dependent, but challenging due to the people needed to run the program system and policy alignment, and funding

(Richmond, 2010) (Chin, Bell, Munby, & Hutchinson, 2004). Curriculum standards and testing emphasis makes schools more pressed for time and accountable for test content and therefore curriculum blended initiatives can provide an outlet for humane educators to reach the needs of students and teachers (Unti & DeRosa, 2003). Curriculum-blended programs are teacher-taught programs that combine academic skill development with humane concepts/character education and therefore can persuade teachers that the lessons contribute to their own specific subjects (Faver, 2010) (Ascione F. R., 1997).

Piaget emphasized the importance of child participation with direct actions and how this helps integrate the knowledge into memory (experiential education) (Piaget 1962). Children are more attentive, learn more, and retain longer when involved in the learning process (Sprinkle, 2008), and similarly assisting someone is better than watching because it is an “embodied” activity (Chin, Bell, Munby, & Hutchinson, 2004). Direct participation provides visual, motor, and somatic information to help with memory retrieval (Johnson-Delaney, 2004). A scale that includes four factors can measure motivation and engagement: adaptive cognition (positive attitudes/orientations toward academic learning), adaptive behavior (positive behaviors in student learning), impending maladaptive cognition (student attitudes/orientations inhibiting learning) impending maladaptive behavior (problematic learning behaviors) (Martin, 2009).

Research has shown field trips/informal education is invaluable and students remember these experiences for rest of their lives (Meldrum, 2006). In a study in 2006,

researchers found that minorities were less likely to have made their mind up about a science career by high school, but were more likely to ultimately not pursue a science career (Meldrum, 2006). This indicates that the high school years are particularly important to the decisions of minorities to engage in science careers. It also indicated that Latino students were particularly influenced by informal education, such as field trips. Students with a low socioeconomic status are more unlikely to take advance science courses in general (Meldrum, 2006), making interactive science based programs like VSI more accessible to students. Research has been done indicating the potential for success in science summer and outreach programs that use science or technology schools cannot provide (Hanesian & Perna, 1999). In a neuroscience outreach program, research indicated that students exposed to the program scored higher on tests of neuroscience knowledge and had higher interest in careers than non-exposed students (Cunningham & Kunselman, 1999). Educational literature and specifically Meldrum's study show that for minority students pursuing science, informal science education is a significant factor in their success.

Service learning can be a way to learn using direct participation. Benefits to this include: filling needs in the community, connections to academic learning, good citizenship, etc. (Winiarskyj, 2002). Service learning is a way to combine the intellectual facts and philosophy with how to make a difference (Fixmer-Oraiz & Murray, 2009). Shelters are beginning to serve as service learning sites (Unti & DeRosa, 2003) that have been encouraged by the growth of model in US high schools (Winiarskyj, 2002). Service learning incorporates hands-on activities in the community, professional preparation,

and collaboration, that use scaffolding, modeling, coaching, to teach novices (Chin, Bell, Munby, & Hutchinson, 2004) (Russell & Flynn, 2000). Science can encourage higher levels of learning and encouraging students to reach the public with real-life situations can increase knowledge gain by the increased participation. Internships, capstones, and project results are important for assessment and self-reflection is also important in the learning cycle (Mentkowski & Sharkey, 2011). A combination of testing, survey, and rubric are also able to cover all three domains and their instructional strategies (cognitive, affective, and psychomotor) (Bloom, 1956) (Krathwohl, Bloom, & Masia, 1973). For example, knowledge, receiving ideas, and perception can be satisfied by lecture or question and answer. Synthesis, prioritizing values, and adaptation can be satisfied with real-life situations. Comprehension/application, responding to ideas, and guided response can be achieved through discussions or reflection (Krathwohl, Bloom, & Masia, 1973) (Bloom, 1956). This should be tested on multiple levels and domains including cognitive (knowledge), affective (attitude), and psychomotor (skills) (Bloom, 1956) (Krathwohl, Bloom, & Masia, 1973) (Harrow, 1972).

Surveys by students and program administrators have been used in other educational outreach projects as a primary assessment of student benefits including one designed for engineering (Hanesian & Perna, 1999). In another study with a Junior Fellows Program, goals on increasing diversity and enrollment in health professions was also primarily assessed via survey (Marcelin, Goldman, Spivey, Eichel, Kaufman, & Fleischman, 2004). However, challenges in this study involved a low response rate (40%) when surveys were mailed to participants at a later date (Marcelin, Goldman,

Spivey, Eichel, Kaufman, & Fleischman, 2004). In a nursing summer health care program, 70% of students were tracked into a health profession with 50% in nursing (Bumgarner, Means, & Ford, 2003). This program was also evaluated primarily by survey (Bumgarner, Means, & Ford, 2003). Another program for ultrasound careers used a survey to show that students felt an increased level of knowledge after the program with 90% indicating an increase in knowledge and 60% indicating interest level in pursuing a related career (Merton, 2011). In this program scanning demonstrations were found to be particularly effective (Merton, 2011), and all data collection was completed via survey.

Shelter Logistics

Humane educators must balance educational initiatives with other responsibilities, especially within the shelter. A 600-shelter study showed that 71% have some sort of education program, mostly elementary school that involved tours (77%), community service (44%), volunteering (30%), after-school program (23%), summer camps (15%), and providing curriculum (36%) (Olin, 2002). Most programs involved seeing (86%) or touching (73%) live animals and 94% thought education was important, but 63% of organizations allot less than \$1000 to the humane education program (Olin, 2002). There is only one paid education staff member and one volunteer at most shelters, with only 12% having an education director (Olin, 2002). These education staff members are also responsible for media (57%), adult education (51%), animal behavior counseling (33%), violence prevention (25%), and pet therapy (23%); however, only 15% of staff members are certified to teach and 50% had only on the job

training (Olin, 2002). Educators were concerned about touching on sensitive topics such as wildlife, farming, and research because of fear of interest group or being hostile to community values (Olin, 2002). Humane education's purpose and values should be reinforced and proven with research. Showing a tangible increase in shelter parameters such as adoptions, fosters, and volunteers can help show why humane education should be a full time prerogative and has the merit to warrant funding the emphasis in the financially strapped sheltering field.

Shelters have many parameters they use to reach their ultimate goal of saving lives with three core concepts: decreasing abandonment, increasing adoption, or increasing spay/neuter. Spay/neuter programs were the most effective at saving lives with increasing adoptions being a second effective option (Frank, 2004). Although in other studies, spay-neuter programs caused decrease in cat intake/euthanasia, but not in dogs (White, Jefferson, & Levy, 2010). Increasing adoption or spay/neuter generally is better than abandonment, but decreasing this parameter can be accomplished by educating on the seriousness of the decision, exposing the suffering/death that is a consequence of abandonment, and increasing understanding of time/cost/responsibilities (Frank, 2004). Programs to encourage adoption target two types of people: substitution sources (who would get an animal from another source) and marginal consumer (who would not have gotten an animal) (Frank, 2004). Rate increases that are needed to null the euthanasia rate are much more substantial for marginal consumers (656%) versus substitution (90%) (Frank, 2004). Methods to increase these rates include educating the public about spay/neuter, focusing on

marketing versus altruism, and financial incentives like taxes (Frank, 2004). Education programs are a powerful tool to inform and motivate the public on issues of overpopulation.

Employee salaries are a large burden on non-profits and volunteers are often used to fill that gap. Teenagers want to make a difference and are ripe for activism in the community (Thomas & Beirne, Humane education and humanistic philosophy: toward a new curriculum, 2002), but volunteering usually declines in the transition between School And higher education (Francis, 2011). There is a higher rate of volunteerism in teens then 20 years ago and this can be associated with the previously discussed concept of service learning (Winiarskyj, 2002). Students can often identify needs in the local area and assume some responsibility for that need and with 59.3% of all teens volunteering somewhere this can be a very active impactful unit in any facility (Winiarskyj, 2002). Education and income is not related to volunteering, but age is negatively related (Wei, Donthu, & Bernhardt, 2012). Younger volunteers are shown to spend more time per visit in animal shelters and liked gaining the experience and knowledge (Ferrari, Loftus, & Pesek, 1999). In a research summary, it was found people join volunteer programs for social motives including new friends, alleviating loneliness, and social pressure (Haski-Leventhal & Cnaan, 2009). Surprisingly, approaching volunteering as the “normal” thing to do can actually be more beneficial than listing or explaining the other benefits (Francis, 2011). Volunteers are critical to the functions of many shelters, but there is a struggle to recruit and retain volunteers for nonprofits (Francis, 2011) (Regneir and Panty 2003). Group formation can increase commitment

and the role of these groups can be neglected in management (Haski-Leventhal & Cnaan, 2009). Volunteers can identify with the group, adopt their habits, or lead them and these group types include: habitual volunteers (ongoing time period and are friends), dual-identity volunteers (members of a larger group that volunteer jointly), training induced volunteers (service training), and provisional volunteers (group formed for one time task) (Haski-Leventhal & Cnaan, 2009). This includes not only volunteers in the shelter, but also foster families volunteering their time, home, and resources to care for their pet.

Summary

The lack of research in humane education is a burden to the field and a barrier to effective utilization of resources. Although importance of animals to society, links between violence towards animals and people, and humane education values such as empathy development have been briefly explored, a great deal of areas are untouched by research, especially at the high school level.

Interdisciplinary and arts based courses can capture student interest and can help with STEM subject advancement and scientific literacy in general. Tracking these programs and their results can help prove their worth. Veterinarians and shelter professionals have an interest in increasing public interest about the value of veterinary care. Shelter needs including adoption, foster, and volunteers can be addressed by service learning type programs. However, careful planning is critical to successful partnerships within the field to produce effective and productive programs. VSI seeks to document the benefits of a high school humane education program to students,

teachers, the shelter, veterinarians, and the community. By integrating interests on multiple levels, a more effective analysis can be completed on the successful aspects of this humane education program.

Chapter 3: Methodology

Program Design

Program Overview:

Lessons and content are based on the idea of integrating “hard” science concepts and techniques with other areas of emphasis including law, art, and ethics. VSI is designed as an intensive type program (Fitzgerald, 1981) with repeated treatments (Malcarne, 1983). It also encourages science students to use their knowledge to confront societal issues and problems, placing an emphasis on the human-animal interface. As Faver recommends, the program is curriculum based and provides outlets for students to take action. Engaging teachers, standards linkage, and integration of ethics and values into curriculum, are all goals of the VSI program’s structure as recommended by Unti & DeRosa in 2003, Faver in 2010, and Thomas & Beirne in 2002.

VSI uses a variety of techniques in the lessons based on the literature and catering to different learning styles and levels. Media-based learning is included in instructional videos and creative product lessons as recommended by Cameron in 1983. Role-play is adapted for high school students using the legislative process of pig animal welfare. Different animal species are used throughout the program, although live animal interaction is limited to cats and dogs.

Themes in the literature review are addressed in the VSI assessment and evaluation plan. Pretest and posttest measures are included when possible to combat issues like the ones highlighted by Vockell & Hodel in the 1980 study. A control group is utilized in all the parameters except lesson surveys. Also, issues with lack of diversity in humane education, with some studies citing 95% Caucasian participants, are mitigated with a larger percentage of African American students enrolled in VSI. Including high-risk schools helps give a more complete picture regarding differences in impact between ethnicities and socioeconomic status. Examining changes in knowledge, attitudes, intention to take action, and actual behaviors as a whole picture of program effectiveness is the basis for the VSI evaluation methodology. This mirrors the consideration of knowledge, attitudes, and intention to change behaviors emphasized in the NAHEE project in 1985, the O'Hare & Montminy-Danna study in 2001, and the Jamieson et al animal welfare project in 2012, while also adding an element to track real behavioral changes. Combining qualitative and quantitative assessments provides a more complete illustration of student learning and helps alleviate the possibility of missing changes due to testing structure as discussed in Aguirre & Orihuela in 2010. Student progress throughout the program is assessed each lesson and at the conclusion of the program. Behavioral changes are monitored after the program. Long-term effects are only examined 4 months after the program due to time limitations.

Before the Program:

Before the actual program began, Charleston Animal Society staff met with the partnering teacher to explain the curriculum, answer any questions, make adjustments based on their classroom, and schedule time for the initial site visit and the capstone field trip. This enabled excellent communication and more smooth execution of the curriculum and created a relationship from which valuable feedback and guidance was gained.

All resources required were provided by Charleston Animal Society if not available at the high school. Also, most lessons can be adapted to extend for longer times by allowing student more time to work on projects in-class that can be graded. Suggestions for these schedule adaptations are in the curriculum along with rubrics for evaluation. Also, specific South Carolina educational standards were documented with each lesson. This allowed teachers to prove to their district that the VSI program covers subject matter required by state law.

The instructor was encouraged to use groups of 4 or 5 and keep those groups intact throughout the activities. This allowed students with different abilities and strengths to shine at different lessons. Someone who is excellent at identifying parasites under the microscope might not be a good artist and keeping the group together allows students to learn to help each other and value different skills.

Introductory Videos:

The CAS education staff created introductory videos and transition for each lesson using professional Final Cut Pro software. These videos made teachers more

confident teaching lessons because discussion and introductions are provided. They also connected students to technology and visuals that they are accustomed to in a world centered on technological communication. In classrooms where written material was a challenge due to elementary reading level, these videos provided verbal, visual, and written instructions.

Lesson Summaries

VSI is organized into seven lessons with the first and last being taught by CAS part-time teachers and the other five taught by the classroom teachers. Descriptions of each lesson are below. A visual diagram summarizing each lesson is included in Appendix A.

Lesson 1: Introducing Shelters and the Human-Animal Interface

- “Heartbeat, Heartfelt” - Charleston Animal Society Program Introduction
- Humane Education Introduction
- Shelter Issues Introduction including overpopulation
- Five Freedoms of Animal Welfare
- Ultrasound Demonstration

A Charleston Animal Society science teacher visited students participating in the initiative for a “kick-off” lesson. Students interacted with the animal visitor in the classroom as the teacher discussed Charleston Animal Society, introduced some humane education topics, and gave an overview of the VSI program. Animal behavior introduction helped scared students connect with the canine companion. This lesson

covers more classic humane education topics including overpopulation, shelter roles, spay/neuter, etc. Following the presentation, an ultrasound demonstration showed students inside an animal abdomen and the heart. Ultrasound was particularly useful for teaching because it is portable and displays images in real-time. Direction of blood flow, valves opening and closing, and cross-sections of the working heart create a substantial impact on students.

Lesson 2: Pathology and Cruelty Investigation

- “CSI (Crime Scene Investigation)” - Cases on Zoonotic Disease and Parasites
- Identification of parasites and use of the microscope
- Introduction to radiographs
- How to write a scientific court report for cruelty investigation\
- Interpretation of necropsy findings, blood splatter, housing, exam findings, and patient management

Students came into class and were asked to become CSI investigators. The case is set up like a “choose your own story” book, where each choice directs them to a different part of the investigation. Students must also balance time and money resources that are depleted each time they make a decision. Evidence packets with samples, microscope slides, and case details were included for students to solve. Students also create a court report that is reviewed for accuracy and content.

Student Product: Court Report

Lesson 3: Ethical Snapshots

- "Weight on Your Shoulders" - Managing Difficult Shelter Population Decisions
- Ethical Scenarios presented via video for discussion
 - 1- Human-Animal Interface- Feral Cats and Wildlife
 - 2- Overpopulation- Puppy Mills, Spay-Neuter, and Growth Models
 - 3- Animal Advocacy- Animal Welfare versus Rights, Open and Closed Admission

Shelters

- 4- Common Medical Conditions- Heartworms

Students used video introductions as a guide through many ethical scenarios.

Students must discuss a variety of ethical issues encountered in the animal world and share them with their partners. Topics include managing feral cat populations and impacts on wildlife, the realities of puppy mills, details of spay/neuter, how quickly animals can multiply, the distinct difference between animal welfare and animal rights, defining open and closed admission shelters, and the realities of fleas and heartworm disease. Students discussed issues, responded to ethical dilemmas, and calculated costs and population growth.

Student Product: Ethical Question Worksheets

Lesson 4: Zoonotic Disease

- "Don't Drink Out of That Glass" - Disease Transfer and Investigation Activity
- Discover point source of outbreak like epidemiologic intelligence service
- How to identify, prevent, and treat disease in an animal

- Create screenplay focused on either Rabies or Cryptosporidium using real information on these zoonotic diseases

Students began the lesson with a disease transfer activity. One student in the classroom was given a “contaminated” glass, while every other student has a clean glass. Students did not know who this person is, but the instructor wrote down this person. Students are told they are at a party and decided to have a sip of their friend’s soda. They simulated this by pouring the liquid from their friend’s glass to theirs and then splitting them back in each cup. This is done for three rounds. Students then poured an indicator solution that turns pink to show which students are “infected.” They then worked as a group to figure out who was the “point-source” for the infection. This simulated how real infection sources are determined in the field, like through the Epidemiologic Intelligence Service. After a disease introduction, students created a screenplay centered on Rabies or Cryptosporidium (both zoonotic diseases). They were required to use factual scientific explanations in their scripts. Students receive instruction about zoonotic disease before starting the activity. They must integrate their knowledge of disease within the scenarios in the screenplay.

Student Product: Screenplay on Zoonotic Disease

Lesson 5: Communication and Advertising

- “You Know the Science, Now Get It Out There!” - Creating public health advertising
- Art and communication essential to science
- How to present information to the public to catch someone’s attention and make it understandable

- Students create either poster or public service video announcement

Students created one piece of public health advertising (such as a poster) or public health service announcement (video). Student posters can be displayed in the shelter for the public to see or copied to include in adoption packets. Students utilized concepts of art, spacing, color, and planning to properly show their message. This activity also allowed students to understand why knowing science is not enough and how different people have different skills to contribute. Preventing heartworm disease was used in the project, which reinforces other heartworm information in the program. It teaches students how they use scientific information to take action and communicate this information to others effectively.

Student Product: Heartworm Poster or Video Scoring

Lesson 6: Emotional Intelligence, Empathy, and Law

- “Can’t We All Just Get Along?” - Farm Animal Ethical Issues
- Developing legislation as scientists and invested parties; working together
- Students write essay after activity to reflect on the realities of passing legislation, especially on animal welfare
- Role play allows students to empathize with the humans and animals involved in all sides of the animal welfare debate

The class was asked to draft legislation for swine farm welfare bill. Students were split initially into groups for each position statement (farmer, animal welfare advocate, consumer, packer, and swine veterinarian). Within these groups students read their own statement and discussed what part of the welfare legislation was important to their

group. A sheet with the format for the law and potential talking points were used as reference. After ten minutes, students switched into groups with one of each type of advocate. Students had to work with the other groups to draft a piece of legislation that they can compromise on. The goal for this activity was for everyone to try to agree on the final law that represents the best-balanced interests of the groups. Students reflected afterwards about how they felt during the activity about their own performance and their other group members via an essay.

Student Product: Essay in Response to Lesson

Lesson 7: Capstone Field Trip to the Shelter

- Four hour minimum shelter visit
- “Behind the Scenes” rotating stations
 - Intake and Processing
 - Meet Your Match and Adoptions
 - Surgery Suite
 - Necropsy Demonstration
- “Outbreak!” - Biosecurity plans and disease control techniques are created
- SAFER Demonstration
- “Race for Space” - Interactive activity showing importance of shelter flow for animal well-being
- Listening to Hearts and Animal Time

Students rotated around the shelter touring the facility and completing activities at each “station.” Tour/activities rotated so students can be split into smaller groups

and therefore more one-on-one contact. In the intake/processing rotation, students learned how animals are taken in, vaccinated, and examined. The animals had blood taken and were tested for heartworms. Students helped run these tests in the room on their dog. Students also got to see the main holding areas of the shelter where the majority of animals are located. In the Meet Your Match rotation, students took a personality assessment to match them with a cat and learn how this is used in the adoption process. They interacted with the animals on the adoption floor for the remainder of the rotation. In the surgery rotation, students observed surgical preparation, surgical recovery, and surgeries in Charleston Animal Society's state of the art surgical suite. Students asked questions to the surgeons and technical staff about the procedure. In the necropsy rotation, students discussed the reasons for doing a necropsy with the veterinarian. Then, a demonstration of a necropsy (autopsy on animal) was completed with a conversation of the importance of necropsies for disease identification and cruelty cases. Students got the opportunity to touch and identify the organs with gloves. A brief discussion about feral cats was also included in this station.

Next, students participated in the "Race for Space" activity. This activity emphasized the importance of getting animals out of the shelter quickly to maintain a healthy number of animals in the facility. Each person played a particular role in their shelter to help the animals get through the facility. This reemphasized the jobs in the shelter observed earlier in the field trip. Two different shelters simultaneously take in the same amount of animals, but one shelter adopts out the animals faster than the other. Students observed how quickly numbers can get out of hand when these animals

stay in the facility. After the activity students discussed animal hoarding, animal welfare in a shelter situation, and brainstorm ideas about how to get animals out of the shelter more quickly and through different avenues. Students also observe a mock SAFER demonstration. This is a research-based assessment to determine an animal's likelihood to aggress. Students participated by evaluating the animal with the assessor. This helped students use some of the behavior observation skills they learned earlier in the program. Standard evaluations are essential to scientific experiments and designs and this type of structure also showed students how consistency can be important in the real world.

In "Outbreak!" students participated in a simulated disease outbreak in the shelter. They stood in the kennel of an imaginary outbreak of parvovirus in the shelter where they can assess biosecurity, quarantine, and disease concerns. Groups came up with biosecurity plans for the shelter in different areas that offer ways to control, diagnose, treat, and prevent the disease in the most ethical way possible. They examined both inside and outside to assess risks. This integrated the many different layers of scientific knowledge and interdisciplinary skills they have achieved earlier in the program.

Finally, students got to go to the adoption floor to interact with the adoptable dogs. They listened to dog hearts using a stethoscope and were encouraged to try and get the dogs to respond to commands using food provided on the adoption floor.

Student Product: Outbreak Activity Worksheet

After the Program:

Charleston Animal Society Education Staff met with the teacher in person to get feedback. This teacher also completed a survey based on success of the overall program and individual lesson plans. Students were also provided with the opportunity to create enrichment toys for the cats in the shelter. This allowed students to do something for animals' mental well-being in the shelter without having to provide any financial resources, just time resources. Other behavioral indicators were tracked after the program's completion. CAS sent a thank you to the principal of each school highlighting specifics of their students' experiences, qualities of the participating teacher, and a picture of the class at the shelter. This was to help reinforce the relationship between the district, teacher, and CAS.

Evaluation Focus and challenges

The assessment for this program involves both summative and formative components. Formative and summative assessment are defined in terms of purpose and timing: formative so that positive achievements can be identified and progression planned with specific content and skills, and summative for recording overall student achievement with criterion-reference or normo-reference (Harlen & James, 1997). When trying to develop valid and usable criteria for assessments, integration of many aspects of learning situations must be utilized (Mentkowski & Sharkey, 2011). VSI assessment showed multiple parameters including achievement in all levels of Bloom's Taxonomy, shelter recognition, and positive experience for students. Bloom identified three domains, cognitive (knowledge), affective (attitude), and psychomotor (skills)

(Bloom, 1956). These correspond to types of assessment and tools being implemented in the VSI evaluation (Whys and hows of assessment). Tests are used for some learning objectives (accuracy and item analysis) including remember, understand, and apply. Rubrics are used for assessing most of the learning objectives (remember, understand, apply, analyze, evaluate, create). This evidence also served as a performance assessment, which ensures student learning and gathers information about how students are integrating information to help with curriculum improvements (Mentkowski & Sharkey, 2011). Internships, capstones, and project results are important for assessment and self-reflection is also important in the learning cycle (Mentkowski & Sharkey, 2011). A combination of testing, survey, and rubric are also able to cover all three domains and their instructional strategies (cognitive, affective, and psychomotor) (Bloom, 1956) (Krathwohl, Bloom, & Masia, 1973). For example, knowledge, receiving ideas, and perception (cognitive, affective, and psychomotor respectively) can be satisfied by lecture or question and answer, synthesis, prioritizing values, and adaptation can be satisfied with real-life situations, and comprehension/application, responding to ideas, and guided response can be achieved through discussions or reflection (Krathwohl, Bloom, & Masia, 1973) (Bloom, 1956).

Fidelity of implementation is “the delivery of instruction in the way in which it was designed to be delivered” (National Research Center on Learning Disabilities, 2006), or as intended by the developers of the program (Dusenbury, Brannigan, Falco, & Hansen, 2003). The VSI program is a complex curriculum with multiple disciplines and levels of learning. Often the more complex the intervention, the lower the fidelity

because it can be difficult to implement the process consistently (National Research Center on Learning Disabilities, 2006). To assess fidelity, it is recommended to track adherence to program, amount of the program, responsiveness of participants, and existence of critical features. By having specific and detailed guidelines for teachers, variation in these parameters can be minimized. Also, teacher communication with a part-time teacher at CAS helped to ensure material was being properly and consistently presented. Materials must be accessible (National Research Center on Learning Disabilities, 2006), and lesson plans in the program and packets include relevant information and resources for the instructor. Also, teachers must believe that this approach will be effective (National Research Center on Learning Disabilities, 2006). Finally, ensuring individuals with similar expertise deliver the information is important for consistency (National Research Center on Learning Disabilities, 2006). This is a huge challenge for VSI because of the complexity and depth of the lesson plans. Detailed lesson plans with suggestions for spurring conversation assisted teachers in proper teaching of the curriculum. Videos developed by CAS educators helped ensure each student gets the same information from the program. Also, correspondence and support from the part-time teacher provided another outlet and resource for implementation. Within the actual assessment, fidelity is simpler. Rubrics, testing, and surveys are standardized and one researcher evaluated projects. One person blindly assessed all project materials at the same time using a rubric or answer key. Because the same people compiled the tests and rubrics, consistency between different teachers (inter) is less of a concern.

Validation is “the process of accumulating evidence that supports the appropriateness of the inferences” or the degree the evidence supports the interpretation (Moskal & Leydens, 2000). The types of evidence that needed to be examined for validity are content (reflects knowledge of content area, adequately samples it), construct (internal evaluation of reasoning), and criterion (results correlate with future event) (Moskal & Leydens, 2000). Objectives also need to be well documented within evaluation (Moskal & Leydens, 2000). Validity is especially essential for formative assessment (Harlen & James, 1997). Reliability is more of a concern for summative assessment, although validity should not be compromised for the sake of reliability (Harlen & James, 1997). Reliability refers to whether the scores are consistent; in other words do not vary between different raters or within one rater depending on parameters such as attitude, time, or place (Moskal & Leydens, 2000). “Establishing reliability is a prerequisite for establishing validity” (Gay, 1987), and therefore something can be reliable without being valid, but not valid without being reliable. Internal consistency is an important aspect of reliability and framing questions in two different ways helped prove consistency in answers.

Evaluation organization

Multiple data sources should be utilized to create a more complete array of sources for student learning (Mentkowski & Sharkey, 2011). Therefore, the design for carrying out the VSI evaluation involved a multimodal assessment. A pre/posttest (with demographic information), feedback forms, and product evaluations (using rubrics) helped to establish gains in knowledge, attitudes, and enthusiasm. Fireman test, IAS

(Intermediate Attitude Scale) and behavioral changes were used to help evaluate empathy in a manner than can be compared to previous research. Other Likert Scale Type questions were used to gather data on other changes in attitude. The initial and final survey and pre and posttests were combined together to facilitate completion. Separately from this evaluation, a rubric-based evaluation of daily lesson products was created. Also, students and teachers completed surveys after each lesson. Repeated topics like spay-neuter were used to show changes across all three levels, knowledge, attitudes, and behavior. A summary of lesson evaluation tools and strategies is included in Appendix B.

Impacts of the program involved previously discussed areas of multidisciplinary learning of students, awareness of shelter, shelter involvement parameters, teacher satisfaction, and long-term community changes, overall program effectiveness. Group goals and hypotheses discussed earlier are reorganize based on the research questions and tools to facilitate dialogue about evaluation techniques and approaches. The chart in Appendix C summarizes hypotheses using the areas being assessed as a frame. A final organization of each target topic with statistical testing and specific questions asked is included in Appendix D.

Evaluation Design and Instrumentation

Instrumentation

An overview of the assessment from each lesson and types of assessment described below is included in Appendix B. This is a guide to the overall assessments administered to students and teachers during the program. Each student will be

tracked using an individual VSI number. This allows all products to be connected to an individual test subject, but also so school and name does not effect grading on student products.

Pre and Posttest Evaluation

A pre and posttest was developed that includes a variety of assessment types. Demographic, knowledge and attitude based questions are included. Appendix F contains a text version of the evaluation. Students took the exam via an online link. The online program allowed for looping questions and randomization of answers and questions to help eliminate error. The Fireman Test, Intermediate Attitude Scale, and volunteer hours prompt were included from previously discussed humane education research to identify changes in empathy in students. Students randomly received one of two versions of the Fireman test with two different types of animals to minimize error. IAS Scale was used because of its validation in ages from 2nd grade level through adult, which was important because some students were reading at the 3rd grade level. Both control and participant classrooms took this assessment so comparisons can be made between scores of participant and control groups before the program and then participant and control groups after the program. The students only answered the demographic information on the pretest and a final survey was conducted at the end of the posttest for program participants. All other questions were exactly the same between both exams. More intensive modeling of empathy towards humans and animals, such as the IRI index (Davis 1983) and CABS (Ascione & Weber 1986) were not included due to concerns about the length of the assessment and student fatigue.

Individual Lesson Surveys

Surveys by students and program administrators have been used in other educational outreach projects as a primary assessment of student benefits including one designed for engineering (Hanesian & Perna, 1999). In another study with a Junior Fellows Program, goals on increasing diversity and enrollment in health professions was also primarily assessed via survey (Marcelin, Goldman, Spivey, Eichel, Kaufman, & Fleischman, 2004). However, challenges in this study involved a low response rate (40%) when surveys were mailed to participants at a later date (Marcelin, Goldman, Spivey, Eichel, Kaufman, & Fleischman, 2004).

When examining the literature on science outreach, the primary method of assessment is the survey method. By utilizing similar methods, the program can be compared in an acceptable way to other programs. Feedback and self-assessment have been shown to be an important element of formative assessment (Black & Wiliam, 1998), and these will both be utilized by the addition of the survey. Students filled out a survey after each lesson. It asked for positive and negative student feedback including changes for the program. Students were also asked selected Likert Scale Type questions based on documenting change in attitudes or knowledge at the time of the lesson.

Tweet Boards

Researchers wished to document via observations the student experience at the shelter. However, this was impossible due the logistical issues of observing all 60 students on a field trip while also actively teaching a lesson. To capture immediate student feedback on the field trip, brown paper tweet boards were posted in each area

of the shelter (Figure 3.1). Students were instructed to have fun “tweeting” their immediate reactions in each area of the shelter using provided pens. This “low tech” tweeting was left posted in the area of each station during the entire field trip. It was also intended to cause brief moments of reflection for students and insight into what they are thinking without having to directly ask.

Individual Lesson Products

Students in lessons 2 through lesson 7 turn in specific student products that are evaluated by a single researcher using a rubric or answer key depending on the activity. Products include a court report (lesson 2), ethics scenario worksheets (lesson 3), disease screenplay (lesson 4), heartworm poster (lesson 5), and disease outbreak worksheets (lesson 6). Rubrics for evaluation of activities in the classroom were used to grade student products to help ensure consistency and determine what specifically is being evaluated. These rubrics allowed assessment of higher learning that is more difficult to capture on a multiple-choice exam. They are included in Appendix G and other lesson worksheets are included in Appendix H.

By demonstrating and documenting advancement, pitfalls of educational assessment can be combated including a lack of definition of learning outcomes and assessment and the inability to teach to these outcomes (Penn, 2011). In small groups with scaffold type learning, data sources can include evaluation ability, presentation ratings, observations, and interviews (Belland, Glazewski, & Richardson, 2011). It is necessary to use more complex analysis than multiple-choice when trying to evaluate ethical competencies. The idea of service learning itself as an educational tool has also

been explored with assessment tools including reflective statements, portfolio, and interview (Jung, 2011). In addition, by utilizing rubrics more advanced layers of learning via Bloom's Taxonomy can be identified.

Teacher Assessments

Teacher Surveys

Teachers were also given surveys after each lesson. These surveys asked open-ended questions about lesson relevance, ease of administration, and other comments. Understanding teacher perceptions on success are critical to evaluating the quality of the VSI program and also to making sure all "team members" are satisfied with the program relationships.

Teacher Evaluations

CAS has two part-time teachers that interacted with each of the teachers, schools, and students. Each was asked via online survey to independently rate the teachers based on their interactions and comment on their experiences. This was to help evaluate the effectiveness of partnership programs and interpret the data in light of the overall school statistics and individual partnering teacher. Surveys were completed after all programs were finished and within one week of each other. Teachers were scored from 1-101 on being respectful, responsible, organized, interested, classroom management skills, ability to execute the program, and ability to execute the evaluation portion. An average score over all these areas was acquired. Also, a rank between 1-5 was given for the ability level and difficult of students.

Instructors also provided text details based on their interactions with the teachers.

Also, part-time teachers were asked if they would work with this teacher again as an overall output of the relationship.

Behavioral Tracking

Both control and participant students received a packet after taking the pretest containing many opportunities to take action at the shelter. Bark Scholarships for free spay-neuter surgery, gift certificate redeemable at the shelter for a prize, foster applications, volunteer information, and adoption information were all included. Papers were differentiated via a “C” on the paperwork if they are from a control classroom for tracking purposes. Controls for School B were a different classroom than the pre and posttest data, because of some teacher difficulties. Inconsistencies with the data collection include that the last classroom (School D), the largest, only had one month of collected data, which is relevant for the adoptions, visits to the shelter, and bark scholarships.

Bark Scholarships

Bark Scholarships are used in many education programs at the shelter to provide students with free spay and neuter for their pets. One of these documents was included in each control and participant packet. Students only had to call the facility, mention the bark scholarship, and make an appointment. This puts a final action to the changes in attitudes and knowledge regarding spay and neuter, veterinary care, and overpopulation. It also takes time to follow through with the surgery as appointments

are made 1-2 months before the actual surgery, which might also show student ability to follow through on actions in the long-term.

Volunteers List

A list was passed around to each class (participant and control) for a volunteer sign up. Students were instructed to provide their name and email if they were seriously interested in volunteering at the facility when the youth volunteer program was running and staffed. This represents the action of donating time and support to the shelter outside of the VSI program. Actually showing visits in shelter was not possible because CAS does not allow minors to volunteer without adult supervision.

Cat Enrichment

Each classroom was provided with materials to create cat enrichment toys for the shelter. A short description was included describing how to assemble the toys and the importance of animal stimulation in the shelter environment. The toys were left for approximately three weeks in each classroom and teachers were told they could not provide in class time to do the project. At pick-up teachers verbally confirmed they did not provide classroom time, only the location for materials. This was provided to capture the students without the resources to volunteer, foster, or adopt at the shelter, but wished to show support. Teachers were instructed to find a place for the materials and announce that they were in the room, but not provide in-class time to complete the task. Both the control classrooms and test classrooms are given an unlimited amount of toy materials and are given a month to complete them. This also represents the action

of donating time and money to the shelter. It was an important addition to the study because many of the schools involved have low socioeconomic status households and might not be able to take action using the other behavioral parameters.

Adoptions

In the paperwork for each adoption, there is a question with “How did you hear about us?” and every adopter is supposed to fill it out. CAS added a specific VSI option on the form assuming that this would be the easiest way to track all VSI related adoptions without adding new paperwork, which can be difficult to implement in the facility. This is a standard form that requires no additional action from the large number of staff and volunteers that process these adoptions.

Shelter Visits

Students were also provided with a certificate for a free gift (which is a water bottle) if they turn in a certificate at the shelter. This was to track foot traffic from the program into the facility. Students redeemed the certificate on a different visit than the field trip.

Statistical Evaluation and Question Design

Appendix D organizes the data analysis methodology with the overall summary of tests. This diagram focuses on the individual questions listed, type of questions, and statistics performed. Only certain questions focused on differences in schools, ethnicity, and pet ownership. Previously discussed research noted differences in empathy scores between pet owners and non-pet owners and different ethnicities. Schools were

included as a factor to try and use the information to look at the differences in classroom to the effectiveness of the program.

Demographic Data on Groups Analyzed

Students were asked on the pretest to answer a series of questions to provide a picture of the study participant and control groups. These demographic questions were only included in the pretest to cut down on the length of the assessment, which was a concern. Differences between ethnicity, pet ownership, and schools were used to analyze selected question results as well. Future data analysis can also use this information to look for qualities that effect program. A summary of each type of question analysis is in Appendix D. A Chi-Square analysis between groups was used when applicable to compare groups (school, ethnicity, and pet ownership). The link between animals and violence is a reason for humane education to impact violence or in many schools bullying; but not appropriate for direct investigation here. The CABS was not used, as the focus of this program is not at home pets. However, each student did respond with how many animals they have and subjectively discussed their bond with pets by whether they are inside/outside and how they feel about them. Although obviously not as extensive, it allowed comparison without making the already lengthy pre and posttest too cumbersome.

Change in Knowledge

Student responses are analyzed based on dichotomous, right or wrong, distribution. Control and participant responses are analyzed using a Chi-Square Analysis

both before and after the program. This was done to not highlight a change that might naturally occur upon retaking the exam, but the difference between the participant and control groups. Questions were used as markers for other knowledge and do not reflect the entirety of knowledge covered in the program. Representative topics were selected because of concerns about exam length. A more in depth look at rabies was chosen because the information seemed like the hardest for students to gain as it involved looking it up in written information sheets for their screenplays. Question topics ranged from ideas that the program developers assume students know (humans can get rabies) to questions that are not covered by the lesson (all rabies cases do not foam at the mouth).

Change in Attitudes

Likert Scale Type Questions

Attitude statements separate from the Intermediate Attitude Scale were used to assess a varied number of responses. Overall differences between control and participant question answers were analyzed using a Wilcoxon Rank Sum Test. Differences between participant pet owners, ethnicity, and school in the pre and posttest were assessed using a Kruskal-Wallis and then Mann-Whitney U Test. This was only noted if it was found to be significant. All of the questions assessed are not directly approached in the program to decrease “parroting” from students. Topics are divided into four main categories: statements concerning the veterinary field, statements concerning animal welfare, statements concerning spay-neuter, statements concerning

interdisciplinary concepts, and statements concerning behavioral changes. Spay-neuter was chosen as a representative subject because of the distinct knowledge, attitude changes, and behavioral changes that can be documented.

Numbered Scale Data

Multiple scales were used in this section for evaluating changes in attitudes. The first scale is the Intermediate Attitude Scale (IAS Scale). ANOVA analysis was used to assess score changes with a Tukey test as applicable. This scale was selected because it was documented effective in 2nd grade level through adults. This was important because students are physiologically adolescent or adult, but many are reading at the elementary level. Missing Item Score was also assessed on the IAS Scale. This represented whether a student's willingness to complete the answers changed between the pre and posttest. Fireman Test was also included as a simple one-question assessment of the changes in attitudes of students toward animals. Student were also asked how many hours they would be willing to volunteer at the shelter per month as a self-reported changed of intended behavior before and after the program.

A Shelter Purpose Score was created around student understanding of shelter functions at Charleston Animal Society. Students were asked to check whether they think the shelter performs the following functions: treat household pets, investigate cruelty cases, prevent disease, spay and neuter shelter animals, spay and neuter pets, take in strays or unwanted animals, board animals for the public, advocate for animal welfare, provide training classes for the public, adopt animals, and help people find their lost pets. One point will be given for all correct answers and one point subtracted for

incorrect answers (boarding animals). Normality and distribution are assessed before using ANOVA analysis to look at differences between groups.

Animal Welfare Statements Scale

This scale was a sliding scale and used a 1-11 ranking system. Each question reflects different animal welfare topics. Because it was a sliding scale, during analysis researchers assumed it was continuous data. A repeated measures ANOVA analysis was therefore used to look at the results between participant and control groups.

Feelings Towards Animals

Students were asked to select all the words that described their feelings toward animals before and after the program. Options for selection included: aggressive, interesting, scared, family members/friends, or don't care about animals. Chi-square tests were used to assess the differences between groups.

Change in Behavior

Bark Scholarships, Visits, Fosters, Adoptions, Volunteers, and Enrichment

System for collection for each of these parameters was discussed in the previous section. Difference between control and participants were assessed using a Chi-Square Test.

Participant Survey Behavioral Question

Students were also asked in the posttest survey about their willingness to volunteer, foster, adopt, attend training, or do another educational program at the

Charleston Animal Society. A Chi-Square analysis was used to compare pre and posttest for controls and participants. This represents the intention to act, but not the actual behavior.

Creation of Student Products

Means for the overall program are reported from rubric and answer sheets. An ANOVA analysis was conducted to look at differences between schools, ethnicity, and pet ownership. Rubrics included in Appendix G identify exact parameters included in the scoring.

Views of VSI

Part-Time Science Teacher Evaluations Summary, Teacher Evaluations of Lessons, Student Program Evaluations, and Tweet Boards

This qualitative data was reported using quotes from surveys and reporting scoring from teacher evaluations. Quotes were representative of the sample on teacher and students surveys as well as tweet boards.

Selection of Subjects

Schools in the area, specifically focusing on North Charleston, were sent letters about the VSI program. Teachers responded if interested and were booked on a first-come, first-serve basis. Teachers were asked in a meeting with the part-time science teacher to provide a control classroom for the study and were informed about each lesson and the required materials for submission. The final school's meeting (School D) was conducted at the animal shelter, which is the new protocol for the VSI program.

The reasoning for this decision and how it relates to classroom success is discussed in the final chapter.

Data Exclusions

Two classrooms were excluded from the study due to incomplete participation. The researcher collected this information, but could not directly compare to other classrooms and therefore these groups are not used in the study. One teacher did not complete the whole program with her students and the other teacher refused to have her students take the post-test. The differences between these classrooms and the other classrooms are discussed in the final chapter of the thesis. Comparison to other groups for future study and publication might be beneficial, especially since one teacher has students in the exact same school, grade, and age as another successful participant teacher.

Some students in each classroom did not complete both the pre and posttest. These were not included in the final study. Teachers were largely unable or unwilling to track down these students. The researcher does not believe this drastically affected any data results. Although these students could have simply been sick or absent that day (teacher consensus), there is a possibility that these students consist more of those did not want to put the effort forth to take the 20 minute long test. Therefore, it is possible that more at-risk group was overrepresented in the exclusions; however, due to the generous sample number it is likely these individuals did not impact the overall results in a statistically significant way.

When conducting statistical calculations on individual lessons, if the students did not turn in the product they are not included in the calculation. N-values for each statistical calculation are provided. This same system is used for questions from the tests that were not answered by students. Also, students who did not answer the questions properly for the fireman test or ranking questions were not included. For example, the question asks to select four items but if student selected two items they are not included in the evaluation.

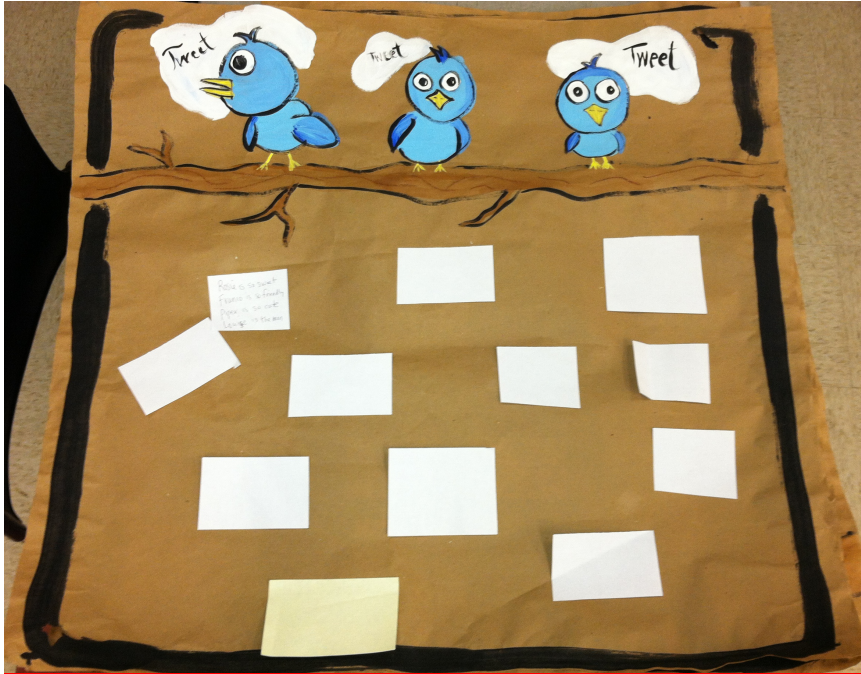


Figure 3.1 – Picture of Tweet Boards used during field trip.

Chapter 4: Results

Demographic Data on Groups Analyzed

Pre versus Posttest

Students took a pretest exam before the VSI program began and then took another posttest exam after the program ended. Teachers reported some transfers and dropouts from their classrooms and these were not included in the study. A total of 250 students took the pretest and 250 students took the posttest. Commitment for accurate results was difficult in the control classrooms where approximately 30% of student in School D and 35% School B did not complete both the pre and post exam properly. Other control classrooms managed a less significant rate with School E of 20% attrition (this includes transfers, suspensions, drop-outs, extended absences, incorrect student numbers). Students also incorrectly documented their student numbers in some cases. Researchers attempted to minimize this by emphasizing importance to teachers, but it still occurred. Handwriting was used to identify correct student product if possible, but otherwise the product was removed from study. Because of the enormous amount of statistical analysis, questions, and results, a summary figure is available in Appendix E to more succinctly display study question results. However it

does not include statistical methods. A more general overview of results with a focus on methodology and statistics is provided by Appendix D with significant results in bold.

Control versus Participant

Each school district had at least one control classroom and participant classroom. Teachers were instructed to make these control students as close to their participant students in age as possible. However, some differences did occur especially in schools where entire grades were involved in the program (School D). There are 78 students in the control group with 172 participant group students.

Schools

Students enrolled in the study were from 5 schools. Excluded groups were discussed in the exclusions section of the methodology chapter. The participant group has 18 (10.47%) from School A, 26 (15.12%) from School B, 20 (11.63%) from School C, 41 (23.84%) from School D, and 67 (38.95%) from School E. The control group has 21 (26.92%) from School A, 12 (15.38%) from School B, 17 (21.79%) from School C, and 8 (10.26%) from School D, and 20 (25.64%) from School E (Figure 4.1). It was difficult to recruit control classrooms in equal numbers within the districts and the controls were a relatively large burden for instructors. Many schools had to be asked to find more students to take the exam after their initial efforts had too few control students. Although equal numbers would have been better, this relatively large overall control group should effectively allow analysis between control and participant groups.

Description of Each School:

The following school statistics are from 2012 were gathered from The State of South Carolina Annual School Report Cards provided publicly online (South Carolina State Department of Education, 2013). Although not an absolute measure of quality, schools are ranked by grade in Figure 4.2. A short description of each school is included below for comparison.

School A

This high school has 1436 students and an excellent absolute rating with an average growth rating (excellent, good, average, below average, at-risk are the rankings). HSAP pass rate was 95.9% by spring of 2012 and in 2012 77.1% of student graduated (in four years). School A average SAT scores for reading math and writing are (471, 476, 451). End of course test pass rates overall are 67.0%. Attendance rate is 97.1%. Federal Accountability Rating System rates them at 86.4, B. It is not a Title 1 School.

School B

This high school has 984 students and an at-risk absolute rating with an excellent growth rating (excellent, good, average, below average, at-risk are the rankings). HSAP pass rate was 80% by spring of 2012 and in 2012 54.3% of student graduated. School B SAT scores for reading, math, and writing are (389, 390, 387). End of course test pass rates overall are 52.2%. Attendance rate is 90.8%. Federal Accountability Rating System rates them at 34.0, F. It is a Title 1 Priority School, meaning one of the lowest 5% of

performing Title 1 Schools. This teacher specifically mentions a large number of her students are reading at the third-grade reading level.

School C

This high school has 1719 students and a good absolute rating with a below average growth rating (excellent, good, average, below average, at-risk are the rankings). HSAP pass rate was 94.2% by spring of 2012 and in 2012 74.1% of student graduated (in four years). School C SAT scores for reading, math, and writing are (504, 537, 460). End of course test pass rates overall are 64.4%. Attendance rate is 97.2%. Federal Accountability Rating System rates them at 53.8, F. It is not a Title I School.

School D

This high school has 493 students and an at-risk absolute rating with an excellent average growth rating (excellent, good, average, below average, at-risk are the rankings). HSAP pass rate was 73.5% by spring of 2012 and in 2012 45.3% of student graduated (in four years). School D SAT scores for reading, math, and writing are (376, 390, 362). End of course test pass rates overall are 42.1%. Attendance rate is 94.5%. Federal Accountability Rating System rates them at 65.3, D. It is a Title I School.

School E

This high school has 1861 students and a good absolute rating with a good growth rating (excellent, good, average, below average, at-risk are the rankings). HSAP pass rate was 90.7% by spring of 2012 and in 2012 69.5% of student graduated. School E SAT scores for reading math and writing are (437, 436, 420). End of course test pass

rates overall are 69.6%. Attendance rate is 94.0%. Federal Accountability Rating System rates them at 77.9, C. It is not a Title 1 School.

Gender

Participating groups had 103 (60.23%) female and 68 (39.77%) male. Control groups had 47 (60.26% female) and 31 (39.74%) male. There is no statistically significant difference between control and participant groups (Figure 4.3).

Grade

In the participant group, 41 (23.98%) were in 9th grade, 21 (12.28%) were in 10th grade, 33 (19.3%) were in 11th grade, and 76 (44.44%) were in 12th grade. The control group had 11 (14.1%) in 9th grade, 9 (11.54%) in 10th grade, 28 (35.9%) in 11th grade, and 30 (38.46%) in 12th grade.

Age

In the participant group, 21 (12.28%) were fourteen, 36 (21.05%) were fifteen, 33 (19.3%) were sixteen, 53 (30.99%) were seventeen, 22 (12.87%) were eighteen, and 6 (3.51%) were nineteen. In the control group, 5 (6.41%) were fourteen, 10 (12.82%) were fifteen, 25 (32.05%) were sixteen, 25 (32.05%) were seventeen, and 9 (11.54%) were eighteen, and 4 (5.13%) were nineteen.

It was difficult to completely stratify age, school, and grade due to some entire grades participating in the program. VSI tried to match as close as possible to age and grade level between control and test. Age and grade level are shown in Figure 4.4 and 4.5.

Class

Controls and participants had slightly different subject areas due to the difficulties of acquiring another classroom with the same content area. The participant group had 44 students (25.6%) in Health Sciences, 41 (23.84%) in Physical Science, 87 (48.58%) in some Biology, Zoology, or Forensics class. The control group had 21 (26.92%) in Health Sciences, 46 (59.0%) in some sort of Biology, Zoology, or Forensics class and 11 (14.1%) in some other subject (physical science was not an option because the entire grade was enrolled in the program).

Ethnicity

Students were able to select multiple ethnicities for the survey. In the participant group 110 (64.33%) identified as African American, 53 (31.0%) as Caucasian, 14 (8.19%) as Hispanic, and 11 (6.43%) identified as another race. In the control group 39 (50%) identified as African American, 35 (44.87%) identified as Caucasian, 2 (2.56%) identified as Hispanic, and 6 (7.69%) identified as another race. Of the 171 participant students 17 (9.94%) selected multiple ethnicities and of the 78 control students 4 (5.13%) selected multiple ethnicities. For the rest of the study analysis, students were grouped into categories of African American, Caucasian, or other. African American and Caucasian categories include only students that identified solely as those ethnicities. Mixed race students are included in the other category. The initial study was designed to have Hispanic, Asian, Native American, and other as separate categories. However, not enough students in the control group and participant group were from each of these individual categories to run proper statistical analysis. Therefore, the categories for

determining differences between races focus on African American and Caucasian (Figure 4.6).

Each school also has a different percentage of ethnicities (Figure 4.7): School A (11 (28.2%) African American, 27 (69.2%) Caucasian, 1 (15.6%) other), School B (28 (73.7%) African American, 4 (10.5%) Caucasian, 6 (15.8%) other), School C (18 (48.6%) African American, 14 (37.8%) Caucasian, 5 (13.5%) other), School D (38 (77.6%) African American, 5 (10.2%) Caucasian, 6 (12.2%) other), and School E (42 (48.3%) African American, 30 (34.5%) Caucasian, 15 (17.2%) other). A statistically significant difference between ethnicity and school was found, $\chi^2(8)=47.920$, $p < .0005$ with $\phi = 0.438$, $p < .0005$.

Family Structure

The survey also asked about family structure in the household. Of the participant group 148 (86.05%) of students had a mother or stepmother in the household, but only 80 (46.51%) had a father or stepfather. The control group was similar with 65 (83.33%) of students having a mother in the household, but only 33 (56.41%) having a father or stepfather.

Pet Information

Ownership

In a study by APPA, 62% of all households in the United States have pets (ASPCA, 2013). In the participant group, 86 (50%) of students had pets in their household. In the control group, 45 (57.69%) had pets in their household. No difference between

participant and control using a Chi-Square test, $X^2(3.308)$ $p=.191$ was noted (Figure 4.8). Within the households having pets, the participant group had 29 (33.72%) having one pet, 25 (29.07%) having two pets, 10 (11.63%) having 3 pets, and 22 (25.58%) with more than 3 pets. Control group had 15 (34.09%) with one pet, 9 (20.45%) with two pets, 7 (15.91%) with three pets, and 13 (29.55%) having more than three pets.

Ethnicity and school also divided pet ownership (Figure 4.9 and Figure 4.10). Students involved in the program had vastly different percentages of animal owning households. African American students had 9 (25%) participant group households with pets and 29 (28.71%) of the control group. Caucasian students had 29 (87.88%) participant and 42 (89.36%) control groups with pets. Chi-Square analysis was significant between ethnicity, $X^2(2)=78.482$, $p < .0005$. All expected cell frequencies were greater than five. There was a large effect size between pet ownership and ethnicity, Cramer's $V \phi = 0.560$, $p < .0005$.

Schools divided by pet ownership was 29 (74.4%) of School A, 16 (42.1%) School B, 23 (62.2%) of School C, 17 (34.7%) of School D, and 46 (52.9%) of School E. Chi-Square analysis was significant between schools, $X^2(4)=16.735$, $p = .002$. All expected cell frequencies were greater than five. There was a medium effect size between pet ownership and schools, Cramer's $V \phi = 0.259$, $p = .002$.

Sources

In a study by APPA, 20 to 30 percent of cats and dogs are from shelters and most people get their dogs from family and friends (ASPCA, 2013). The participant students who had pets said 46 (53.49%) had at least one pet that came from family and friends,

16 (18.60%) from a pet store, 8 (9.30%) came from CAS, 13 (15.12%) came from another animal shelter, 8 (9.30%) came from online, 8 (9.30%) came as a stray, and 9 (10.47%) had another origin. The control students who had pets said 29 (64.44%) had at least one pet that came from family and friends, 14 (31.11%) from a pet store, 3 (6.67%) came from CAS, 5 (11.11%) came from another animal shelter, 7 (15.56%) came from online, 7 (15.56%) came as a stray, and 4 (8.89%) had another origin. Therefore, only 21 (24.4%) of participants and 8 (17.78%) of controls had any of their pets come from shelters.

Where Animals Live

In the participant group, 86 (50%) of students had pets in their household. In the control group, 45 (57.69%) had pets in their household. From these numbers 62 (72.09%) of the test group and 30 (66.67%) of the control group had animals that lived primarily inside. 24 (27.9%) of student had animals that lived primarily outside in some capacity compared to 15 (33.33%) of the control group. When looking at just students that had animals that lived primarily outside, 4 (40%) of the participant group that has dogs have dogs that live inside and only 1 (14.3%) of the test group that has cats have cats that live inside. When looking at just students that had animals that lived primarily outside, 5 (38.46%) of the control group that has dogs have dogs that live inside and only 1 (11%) of the control group that has cats have cats that live inside.

Spay and Neutered

A study by APPA (American Pet Products Association) says 78 percent of pet dogs and 88 percent of pet cats are spayed or neutered (ASPCA, 2013). Of those participant students that had pets, 38 (44.19%) had all their pets spayed or neutered, 37 (43.02%) had none of their pets spayed or neutered, and 11 (12.79%) had some of their pets spayed or neutered. Control groups had 23 (52.27%) that were spayed or neutered, 12 (27.27%) that had none spayed or neutered, and 9 (20.45%) that had some pets spayed or neutered. Therefore 48 (55.81%) test student households and 21 (47.73%) of control student households had animals that could be spayed or neutered. In each high school a different percentage of total students had their animals spayed or neutered (Figure 4.11): 16 School A (57.1%), 7 School B (43.8%), 11 School C (47.8%), 4 School D (23.5%), and 23 School E (50.00%). Chi-Square analysis was not significant between schools $\chi^2(2)=12.572$, $p = .217$.

For each ethnicity, 13 (34.2%) of African American, 41 (58.6%) Caucasian, and 7 (31.8%) other students have all their pets spayed and neutered (Figure 4.12). A Chi-square analysis was significant, $\chi^2(4)=24.842$, $p < .0005$, with a medium effect size between pet spaying and neutering and schools, Cramer's $V \phi = 0.309$, $p < .0005$.

CAS Awareness

During the pretest, only 99 (57.89%) of participant students and 35 (44.87%) of control students had heard of the Charleston Animal Society. Of those participant students, 29 (29.29%) had selected friends and family, 62 (62.23%) school, 25 (25.25%) TV, 5 (5.05%) radio, 10 (10.10%) magazine/newspaper, and 7 (7.07%) other. Of those

control students, 19 (54.29%) had selected friends and family, 18 (51.43%) school, 14 (40.00%) TV, 5 (14.29%) radio, 4 (11.43%) magazine/newspaper, and 4 (11.43%) other. The overall larger percentage in the pretest participant group is most likely due to discussion with students about the upcoming VSI: Veterinary Science Initiative Program. Even with some preparation by teachers, 42.11% of participants and 55.13% of controls had not heard of the organization before taking the pretest.

Change in Knowledge

Can humans catch diseases from animals?

For the pretest, 162 (94.2%) of participants got the question correct and 75 (96.2%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. Cell frequencies were less than five so a Fisher's Exact Test was used. There was a not statistically significant association between being a participant and answering the question correctly, $X^2(1) = .422$, $p = .760$.

For the posttest, 144 (84.2%) of participants got the question correct and 72 (92.3%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was not a statistically significant association between being a participant and answer the question correctly, $X^2(1) = 3.055$, $p = .080$.

What is a zoonotic disease?

For the pretest, 88 (51.2%) of participants got the question correct and 34 (43.6%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and answering the question correctly, $\chi^2 (1) = 1.232$, $p = .267$.

For the posttest, 103 (59.9%) of participants got the question correct and 36 (46.2%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a statistically significant association between being a participant and answer the question correctly, $\chi^2 (1) = 4.085$, $p = .043$. There was a medium effect size between participating and answering correctly, $\phi = .128$, $p = .043$

What is the number one cause of death in dogs and cats?

For the pretest, 48 (27.9%) of participants got the question correct and 31 (39.7%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and answering the question correctly, $\chi^2 (1) = 3.479$, $p = .062$.

For the posttest, 104 (60.5%) of participants got the question correct and 33 (42.3%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a statistically significant association between being a participant and answer the question correctly, $X^2 (1) = 7.143$, $p = .008$. There was a large effect size between participating and answering correctly, $\phi = .69$, $p = .008$.

How many animals are killed every year because of overpopulation?

For the pretest, 18 (10.5%) of participants got the question correct and 9 (11.5%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and answering the question correctly, $X^2 (1) = .064$, $p = .800$.

For the posttest, 144 (83.7%) of participants got the question correct and 15 (19.2%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a statistically significant association between being a participant and answer the question correctly, $X^2 (1) = 96.408$, $p < .0005$. There was a large effect size between participating and answering correctly, $\phi = .621$, $p < .0005$.

What is true about rabies?

The following questions were developed to show information already known, learned during the program, and not presented to get an accurate picture of instruction.

Humans can get rabies from an animal

For the pretest, 141 (82.0%) of participants got the question correct and 66 (84.6%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and answering the question correctly, $\chi^2(1) = .262$, $p = .609$.

For the posttest, 145 (84.3%) of participants got the question correct and 66 (84.6%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was not a statistically significant association between being a participant and answer the question correctly, $\chi^2(1) = .004$, $p = .950$.

Vaccination is required by law for dogs

For the pretest, 88 (51.2%) of participants got the question correct and 48 (61.5%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant

association between being a participant and answering the question correctly, $\chi^2(1) = 2.329$, $p = .127$.

For the posttest, 77 (44.8%) of participants got the question correct and 50 (64.1%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a statistically significant association between being a participant and answer the question correctly, $\chi^2(1) = 8.027$, $p = .005$. There was a small association between not participating and answering correctly, $\phi = .179$, $p = .005$.

Rabies is fatal in all reported cases

For the pretest, 61 (35.5%) of participants got the question correct and 35 (44.9%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and answering the question correctly, $\chi^2(1) = 2.007$, $p = .157$.

For the posttest, 98 (57.0%) of participants got the question correct and 29 (37.2%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a statistically significant association between being a participant and answer the question correctly, $\chi^2(1) =$

8.415, $p = .004$. There was a small effect size between participating and answering correctly, $\phi = -.183$, $p = .004$.

Only animals can get rabies

For the pretest, 168 (97.7%) of participants got the question correct and 72 (92.3%) of the controls got the question correct. All expected cell frequencies were not greater than five so a Fisher's Exact Test was used. There was a not statistically significant association between being a participant and answering the question correctly, $\chi^2(1) = 4.025$, $p = .075$.

For the posttest, 165 (95.9%) of participants got the question correct and 74 (94.9%) of the controls got the question correct. All expected cell frequencies were not greater than five so a Fisher's Exact Test was used. There was not a statistically significant association between being a participant and answer the question correctly, $\chi^2(1) = .143$, $p = .744$.

Rabies is not fatal

For the pretest, 165 (95.9%) of participants got the question correct and 74 (94.9%) of the controls got the question correct. All expected cell frequencies were not greater than five so a Fisher's Exact Test was used. There was a not statistically significant association between being a participant and answering the question correctly, $\chi^2(1) = .143$, $p = .744$.

For the posttest, 166 (96.5%) of participants got the question correct and 76 (97.4%) of the controls got the question correct. All expected cell frequencies were not

greater than five so a Fisher's Exact Test was used. There was not a statistically significant association between being a participant and answer the question correctly, $\chi^2(1) = .148$, $p = 1.00$.

Raccoons, dogs, horses, cats, bats, coyotes, and foxes can get rabies

For the pretest, 141 (82.0%) of participants got the question correct and 61 (78.2%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and answering the question correctly, $\chi^2(1) = .492$, $p = .483$.

For the posttest, 144 (83.7%) of participants got the question correct and 63 (80.3%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was not a statistically significant association between being a participant and answer the question correctly, $\chi^2(1) = .328$, $p = .567$.

All rabies cases foam at the mouth and attack people.

For the pretest, 107 (62.2%) of participants got the question correct and 47 (60.3%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant

association between being a participant and answering the question correctly, $\chi^2(1) = .087$, $p = .769$.

For the posttest, 107 (62.2%) of participants got the question correct and 50 (64.1%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was not a statistically significant association between being a participant and answer the question correctly, $\chi^2(1) = .082$, $p = .774$.

All bites from dogs must be reported to prevent rabies transmission.

For the pretest, 121 (70.3%) of participants got the question correct and 49 (62.8%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and answering the question correctly, $\chi^2(1) = 1.398$, $p = .237$.

For the posttest, 133 (77.3%) of participants got the question correct and 51 (65.4%) of the controls got the question correct. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a statistically significant association between being a participant and answer the question correctly, $\chi^2(1) = 3.938$, $p = .047$. There was a small effect size between participating and answering correctly, $\phi = -.126$, $p = .047$.

Change in Attitudes

LIKERT SCALE TYPE QUESTIONS:

A Wilcoxon Signed-Rank test was run to determine if there were overall differences in answers for statements between pre and posttest. Participant and controls are listed separately for each question. Also, differences in scoring between participant ethnicities, pet ownership, and schools were analyzed using a Kruskal-Wallis and if necessary a Mann-Whitney U Test. Differences in answers for the participant groups between pet ownership, ethnicity, and schools via these tests were noted only if statistically significant.

Statements Concerning Veterinary Field:

I am interested in pursuing a career in science

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.206$, $p = .837$. There was not a statistically significant difference in median for test group after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -.517$, $p = .605$. Kruskal-Wallis tests on the pretest led to no significant differences between pet ownership and ethnicity or on the posttest between pet ownership and therefore, the Mann-Whitney U tests were not completed. However, schools did have a statistically significant difference on the pretest, $\chi^2(4) = 11.71$, $p = .020$, and posttest, $\chi^2(4) = 19.92$, $p < .0005$, as well as ethnicity on the posttest, $\chi^2(2) = 7.94$, $p = .020$. Median pretest scores for schools were also traced for School A ($Mdn = 3$), School B ($Mdn = 2$), School C ($Mdn = 2$), School D ($Mdn =$

3) and School E ($Mdn = 2$). Median scores for ethnicity are African American ($Mdn = 2$), Caucasian ($Mdn = 3$) and other ($Mdn = 2$). Median scores for schools were also traced for School A ($Mdn = 3$), School B ($Mdn = 3$), School C ($Mdn = 3$), School D ($Mdn = 2$) and School E ($Mdn = 2$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. This was only completed when Kruskal-Wallis p-value is significant. On the pretest, schools School A and School E were statistically different (Ranksum=1048.5, $z = 3.14$, $p = .002$) and schools School C and School E were statistically different (Ranksum=2591.5, $z = 2.41$, $p = .016$).

Survey responses were statistically significantly different on the posttest between both African American and Caucasian (Ranksum=6886.5, $z = -2.76$, $p = .006$). Survey responses were statistically significantly different between school groups posttest School A and School B (Ranksum=495.5 $z = 2.34$, $p = .019$), School A and School D (Ranksum=729 $z = 3.28$, $p = .001$), School C and School E, (Ranksum=1102.5 $z = 2.35$, $p = .019$), and School A and School E, (Ranksum=1131.5 $z = 4.04$, $p < .0005$).

I am interested in pursuing a career involving animals

There was not a statistically significant difference in median for control after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -.344$, $p = .731$. There was not a statistically significant difference in median for the participant group after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -.703$, $p = .482$. Kruskal-Wallis tests on the pretest led to no significant differences between school or ethnicity and therefore,

the Mann-Whitney U Test was not completed. However, pet ownership from pretest, $\chi^2(1) = 4.83$, $p = .028$, and posttest, $\chi^2(1) = 6.77$, $p = .009$, was significantly different.

Median scores for pretest were also traced for pet owners ($Mdn = 2$) and non-owners ($Mdn = 2$). Posttest median scores were traced for pet owners ($Mdn = 2.5$) and non-owners ($Mdn = 2$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. This was only completed when Kruskal-Wallis p-value is significant. On the pretest, pet owners versus non pet owners was statistically different (Ranksum=7921, $z = 2.20$, $p = .003$). On the posttest, pet owners versus non pet owners was statistically different (Ranksum=8192.5, $z = 2.60$, $p = .009$).

I would like to take more science classes

There was not a statistically significant difference in median for control after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 3$), $z = -.086$, $p = .931$. There was not a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.872$, $p = .408$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership or ethnicity and therefore, the Mann-Whitney U Test was not completed. School was significant on the posttest, $\chi^2(4) = 14.08$, $p = .007$. Median scores for schools were also traced for School A ($Mdn = 3$), School B ($Mdn = 2$), School C ($Mdn = 3$), School D ($Mdn = 3$) and School E ($Mdn = 3$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. This was only completed when Kruskal-Wallis p-

value is significant. Survey responses were statistically significantly different on the posttest between school groups School A and School B (Ranksum=520 $z = 2.92$, $p = .004$), School A and School E (Ranksum=997 $z = 2.58$, $p = .001$), School B and School C (Ranksum=517 $z = -2.24$, $p = .025$), School B and School D (Ranksum=707.5 $z = -2.39$, $p = .017$), and School D and School E, (Ranksum=2532.5 $z = 1.99$, $p = .046$).

It is unnecessary to take your animal to the veterinarian unless it is sick

There was not a statistically significant difference in median for control after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -1.743$, $p = .081$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 1$), $z = -2.667$, $p = .008$. Kruskal-Wallis tests on the pre and posttests led to no significant differences between pet ownership or ethnicity and therefore, the Mann-Whitney U Test was not completed. However, there was differences noted via Kruskal-Wallis between schools on the pretest, $\chi^2(4) = 3.95$, $p = .008$, and posttest $\chi^2(4) = 10.26$, $p = .036$. Median pretest scores for schools were also traced for School A ($Mdn = 1$), School B ($Mdn = 2$), School C ($Mdn = 2$), School D ($Mdn = 1$) and School E ($Mdn = 1$). Median posttest scores for schools were also traced for School A ($Mdn = 1$), School B ($Mdn = 2$), School C ($Mdn = 2$), School D ($Mdn = 1$) and School E ($Mdn = 2$).

Further analysis used a Mann-Whitney U Test to determine which categories in each question were different. On the pretest, statistically significant school differences were School A and School C (Ranksum=272, $z = -2.54$, $p = .011$), School B and School D (Ranksum=968.5, $z = 2.03$, $p = .043$), School C and School D (Ranksum=818, $z = 3.431$, $p <$

.0005) and School C and School E (Ranksum=1109.5, $z = 2.551$, $p = .011$). Responses were statistically significantly different on the posttest school groups School A and School B (Ranksum=318 $z = -2.29$, $p = .022$), School A and School E (Ranksum=537 $z = -2.75$, $p = .006$), School D and School E (Ranksum=1932.5 $z = -2.07$, $p = .038$).

Taking an animal for veterinary visits each year is important

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 4$), $z = -.1.936$, $p = .053$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 4$) compared to the pretest ($Mdn = 4$), $z = -2.210$, $p = .027$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership, school, or ethnicity and therefore, the Mann-Whitney U Test was not completed.

Statements Concerning Animal Welfare:

Mental stimulation is an animal welfare issue

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -1.750$, $p = .080$. There was not a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -1.699$, $p = .089$. Kruskal-Wallis tests on the pretest led to no significant differences between pet ownership, ethnicity or school and therefore the Mann-Whitney U Test was not completed. However, on the posttest ethnicity ($\chi^2(2) = 12.1$, $p = .002$), pet ownership ($\chi^2(1) = 6.5$, $p = .011$), and school ($\chi^2(4) = 12.21$, $p = .016$) were all significant. Posttest median scores for ethnicity

are African American ($Mdn = 3$), Caucasian ($Mdn = 3$) and other ($Mdn = 3$). Posttest median scores were also traced for pet owners ($Mdn = 3$) and non-owners ($Mdn = 3$). Posttest median scores for schools were traced for School A ($Mdn = 3$), School B ($Mdn = 3$), School C ($Mdn = 3$), School D ($Mdn = 3$) and School E ($Mdn = 3$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. This is only completed when Kruskal-Wallis p -value is significant. Responses were statistically significantly different on the posttest between both African American and Caucasian (Ranksum=6917, $z = -2.81$, $p = .005$) and African American students and other students (Ranksum=5981, $z = -2.62$, $p = .009$). Survey responses were statistically significantly different between pet owners and non-owners (Ranksum=8185, $z = 2.55$, $p = .011$). School groups were different on the posttest for School A and School B (Ranksum=504 $z = 2.62$, $p = .009$), School B and School C (Ranksum=489 $z = -3.01$, $p = .003$), School C and School E (Ranksum=1063 $z = 2.13$, $p = .033$).

Dog Fighting is Acceptable

There was not a statistically significant difference in median for control after the posttest ($Mdn = 1$) compared to the pretest ($Mdn = 1$), $z = -.739$, $p = .460$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 1$) compared to the pretest ($Mdn = 1$), $z = -2.276$, $p = .023$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership, school, or ethnicity and therefore, the Mann-Whitney U Test was not completed.

Cock fighting is acceptable

There was a statistically significant difference in median for control after the posttest ($Mdn = 1$) compared to the pretest ($Mdn = 1$), $z = -2.349$, $p = .019$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 1$) compared to the pretest ($Mdn = 1$), $z = -1.547$, $p = .122$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership, school, or ethnicity and therefore, the Mann-Whitney U Test was not completed.

As long as an animal has food and water it is being humanely treated

There was not a statistically significant difference in median for control after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -.667$, $p = .505$. There was not a statistically significant difference in median for participant group after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -1.489$, $p = .137$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership, schools, or ethnicity and therefore, the Mann-Whitney U Test was not completed.

Euthanasia is an important tool for animal welfare

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.794$, $p = .427$. There was not a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.371$, $p = .711$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership, schools, or ethnicity and therefore, the Mann-Whitney U Test was not completed.

Statements Concerning Interdisciplinary Concepts:

Passing animal welfare legislation is important

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.159$, $p = .874$. There was not a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.673$, $p = .501$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership or ethnicity and therefore, the Mann-Whitney U Test was not completed. School was significantly different on the posttest, $\chi^2(4) = 19.24$, $p = .0007$. Median scores for schools were also traced for School A ($Mdn = 3$), School B ($Mdn = 3$), School C ($Mdn = 4$), School D ($Mdn = 3$) and School E ($Mdn = 3$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. This was only completed when Kruskal-Wallis p-value is significant. Survey responses were statistically significantly different on the posttest between school groups posttest School A and School B (Ranksum=501 $z = 2.77$, $p = .006$), School B and School C (Ranksum=461.5 $z = -3.67$, $p = .0002$), School B and School D (Ranksum=733.5 $z = -2.38$, $p = .019$), School B and School E (Ranksum=963 $z = -2.71$, $p = .007$), School C and School D (Ranksum=762.5 $z = 2.496$, $p = .0123$), and School C and School E, (Ranksum=1103.5 $z = 2.624$, $p = .009$).

Communication skills are important for scientists to learn

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.466$, $p = .641$. There was not a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.796$, $p = .426$. Kruskal-Wallis tests on the pre and posttests led to no significant differences between pet ownership, ethnicity, or schools and therefore, the Mann-Whitney U Test was not completed.

Animal welfare legislation is easy to pass

There was not a statistically significant difference in median for control after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -.432$, $p = .665$. There was not a statistically significant difference in median for participant group after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -1.792$, $p = .073$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership, schools, or ethnicity and therefore, the Mann-Whitney U Test was not completed.

Scientists do not have to learn about art and communication because that is not their job; they must concentrate on research

There was not a statistically significant difference in median for control after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -.218$, $p = .827$. There was not a statistically significant difference in median for the participant group after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -.612$, $p = .540$. Kruskal-Wallis tests on

pretests and the posttest led to no significant differences between pet ownership, school, or ethnicity and therefore, the Mann-Whitney U Test was not completed.

Art and Advertising are important for scientists to learn

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.525$, $p = .600$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.3411$, $p = .001$. Kruskal-Wallis tests on the pretest led to no significant differences between pet ownership, school, or ethnicity and therefore, the Mann-Whitney U Test was not completed. Kruskal-Wallis tests on the posttest was statistically significant between schools, $\chi^2(4) = 13.54$, $p = .009$. Median scores for schools were also traced for School A ($Mdn = 3$), School B ($Mdn = 3$), School C ($Mdn = 3$), School D ($Mdn = 3$) and School E ($Mdn = 3$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. Responses were significantly different on the posttest between school groups School A and School C (Ranksum=287.5 $z = -2.25$, $p = .025$), School B and School C (Ranksum=485 $z = -3.19$, $p = .001$), School B and School D (Ranksum=703.5 $z = -2.61$, $p = .009$), and School C and School E (Ranksum=1063.5 $z = 2.29$, $p = .022$).

Statements Concerning Spay-Neuter Perceptions:

I feel like most animals should be spayed/neutered (fixed)

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.438$, $p = .662$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -5.343$, $p < .0005$. Kruskal-Wallis tests on the pre and posttests led to no significant differences between pet ownership, ethnicity, or schools and therefore, the Mann-Whitney U Test was not completed.

Neutering (fixing) a male dog affects masculinity

There was not a statistically significant difference in median for control after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2$), $z = -.431$, $p = .666$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 2$) compared to the pretest ($Mdn = 2.5$), $z = -5.961$, $p < .0005$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership or ethnicity and therefore, the Mann-Whitney U Test was not completed. Differences between schools was statistically significant on the posttest, $\chi^2(4) = 20.08$, $p < .0005$, but not the pretest, $\chi^2(4) = 6.78$, $p = .148$. Pretest median scores for schools were traced for School A ($Mdn = 3$), School B ($Mdn = 2$), School C ($Mdn = 2$), School D ($Mdn = 3$) and School E ($Mdn = 2$). Posttest median scores for schools were also traced for School A ($Mdn = 1.5$), School B ($Mdn = 2.5$), School C ($Mdn = 1$), School D ($Mdn = 2$) and School E ($Mdn = 2$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. This is only completed when Kruskal-Wallis p-

value is significant. Survey responses were statistically significantly different on the posttest between school groups posttest School A and School B (Ranksum=283.5 $z = -3.05$, $p = .002$), School A and School E (Ranksum=504 $z = -3.03$, $p = .002$), School B and School C (Ranksum=741 $z = 3.03$, $p = .002$), School C and School D (Ranksum=500 $z = -1.98$, $p = .048$), and School C and School E (Ranksum=581 $z = -3.12$, $p = .002$).

Neutering or spaying (fixing) an animal prevents other animals from being euthanized

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -1.558$, $p = .119$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.5099$, $p < .0005$. Kruskal-Wallis tests on the pretest led to no significant differences between pet ownership or ethnicity and therefore, the Mann-Whitney U Test was not completed. Significant differences existed between schools on the pretest ($\chi^2(4) = 12.83$, $p = .012$) and posttest ($\chi^2(4) = 15.49$, $p = .004$). Median scores for schools on pretest were traced for School A ($Mdn = 3$), School B ($Mdn = 3$), School C ($Mdn = 2$), School D ($Mdn = 3$) and School E ($Mdn = 2$). Median scores for schools on posttest were also traced for School A ($Mdn = 3$), School B ($Mdn = 3$), School C ($Mdn = 4$), School D ($Mdn = 3$) and School E ($Mdn = 3$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. This was only completed when Kruskal-Wallis p -value is significant. On the pretest, statistically different schools included School A and School C (Ranksum=433, $z = 2.55$, $p = .011$), School B and School C (Ranksum=565.5 $z = 2.54$, $p = .011$), and School C and School D (Ranksum=453.5 $z = -2.73$, $p = .006$).

Responses were statistically significantly different on the posttest between school groups School A and School B (Ranksum=500 $z = 2.60$, $p = .009$), School B and School C (Ranksum=468 $z = -3.37$, $p = .0007$), School B and School D (Ranksum=740.5 $z = -1.96$, $p = .049$), and School C and School E (Ranksum=1147 $z = 2.94$, $p = 0.003$).

Spaying or neutering an animal is beneficial for its health

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.934$, $p = .350$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -5.483$, $p < .0005$. Kruskal-Wallis tests on the pretest and posttest led to no significant differences between pet ownership, schools, or ethnicity and therefore, the Mann-Whitney U Test was not completed.

Statements Concerning Behavior Changes:

I would like to foster at the shelter

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.086$, $p = .931$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.3790$, $p < .0005$. Kruskal-Wallis tests on the pretest led to no significant differences between pet ownership, school, or ethnicity and therefore, the Mann-Whitney U Test was not completed. On the posttest, significant differences between schools existed, $\chi^2(4) = 16.95$, $p = .002$. Posttest median scores for

schools were also traced for School A ($Mdn = 3$), School B ($Mdn = 2$), and School C ($Mdn = 3$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. This is only completed when Kruskal-Wallis p-value is significant. Responses were statistically significantly different on the posttest between school groups School A and School B (Ranksum=518.5 $z = 2.87$, $p = .004$), School B and School C (Ranksum=453.5 $z = -3.79$, $p < .0005$), School B and School D (Ranksum=675 $z = -2.87$, $p = .004$), School B and School E, (Ranksum=963 $z = -2.26$, $p = .024$), and School C and School E, (Ranksum=1068.5 $z = 2.18$, $p = .029$).

I would adopt an animal from the shelter for my next pet

There was not a statistically significant difference in median for control after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -.448$, $p = .654$. There was a statistically significant difference in median for participant group after the posttest ($Mdn = 3$) compared to the pretest ($Mdn = 3$), $z = -2.084$, $p = .037$. Kruskal-Wallis tests on the posttest led to no significant differences between pet ownership, school, or ethnicity and therefore, the Mann-Whitney U Test was not completed. On the pretest, pet ownership, $\chi^2(1) = 5.03$, $p = .025$, and ethnicity, $\chi^2(2) = 6.85$, $p = .032$, were significant. Median scores for ethnicity are African American ($Mdn = 3$), Caucasian ($Mdn = 3$) and other ($Mdn = 3$). Median scores were also traced for pet owners ($Mdn = 3$) and non-owners ($Mdn = 3$).

Further analysis used a Mann-Whitney U Test to determine what is different between categories in each question. This is only completed when Kruskal-Wallis p-

value is significant. On the pretest, African American and Caucasian students were significantly different (Ranksum=6733.5 $z = -2.485$ $p = .013$) and pet owners were significantly different (Ranksum=8013, $z = 2.24$ $p = 0.025$).

Numbered Scale Data

The following data was analyzed using a repeated measures ANOVA. Outliers in data were included in calculations and normality was assumed due to the robust nature of the ANOVA and the previously trialed IAS, Fireman, and Missing Item Score.

Mauchly's Test of Sphericity is $\chi^2(1) = 0$, $p = .0$ because there are only two time points.

IAS Score

IAS Scores for participants remained similar, but slightly increased before ($M = 100$, $SD = 12.886$) to after ($M = 101.85$, $SD = 11.557$). IAS Scores for controls remained similar before ($M = 98.08$, $SD = 15.434$) to after ($M = 98.87$, $SD = 10.491$). IAS Scores are not statistically significantly different pre and posttest during the program ($F(1, 248) = 2.064$, $p = .152$, partial $\eta^2 = .008$) and participants and controls did not have an affect either ($F(1, 248) = 0.326$, $p = .569$, partial $\eta^2 = .001$). Although the slope seems higher on the participant line (Figure 4.13), no statistical difference was found using an ANOVA.

Ethnicity

Participant means varied by ethnicity on pretest African Americans ($M = 98.831$, $SD = 3.924$), Caucasians ($M = 104.685$, $SD = 6.193$), and others ($M = 100.824$, $SD = 6.45$) and posttest African Americans ($M = 101.365$, $SD = 3.283$), Caucasians ($M = 104.874$, SD

= 5.18), and others ($M = 103.332$, $SD = 5.396$). An analysis of variance (ANOVA) on these scores yielded significant variation among conditions, $F(2, 37) = 4.29$, $p = .03$. A post-hoc Tukey test showed African American and Caucasian groups differed significantly at $p = .003$, but the other groups did not differ from either group lying somewhere in the middle (Figure 4.14).

Pets

Participant means varied by pets on pretest pet owners ($M = 102.157$, $SD = 3.556$) non-owners ($M = 100.183$, $SD = 5.147$) and posttest pet owners ($M = 103.118$, $SD = 3.172$) and non-owners ($M = 102.970$, $SD = 4.591$). Even though the program seems to normalize pets and non-pet owners via graph (Figure 4.15) an analysis of variance (ANOVA) on these scores yielded insignificant variation among conditions $F(1, 170) = .004$, $p < .947$.

High School

Participant means varied by ethnicity on pretest School A ($M = 107.750$, $SD = 8.871$), School B ($M = 96.262$, $SD = 7.528$), School C ($M = 101.536$, $SD = 7.487$), School D ($M = 102.836$, $SD = 6.916$), and School E ($M = 99.447$, $SD = 4.617$) and posttest School A ($M = 107.051$, $SD = 7.421$), School B ($M = 99.248$, $SD = 6.298$), School C ($M = 106.342$, $SD = 6.263$), School D ($M = 103.575$, $SD = 5.786$), and School E ($M = 99.821$, $SD = 3.862$).

An analysis of variance (ANOVA) on these scores within subjects again yielded significant variation among conditions, $F(4, 200) = 2.723$, $p = .031$, partial $\eta^2 = .052$. A post-hoc Tukey test showed School B and School A groups differed significantly at $p =$

.002, but the other groups did not differ from either group lying somewhere in the middle (Figure 4.16).

Fireman Score

Fireman Scores for participants increased before ($M = .58$, $SD = .937$) to after ($M = 1.16$, $SD = 1.028$). IAS Scores for controls increased before ($M = .47$, $SD = .908$) to after ($M = .95$, $SD = 1.031$). IAS Scores are statistically significantly different pre and posttest overall ($F(1, 248) = 55.494$, $p < .0005$, partial $\eta^2 = .183$) but participants and controls did not have an affect ($F(1, 248) = 0.570$, $p = .451$, partial $\eta^2 = .002$) (Figure 4.17).

Missing Item Score

Missing Item Scores for participants decreased before ($M = .99$, $SD = 5.254$) to after ($M = .15$, $SD = 1.982$). Missing Item Scores for controls decreased before ($M = 1.46$, $SD = 6.603$) to after ($M = .33$, $SD = 2.944$). Missing Item Scores are statistically significantly different pre and posttest during the program ($F(1, 248) = 5.418$, $p = .021$, partial $\eta^2 = .021$) but participants and controls did not have an affect either ($F(1, 248) = .113$, $p = .737$, partial $\eta^2 < .0005$) (Figure 4.18).

Hours Volunteering

Hours volunteering for participants decreased before ($M = 20.84$, $SD = 42.371$) to after ($M = 13.59$, $SD = 30.435$). Hours volunteering for controls increased before ($M = 36.88$, $SD = 107.796$) to after ($M = 40.01$, $SD = 119.1$). Hours volunteering are not statistically significantly different pre and posttest during the program ($F(1, 242) = .229$, p

=.632, partial η^2 =.001) and participants and controls did not have an affect either ($F(1,242)=1.45$, $p=.230$, partial η^2 = .006).

Purpose of Shelters

A shelter function score was created to look at student ability to understand the purpose of shelters. Normality and parametric data was assessed via bar graph. Shelter function score for participants increased before ($M= 2.98$, $SD= 1.85$) to after ($M= 4.36$, $SD= 1.82$). Shelter function score for controls increased before ($M= 2.94$, $SD= 1.99$) to after ($M= 3.41$, $SD= 1.88$). Shelter function score is statistically significantly different pre and posttest during the program ($F(1, 248)=40.34$, $p <.0005$, partial η^2 =.140) and participants and controls did have an affect ($F(1, 248)=9.60$, $p =.002$, partial η^2 = .037).

ANIMAL WELFARE STATEMENTS SCALE

Students ranked on a scale from 0-10 their feelings on statements reflecting animal welfare perspectives. Although this is not technically a continuous scale, this assumption was made due to the large amount of numbers on the scale and the sliding scale that students moved to provide their answer. Using this assumption, these rankings were compared using a repeated measures ANOVA.

Free from fear and distress

The scale number for participants increased before ($M= 9.90$, $SD= 2.122$) to after ($M= 9.93$, $SD= 1.984$). Scale number for controls decreased before ($M= 10.12$, $SD= 1.799$) to after ($M= 9.57$, $SD= 2.515$). Scale numbers are not statistically significantly different pre and posttest during the program ($F(1, 247)=2.495$, $p =.116$, partial η^2

=.010) and participants and controls did not have an affect ($F(1,247)=3.223$, $p=.074$, partial $\eta^2 = .013$).

To live in a comfortable environment

The scale number for participants decreased before ($M= 10.264$, $SD= 1.646$) to after ($M= 9.98$, $SD= 2.001$). Scale number for controls decreased before ($M= 10.25$, $SD= 1.726$) to after ($M= 9.90$, $SD= 2.263$). Scale numbers are statistically significantly different pre and posttest during the program ($F(1, 246)=4.149$, $p =.043$, partial $\eta^2 =.017$), but participants and controls did not have an affect ($F(1,246)=.061$, $p=.805$, partial $\eta^2 <.0005$).

To have enough space to behave as they wish

The scale number for participants increased before ($M= 8.55$, $SD= 2.620$) to after ($M= 8.87$, $SD= 2.489$). Scale number for controls increased before ($M= 8.62$, $SD= 2.72$) to after ($M= 8.65$, $SD= 2.659$). Scale numbers are not statistically significantly different pre and posttest during the program ($F(1, 245)=.895$, $p =.345$, partial $\eta^2 =.004$) and participants and controls did not have an affect ($F(1,245)=.649$, $p=.421$, partial $\eta^2 = .003$).

To be stimulated

The scale number for participants increased before ($M= 8.60$, $SD= 2.409$) to after ($M= 8.68$, $SD= 2.370$). Scale number for controls increased before ($M= 8.26$, $SD= 2.741$) to after ($M= 8.32$, $SD= 2.908$). Scale numbers are not statistically significantly different pre and posttest during the program ($F(1, 246)=.149$, $p =.700$, partial $\eta^2 =.001$) and

participants and controls did not have an affect either ($F(1,246)=.002$, $p=.965$, partial $\eta^2 < .0005$).

To have hunger and thirst satisfied

The scale number for participants decreased before ($M= 10.31$, $SD= 1.953$) to after ($M= 10.04$, $SD= 2.288$). Scale number for controls decreased before ($M= 10.19$, $SD= 2.103$) to after ($M= 10.08$, $SD= 2.287$). Scale numbers are not statistically significantly different pre and posttest during the program ($F(1, 246)=1.375$, $p =.242$, partial $\eta^2 =.006$) and participants and controls did not have an affect ($F(1,246)=.224$, $p=.637$, partial $\eta^2 = .001$).

To be healthy

The scale number for participants decreased before ($M= 10.59$, $SD= 1.350$) to after ($M= 10.35$, $SD= 1.749$). Scale number for controls decreased before ($M= 10.69$, $SD= 1.150$) to after ($M= 10.16$, $SD= 2.195$). Scale numbers are statistically significantly different pre and posttest during the program ($F(1, 247)=.7.554$, $p =.006$, partial $\eta^2 =.030$), but participants and controls did not have an affect ($F(1,247)=1.161$, $p=.282$, partial $\eta^2 = .005$).

Feelings toward animals

Aggressive

For the pretest, 2 (1.2%) of participants said they felt animals were aggressive and 0 (0%) of the controls felt like animals were aggressive. Expected cell frequencies were not greater than five so the Fisher's Exact Test was used. There was a not

statistically significant association between being a participant and identifying animals as aggressive, $\chi^2(1) = .914$, $p = 1.00$.

For the posttest, 6 (3.5%) of participants said they felt animals were aggressive 1 (1.3%) of the controls said they felt animals were aggressive. All expected cell frequencies were not greater than five so a Fisher's Exact Test was used. There was not a statistically significant association between being a participant and identifying animals as aggressive, $\chi^2(1) = .960$, $p = .440$.

Interesting

For the pretest, 107 (62.2%) of participants thought animals were interesting and 45 (57.7%) of the controls thought animals were interesting. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and thinking animals were interesting, $\chi^2(1) = .459$, $p = .498$.

For the posttest, 103 (69.9%) of participants thought animals were interesting and 38 (48.7%) of the controls thought animals were interesting. A Chi-square test for association was conducted between participants and controls and thinking animals are interesting. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and thinking animals were interesting, $\chi^2(1) = 2.721$, $p = .099$.

Scared

For the pretest, 15 (8.7%) of participants felt scared about animals and 8 (10.3%) of the controls felt scared about animals. A Chi-square test for association was conducted between participants and controls and feeling scared about animals. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and feeling scared about animals, $\chi^2(1) = .151$, $p = .697$.

For the posttest, 9 (5.2%) of participants felt scared about animals and 8 (10.3%) of the controls felt scared about animals. A Chi-square test for association was conducted between participants and controls and feeling animals were scary. All expected cell frequencies were greater than five. There was not a statistically significant association between being a participant and feeling scared about animals, $\chi^2(1) = 2.137$, $p = .144$.

Family members/friends

For the pretest, 103 (59.9%) of participants felt animals were family or friend and 53 (67.9%) of the controls felt animals were family or friends. A Chi-square test for association was conducted between participants and controls and getting the answer correct. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and feeling like they are family or friends, $\chi^2(1) = 1.488$, $p = .223$.

For the posttest, 125 (72.7%) of participants felt animals were family or friends and 54 (69.2%) of the controls felt animals were family or friends. A Chi-square test for

association was conducted between participants and controls and thinking animals are family or friends. All expected cell frequencies were greater than five. There was a not statistically significant association between being a participant and feeling like animals are family or friends, $X^2(1) = .313$, $p = .576$.

Don't Care About Animals

For the pretest, 10 (5.8%) of participants didn't care about animals and 6 (7.7%) of the controls didn't care about animals. A Chi-square test for association was conducted between participants and controls and selecting that they didn't care about animals. All expected cell frequencies were greater than five. There was no statistically significant association between being a participant and saying they did not care about animals, $X^2(1) = .316$, $p = .574$.

For the posttest, 7 (4.1%) of participants didn't care about animals and 6 (7.7%) of the controls didn't care about animals. A Chi-square test for association was conducted between participants and controls and selecting that they didn't care about animals. All expected cell frequencies were greater than five. There was no statistically significant association between being a participant and saying they did not care about animals, $X^2(1) = 1.429$, $p = .232$.

Change in Behavior

Packets were distributed to a slightly different group of students than the pre and posttest. During the program 119 control students received packets (24 from School B, 21 from School C, 25 from School A, 27 from School E, and 22 from School D).

During the program 229 test students received packets (40 from School B, 23 from School C, 23 from School A, 82 from School E, and 61 from School D). School D has the classroom that did not complete the post-exam included because these numbers could not be separated from the other School D students. This group also included School F (31 test, 28 control) who completed the program and the packet portion of the program, but not the posttest. The following numbers are based on those packets: Bark Scholarships, certificates for visiting, forms for fostering. Students were included because the data that was collected included these students and school was not identified separately. Totals for calculations included 147 control and 260 test students. The data collected above (adoptions, surgeries, fosters, stop-by slips) was collected from December 2012-March 2013 with unequal amounts of time for each school (School D receiving much less time than other schools). This was not optimal, but necessary due to data collection time restrictions.

BARK SCHOLARSHIPS

Bark Scholarships are certificates to get an animal spayed or neutered for free at the Charleston Animal Society. The calculations were performed using a Fisher's Exact test comparing participant and control groups and then number of Bark Scholarships that were redeemed at the shelter. This number was per family, not per animal. Many families used one bark scholarship to spay or neuter all their animals. Twenty-one total students from the participant group (8.1%) and three students (2%) filed from the control group turned in scholarships. A Fisher's Exact Test for association was conducted between scholarship redeemers and participant and control groups. There

was a statistically significant association between participation in VSI and certificates, $\chi^2(1)=6.167$, $p=.015$. This is consistent with the change in attitudes about spaying and neutering pets shown in Likert-scale type questions above. Only 55.81% test student households and 47.73% of control student households had animals that could be spayed or neutered, so this is an even larger percentage of the population that could take action. Also two-thirds (24 out of 36) total Bark Scholarships for entire school year to date have been from the VSI program. This is the only high school program that the shelter has given Bark Scholarships for this school year. The rest of the programs are at the middle school and elementary school level. However, the number of students involved in VSI was much less than the other school groups involved at the elementary and middle school level (estimated by Director of Education to be approximately 1200 that receive Bark Scholarships in middle school and elementary school). A Chi-Square Test for association was conducted between scholarship redeemers in the VSI group and non-VSI educational programs. There was a statistically significant difference between participation in VSI and certificates, $\chi^2(1)=22.178$, $p < .0005$.

VISITS

Visit calculations were performed using a Fisher's Exact test comparing participant and control groups and then number of gift certificates that were redeemed at the shelter. Ten total students turned in certificates from the participant group (1.4%) and two students filed from the control group (3.8%). A Fisher's Exact Test for association was conducted between certificate redeemers and participant and control

groups. There was not a statistically significant association between participation in VSI and certificates ($\chi^2(1)=2.502$, $p=.225$).

FOSTERS

Foster calculations were performed using a Fisher's Exact test comparing participant and control groups and then number of applications that were filed. Five total students (1.9%) filed from the participant group and no students (0%) filed from the control group. A Fisher's Exact Test for association was conducted between foster applications and participant and control groups. There was not a statistically significant association between participation in VSI and foster applications ($\chi^2(1)=2.862$, $p=.164$).

ADOPTIONS

Answers to the "where did you hear about us?" question were supposed to be tallied via the adoption paperwork on the monthly report for shelter management. Unfortunately, when the paperwork was by hand sorted instead of just sent out in a report (when a month was missing), the researcher realized that employees only had about half of adopters fill out the survey. Of that half, a large number wrote in "just knew it" which is not realistic or reliable results. Although three students selected VSI and two students selected education, the researchers do not feel this is a proper way to collect this data.

VOLUNTEERS

After the program field trip, but before the post exam, a sign-up sheet was passed around to both students in the participant and control group. They were asked

to write down their name and email address if they were seriously interested in becoming a volunteer at the shelter. School F group was not included for this data collection technique because they had no control group and data was coded by school and therefore could be separated.

In control classrooms, 65 total students were asked to sign up to be volunteers with 12 (18.5%) signing the list. In the participant classrooms, 229 total students were asked to sign up if interested in volunteering with 86 (37.6%) signing the list (Figure 4.19). A Chi-Square Test for association was conducted between volunteers and participant and control groups. There was a statistically significant difference between participation in VSI and volunteers, $\chi^2(1)=8.305$, $p=.004$. All expected cell frequencies were greater than five. There was a small association between participating in the program for volunteer list sign up, $\phi = 0.168$, $p = .004$.

TOYS

Each control and participant classroom was provided a box of materials to make cat enrichment after the entire program was completed. Overall control classrooms completed 0.52 toys per student and participant classrooms completed 0.62 toys per student. A Chi-Square Test for association was conducted between toy production and participants and controls. There was a statistically significant difference between participation in VSI and toy production $\chi^2(1)=8.089$, $p=.041$. The rates between schools varied tremendously, but larger amounts in participant classrooms remained constant (Figure 4.20). School B had 0 in controls and 0 in participant. School C had 1.23 toys per students in the control and 2.3 toys per student in participant. School A had 0 toys in

the control and 0.65 toys per student in the participant group. School E had 0.73 toys per student in the control and 0.85 toys per student in the participant group. School D had 0 students in the control and 0.69 toys per student in the participant group (this includes both classroom groups including those that were not part of the post/pretest evaluation).

Participant Survey Behavioral Question

Are you interested in doing any of the following with CAS?

Volunteering

After the program, 82 (47.7%) of participants and 5 (6.4%) of controls checked that they would be interested in volunteering in the shelter in the future. All expected cell frequencies were not greater than five, so a Fisher's Exact Test was used. There was a statistically significant association between being a participant and wishing to volunteer, $\chi^2(1) = 40.272$, $p < .0005$. There was a medium effect size between participating and wishing to volunteer, $\phi = .401$, $p < .0005$.

Fostering

After the program, 61 (35.5%) of participants and 5 (6.4%) of controls checked that they would be interested in fostering in the shelter in the future. All expected cell frequencies were not greater than five, so a Fisher's Exact Test was used. There was a statistically significant association between being a participant and wishing to foster, $\chi^2(1) = 23.315$, $p < .0005$. There was a medium effect size between participating and wishing to foster, $\phi = .305$, $p < .0005$.

Adopting

After the program, 93 (54.1%) of participants and 6 (7.7%) of controls checked that they would be interested in adoption at the shelter in the future. All expected cell frequencies were greater than five, so a Chi-Square test was performed. There was a statistically significant association between being a participant and wishing to adopt, $\chi^2(1) = 48.258, p < .0005$. There was a medium to large effect size between participating and wishing to adopt, $\phi = .401, p < .0005$.

Attending Training

After the program, 34 (19.8%) of participants and 3 (3.8%) of controls checked that they would be interested in taking training classes at the shelter in the future. All expected cell frequencies were not greater than five, so a Fisher's Exact Test was used. There was a statistically significant association between being a participant and wishing to attend training classes, $\chi^2(1) = 10.788, p = .001$. There was a medium effect size between participating and wishing to attend training classes, $\phi = .208, p = .001$.

Other Educational Program

After the program, 39 (22.7%) of participants and 3 (3.8%) of controls checked that they would be interested in participating in an educational program in the future. All expected cell frequencies were not greater than five, so a Fisher's Exact Test was used. There was a statistically significant association between being a participant and wishing to volunteer, $\chi^2(1) = 13.610, p < .0005$. There was a medium effect size between participating and wishing to volunteer, $\phi = .233, p < .0005$.

Not interested

After the program, 33 (19.2%) of participants and 9 (11.5%) of controls checked that they are not interested in any programs at CAS. All expected cell frequencies were greater than five, so Chi-square test was performed. There was not a statistically significant association between being a participant and not having interest in CAS programs, $X^2(1) = 2.245$, $p = .134$.

Creation of Student Products

Lesson 2

Mean scores for overall CSI packets were 18.58 +/- 7.77. When looking at schools, each had very different means: School B (12.33 +/- 4.92), School C (22.78 +/- 4.91), School D (15.83 +/- 6.73), School E (18.5 +/- 21.06). ANOVA analysis showed a statistically significant difference between schools $F(2,135)=6.449$, $p = .002$, $\eta = .040$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for School B was significantly lower than for School C ($p < .0005$) or School E ($p < .0005$), School D was significantly lower than School E ($p = .003$) or School C ($p = .006$). Ethnicity also had statistically significant differences in scoring: African American (17.35 +/- 7.73), Caucasian (23 +/- 7.34), and others (18.58 +/- 7.77). ANOVA analysis showed a statistically significant difference between ethnicity $F(2, 135)= 6.449$, $p<.002$, $\eta = .297$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for African Americans was significantly lower than for Caucasians ($p = .002$) and Caucasians also had a significantly higher score than other ethnicities ($p = .030$). Pet ownership also

caused statistically significant changes in score: pet owners (20.2 +/- 7.86) and non-pet owners (17.09 +/- 7.44). ANOVA analysis indicated a statistically significant difference between pet ownership $F(1, 135) = 5.609$, $p = .019$, $\eta^2 = .200$.

Lesson 3

Mean scores for overall score on the ethics packet was 14.95 +/- 5.28. When looking at schools, each had very different means: School A (14.33 +/- 6.73), School B (11.58 +/- 5.37), School C (19.25 +/- 5.52), School D (13.18 +/- 4.97), School E (16.21 +/- 3.50). ANOVA analysis showed a statistically significant difference between schools $F(4, 171) = 906.676$, $p < .0005$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for School C were significantly higher than for School A ($p = .017$), School B ($p < .0005$), and School D ($p < .0005$). School E had a significantly higher score than School B ($p < .0005$) or School D ($p = .015$). Ethnicity also had statistically significant differences in scoring: African American (14.05 +/- 5.46), Caucasian (16.79 +/- 5.03), and others (15.1 +/- 5.28). ANOVA analysis showed a statistically significant difference between ethnicity $F(2, 171) = 4.495$, $p = .013$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for African Americans was significantly lower than for Caucasians ($p = .009$). Pet ownership did not cause statistically significant changes in score: pet owners (15.41 +/- 5.60) and non-pet owners (14.48 +/- 4.93). ANOVA analysis did not indicate a statistically significant difference between pet ownership $F(1, 171) = 1.352$, $p = .246$, $\eta^2 = .089$.

Lesson 4

Mean scores for overall score on the screenplay was 8.91 +/-2.05. When looking at schools, each had different means: School A (9.63+/- 1.75), School B (7.6 +/- 2.19), School C (6.5 +/- .707), School D (9.47 +/- 2.5), School E (8.48 +/-1.55). ANOVA analysis showed a statistically significant difference between schools $F(4, 91)=2.867$, $p = .028$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for School C was higher than for School B ($p<.0005$), School A ($p=.017$) and School D ($p<.0005$). School B also had lower mean score than School E ($p<.0005$). Ethnicity did not have statistically significant differences in scoring: African American (9.07 +/- 2.13), Caucasian (8.81 +/- 2.20), and others (8.36 +/-2.05). ANOVA analysis did not show a statistically significant difference between ethnicity $F(2, 91)= .586$, $p = .559$. Pet ownership did not cause statistically significant changes in score: pet owners (8.80 +/- 2.11) and non-pet owners (9.05 +/- 2.00). ANOVA analysis did not indicate a statistically significant difference between pet ownership $F(1, 91) = .339$, $p = .562$. $\eta^2 .061$

Lesson 5

Mean scores for overall score on the poster was 9.62 +/-1.98. When looking at schools, each had different means: School A (9.6+/- .843), School B (9.11 +/- .737), School C (9.26+/- .1.82), School D (9.00+/- 1.41), School E (10.05 +/-2.53). ANOVA analysis did not show a statistically significant difference between schools $F(4, 91)=1.02$, $p = .403$. Ethnicity did have statistically significant differences in scoring: African American (9.35 +/- 1.79), Caucasian (10.33 +/- 2.15), and others (9.00+/-1.91). ANOVA analysis showed a statistically significant difference between ethnicity $F(2, 91)= .3.208$, p

= .045. Post hoc comparisons using the Tukey HSD test indicated that the mean scores were not different between ethnicities. Pet ownership did cause statistically significant changes in score: pet owners (10.06 +/- 2.15) and non-pet owners (9.12 +/- 1.63). ANOVA analysis indicated a statistically significant difference between pet ownership $F(1, 91) = 5.490, p = .021$.

Lesson 6

Mean scores for overall score on the screenplay was 11.07 +/-2.13. When looking at schools, each had different means: School A (11.07+/- 2.13), School B (none turned in), School C (10.0+/- 3.37), School D (12.77 +/- 3.27), School E (10.71 +/-3.08). ANOVA analysis showed a statistically significant difference between schools $F(3, 102)=3.070, p = .031$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for School D is higher than School C ($p = .046$) or School E ($p=.046$). Ethnicity did not have statistically significant differences in scoring: African American (11.27 +/- 3.43), Caucasian (10.97 +/- 2.83), and others (10.77 +/-2.89). ANOVA analysis did not show a statistically significant difference between ethnicity $F(2, 102)= .180, p = .836$. Pet ownership did not cause statistically significant changes in score: pet owners (11.16 +/- 2.82) and non-pet owners (11.04 +/- 3.54). ANOVA analysis did not indicate a statistically significant difference between pet ownership $F(1, 102) = .036, p = .851$.

Lesson 7

Mean scores for overall score on the essay was 3.90 +/-1.063. When looking at schools, each had different means: School A (5+/- 0 n=3), School B (4.26+/- .872), School

C (4.47+/- 1.172), School D (3.43 +/- .913), School E (3.72 +/-1.031). ANOVA analysis showed a statistically significant difference between schools $F(4, 112)=5.110$, $p = .001$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for School D is lower than School C ($p=.005$) and School B ($p=.042$). Ethnicity did have statistically significant differences in scoring: African American (4.02 +/- .912), Caucasian (3.91 +/- 1.109), and others (3.35 +/-1.455). ANOVA analysis did not show a statistically significant difference between ethnicity $F(2, 112)= 2.813$, $p = .064$. Pet ownership did not cause statistically significant changes in score: pet owners (3.83 +/- 1.165) and non-pet owners (3.90 +/- .958). ANOVA analysis did not indicate a statistically significant difference between pet ownership $F(1, 112) = .450$, $p = .504$.

Views of VSI

Part-Time Science Teacher Evaluations Summary

The following section individually records CAS part-time teacher evaluations for each school's teacher. A summary of the results and rankings is in Figure 4.21.

School A Teacher

This teacher had an overall average score of 90.2 (Respectful (96), Responsible (89), Organized (89), Interested (84), Classroom Management (76.5), Program Execution (96), Evaluation Execution (101)). Ability of students was scored as a 3 average and difficult of students was scored as a 3 average. Both CAS teachers wished to work with this teacher again. Comments included "easy to work with" and "able to follow

directions” however a complaint was that “she did not create enthusiasm for the program...the students did not...try very hard because she did not make them.”

School B Teacher

This teacher had an overall average score of 18.1 (Respectful (56.5), Responsible (22), Organized (7), Interested (27.5), Classroom Management (1.5), Program Execution (1), Evaluation Execution (11.5)). Ability of students was scored as a 1.5 average and difficult of students was scored as a 2 average. Both CAS teachers did not wish to work with this teacher again. One teacher said “I wanted to give...a second chance due to her enthusiasm... however...her continual behavior became a problem...she could not follow directions...[and]...did not know how to read or carry out lesson plans...[it]...was a disservice to her students.” Also, they mentioned “she treated the students with contempt and they therefore did not seem to respect her.”

School C Teacher

This teacher had an overall average score of 100.4 (Respectful (101), Responsible (101), Organized (101), Interested (101), Classroom Management (101), Program Execution (97), Evaluation Execution (101)). Ability of students was scored as a 4.5 average and difficult of students was scored as a 4.5 average. Both CAS teachers wished to work with this teacher again. The CAS instructors both loved working with this teacher for many reasons including “wonderful, useful, feedback intended to improve the program...extremely organized” and “enthusiastic and independent.”

School D Teacher

This teacher had an overall average score of 101 (Respectful (101), Responsible (101), Organized (101), Interested (101), Classroom Management (101), Program Execution (101), Evaluation Execution (101)). Ability of students was scored as a 2 average and difficult of students was scored as a 3 average. Both CAS teachers wished to work with this teacher again. Comments included that “very easy to work with...[and]... got her students involved” and she “did an amazing job with students that are not well educated and [took] ...extra effort to get to participate and focus on the task...[and]...she was organized and prepared for every lesson.”

School E Teacher

This teacher had an overall average score of 100.29 (Respectful (101), Responsible (101), Organized (101), Interested (101), Classroom Management (101), Program Execution (96), Evaluation Execution (101)). Ability of students was scored as a 4 average and difficulty of students was scored as a 3.5 average. Both CAS teachers wished to work with this teacher again. Comments included “enthusiastic teacher...able to motivate students to learn difficult topics...went above and beyond researching topics...passionate...truly inspires students to learn.” The only reason for the 96 on execution was that he included a PETA video in his class lesson that was not provided to engage students (although this does show his commitment to effectively engage his classroom in the lessons). Students hated this video because of its graphic nature and it destroyed some of the empathetic elements of the lesson. It also caused unfavorable responses to the lesson by students. However, it did command student attention and a

more balanced, but visual, video of pig issues has been added to different lessons from his suggestions.

School F Teacher from Eliminated Classroom

This teacher had an overall average score of 15.1 (Respectful (13.5), Responsible (6), Organized (33.5), Interested (13.5), Classroom Management (12), Program Execution (9), Evaluation Execution (18.5)). Ability of students was scored as a 4 average and difficult of students was scored as a 2 average. Both CAS teachers did not wish to work with this teacher again. Comments included that she was “rude to students...[with] little effort to teach them...did not follow directions...[had] no control over her students...[and] openly lied...on several occasions...[and was my] least favorite teacher.”

School D Teacher from Eliminated Classroom

This teacher had an overall average score of 8.71 (Respectful (31), Responsible (1), Organized (1), Interested (25), Classroom Management (1), Program Execution (1), Evaluation Execution (1)). Ability of students was scored as a 2 average and difficult of students was scored as a 2 average. Both CAS teachers did not wish to work with this teacher again. Comments included “extreme amount of effort to keep her organized...students have zero respect for her.” She also failed to organize the field trip and CAS instructors had to come in and teach the lessons.

Teacher Evaluations of Lessons:

Overall

Teacher evaluations overall were positive with each teacher being able to find relevance to their curriculum within each individual lesson. Some teachers had missing surveys, School B (5), School E (1) (however this was the part-time CAS teacher's fault for not including the survey in the lesson), School A (6). Teachers mentioned consistently how they could use the lessons and experiences from VSI in other parts of their curriculum. School A, School C, School E all wished to participate in the program again. School B was already a repeat participant and School D has not said either way whether they will participate next year.

Program Pre-Meeting

The program added a pre-meeting at the shelter with teachers to help facilitate understanding of the lessons and program. This was only conducted with the teacher from School D that completed the program. The successful teacher attended and the program where the teacher did not complete VSI did not attend. The teacher commented that the meeting was valuable, especially to ask questions, see the lessons and their materials, tour the shelter, and meet the researcher to find out why the program is being implemented.

Lesson 1

Teachers commented how animal behavior, technology, veterinary medicine, environmental science, and overpopulation made this lesson especially relevant to the

curriculum. Few concerns were voiced about the lessons themselves, the only improvement recommended was changing the questions because students were too excited over “buzzing in” with the answers. Teachers commented they enjoyed “everything” especially the ultrasound and basic dog training skills.

Lesson 2

Teachers commented how forensics, crime solving, parasites, scientific method and inquiry made this lesson especially relevant to the curriculum. Concerns include students being frustrated that the shells did not match the gun found in the investigation and more instructions for using the actual packet. Teachers felt prepared for teaching the lesson. They liked that “students had to make a choice about...time and money” and the case used “real evidence.” Students were “engaged and asking questions...[and] really seemed to enjoy the lesson”. The teacher from School C said “my favorite lesson...I wish I had this type of real evidence to use in my [other] classes.”

Lesson 3

Teachers felt ethics, parasites, and critical thinking made this activity relevant to their classroom. Teachers varied with their favorite parts of the lesson, but the weight on your shoulders, open/closed admission shelters, and animal welfare/rights sections were all mentioned multiple times. The length of the lesson was a concern for almost all of the teachers, especially School B. Teachers felt prepared for teaching the lesson. They felt that “lessons about ethics were very informative and valuable” and they were “quick, informative, and lots of great images.”

Lesson 4

Teachers commented how parasites and disease transfer relate to their curriculum. Including more information about the diseases and directions for the screenplay was an area for improvement. Teachers felt prepared for teaching the lesson. They felt that the lesson was “a great overview of how fast diseases spread...in a population” and “how students were able to interweave their creativity and the science of the lesson in their screenplays”.

Lesson 5

Teachers commented how the students could be creative and learn how science enhances health issues and how art can be used to promote issues. The only concern voiced about the lessons itself was the length of one of the videos. Teachers felt prepared for teaching the lesson. All expressed, “the students really enjoyed this activity.”

Lesson 6

Teachers commented how debating and discussion and humane treatment of animals were important in their classroom. Suggestions were made to add a clip with actual video from a swine farm and visual of student movement during the activity. Teachers felt prepared for teaching the lesson, but that it took extra effort to fully grasp. Teachers said that “they did a great job” and “some students were successful with their interest groups while others...[couldn’t] keep their personal opinions out of the

discussion.” For the bill itself “there were very lively discussions in the same groups and good compromises arose from them” and “they discussed and were able to negotiate.”

Lesson 7

The teachers felt surgery, learning about veterinary careers, necropsies, heartworms, safety skills, and health concerns were directly relevant to their curriculum. Teachers in the program most often mentioned surgery and necropsy as their favorite part of the program. Only criticism is that one teacher mentioned no down time, however her classroom was 20 minutes late, which forced a schedule change.

Student Lesson Surveys

Lesson 1

Students indicated that their perceptions of shelters changed ($Mdn = 4$, $SD = 0.656$) (Figure 4.22). Students said “it has opened my understanding of the shelters,” “I didn’t know there was more than dogs and cats,” and “I now know why so many dogs are in a shelter and more about what a shelter does.”

Lesson 2

Students indicated that their perception of the veterinarian’s role in court cases had changed ($Mdn = 3.09$, $SD = 0.769$) (Figure 4.23). Students overall wished the animal didn’t have to die in the case and didn’t like that it was hurt. Students mentioned the parasites and x-rays as favorites. They “liked actually getting to see evidence of a real

case” and “trying to decide what we should do [with]...money and time.” It also surprised them that “people actually do cruel things to pets.”

Lesson 3

Students indicated that knowing both sides of an issue helps them understand it better ($Mdn = 3.42$, $SD = 0.665$) (Figure 4.24) and also that they felt they understood more about making difficult decisions ($Mdn = 3.00$, $SD = 0.721$) (Figure 4.25). For this lesson students did not like all of the writing and worksheets and wanted to cut down on the amount of scenarios. There were some students that wanted more information. They “wanted to get check-ups on my [dogs] more often because even [though] something doesn’t look wrong doesn’t mean something isn’t” and thought “taking care of a dog is more than giving it water and food and taking it for walks.” Students wanted to “make sure all pets...are treated for fleas...and [on] heartworm prevention.” They also said they “feel like adopting a pet now that I know that shelters kill dogs for overpopulation.”

Lesson 4

Students did not feel that they knew more about zoonotic disease after the lesson ($Mdn = 1$, $SD = .621$) (Figure 4.26).. However, students did feel that it was important to understand zoonotic disease ($Mdn = 3$, $SD = .633$) (Figure 4.27). Students had a large number of positive responses to the lesson and less suggestions than other lessons, although a select few did not like writing the screenplay. One student said “I like making up stories!”

Lesson 5

Students felt that advertising is important ($Mdn=4$, $SD=.560$) (Figure 4.28). and that it is important to advertise scientific concepts ($Mdn=3$, $SD=.789$) (Figure 4.29). Students did mention shortening the video length. One student mentioned “I learn more and more each day. I love these lessons.” The majority of students said their favorite part was the poster.

Lesson 6

Students felt that they understood more the difficulties of passing animal welfare legislation ($Mdn= 3$, $SD=.650$) (Figure 4.30). In this lesson students seemed to both want more information, but also some wanted less reading of information. Also, some students loved the optional costumes provided and some did not. Students “liked debating the law” and “comparing what others thought to what I thought.”

Lesson 7

Students felt they understood more about the difficult decisions that must be made for disease control ($Mdn=4$, $SD=.514$) (Figure 4.31). Students agreed they were excited about adopting an animal in the future ($Mdn=4$, $SD=.657$). Students were also excited about volunteering ($Mdn=3.00$, $SD=.735$) (Figure 4.32 and 4.33). Finally, students understood that shelters were more complicated than they initially thought ($Mdn=4.00$, $SD=.593$) (Figure 4.34). Students commented that they wanted more time at the shelter to spend with the animals.

Students also thanked the shelter for running the program. Selected student comments after the field trip involved many calls to action for adoptions, fostering, spaying and neutering, and volunteering including:

- “it was very educational but also so much fun. I loved meeting the dogs to seeing the necropsy take place. It’s not everyday that we see what goes on in an animal shelter, so I am very thankful for this experience...I never knew about fostering until this program told us about it...I was glad I was able to be with the dogs laying in the ‘beach’ making them feel better after their surgery”
- “Y’all have a lot of work that a lot of people don’t know y’all do. I really appreciate everything y’all do for us and the animals. I hope to see you soon so you can spay my puppy. And now I know how well y’all would be treating my dog”
- “I had lots of fun interacting with the animals, necropsy, and learning so much about the health of the animals. I plan on attempting to volunteer there. “
- “Thank you for allowing me and my class to participate in the VSI program...[it] was very interesting from the in class parodies to the necropsy. I hope to come back soon and adopt a puppy or a kitty”
- “Thank you very much for letting our class come to visit the shelter. It was truly a wonderful experience for me, and probably the best I’ve had throughout my high school career...Anyways, I honestly feel like I learned a lot about the shelter and what you are all about. I realize how stressful your jobs must get. I hope more kids in high school get the change to see and learn all that my class did. Again, thank you VERY much☺”

- “I and my fellow classmates are so grateful for the opportunity to come to your facility and work with you guys. I learned so many things like about the virus Parvo and how to check for heartworms in a dog. The part I really enjoyed with the dogs. I really liked Louey and Gracie and Chico. Another thing that was interesting was seeing the necropsy and spaying and neutering. It was cool to see the inside of a dog. I had a really fun time and plan to come back and volunteer one day. Again thank you so much for this experience.”
- “I enjoyed seeing all the animals and learning how the process works there. I feel as if I know enough now to share this information to others who maybe interested...also I want to say a special thank you for taking care of Rosco he is a great dog so I really appreciate what you guys do. Please continue what your doing and find Rosco a good home.”

Tweet Boards

Students were able to directly document their feelings on the field trip via paper “tweet boards.” Student comments on each area of the field trip were helpful and students liked posting their thoughts. During the field trips, 209 total tweets were provided. 27.3% were from surgery, 26.3% were from necropsy, 13.9% were from intake, 23.0% from education room, and 9.6% in the dog room. School D has the least number of tweets, but they were mistakenly not told about the boards before their rotations. The bullets below organize some samples of the comments by area:

- Surgery

- “The surgery was cool!!! #vets” “You can tell everyone here loves what they do!” “Thinking about job shadow” “The surgery is cool, it’s nice to see them recover.” “Looking at the dog in surgery was nasty but interesting at the same time” “Cool to see the way the people take care of the animals. They are in good care”
- Necropsy
 - “Very awesome! #vetswag” “Oh yeah! I’m cool! I touched heartworms!” “Animals are AMAZING” “This is freaking awesome!” “This thing is kind of stinky, but cool” “OMG that was pretty cool”
- Intake
 - “Say no to fecal oral. #nobueno” “I am sad the dog had heartworms” “The heartworm test is cool but it makes you anxious, great job overall” “I just tested heartworms!!”
- Education Room
 - “Found my purr-fect match☺” “It was complicated trying to keep all the dogs when we ran out of space” “Being involved in a shelter is hard work with hard decisions” “I truly love playing this game it was very challenging” “Best field trip ever!”
- Dog Adoption Room
 - “Taught a dog a trick” “I had a lot of fun and am going to come back and play with the dogs.” “I enjoyed my day...I am definitely coming back to adopt.” “Listening to a dogs heartbeat was really cool☺”

Posttest Survey

Posttest evaluations did ask for some open text questions. A word cloud was developed based on the number of times a particular answer came up in the text for each student means the font is larger. These visual diagrams are included in the Appendix I for a representation of student responses for each open text question. Word cloud questions included what students liked about the VSI program, what would they change about the program, and whether the program changed their ideas about science.

What day did you like the best?

Students overwhelmingly reported lesson 7 as their favorite lesson. Students identified their favorite lesson at the following frequencies: 20 Lesson 1 (10.9%), 11 Lesson 2 (6.0%), 2 Lesson 3 (1.1%), 3 Lesson 4 (1.6%), 7 Lesson 5 (3.8%), 7 Lesson 6 (3.8%), 134 Lesson 7 (72.8%) (Figure 4.35)

What day did you like the least?

Students identified their least favorite lesson more distributed between the different options. Lesson 6 had the most issues with 31% of students choosing it. Students identified their least favorite lesson at the following frequencies: 22 Lesson 1 (12%), 20 Lesson 2 (10.9%), 33 Lesson 3 (17.9%), 21 Lesson 4 (11.4%), 26 Lesson 5 (14.1%), 57 Lesson 6 (31%), 5 Lesson 7 (2.7%) (Figure 4.36).

Did this program change your ideas about science?

The majority of students felt like this program changed their ideas about science 130 (70.7%) (Figure 4.37). Looking at ethnicity, 73 (66.4%) of African Americans, 37 (74%) of Caucasians, and 20 (83.3%) of others thought that VSI changed their ideas about science. There was not a statistically significant difference between ethnicities, $X^2(2) = 3.107$, $p = .211$ (Figure 4.38). Looking at school, 15 (78.9%) of School A, 18 (54.5%) of School B, 16 (84.2%) of School C, 28 (60.9%) of School D, and 53 (79.1%) of School E felt that VSI had changed their ideas about science. There was a statistically significant difference between schools, $X^2(4) = 10.875$, $p = .028$ with small change in effect size, Cramer's $V \phi = .243$, $p = .028$. For pet ownership, 69 (75.0%) of pet owners and 61 (66.3%) of non-owners thought VSI changed their ideas about science. There was not a statistically significant difference between pet ownership, $X^2(1) = 1.677$, $p = .195$ (Figure 4.39).

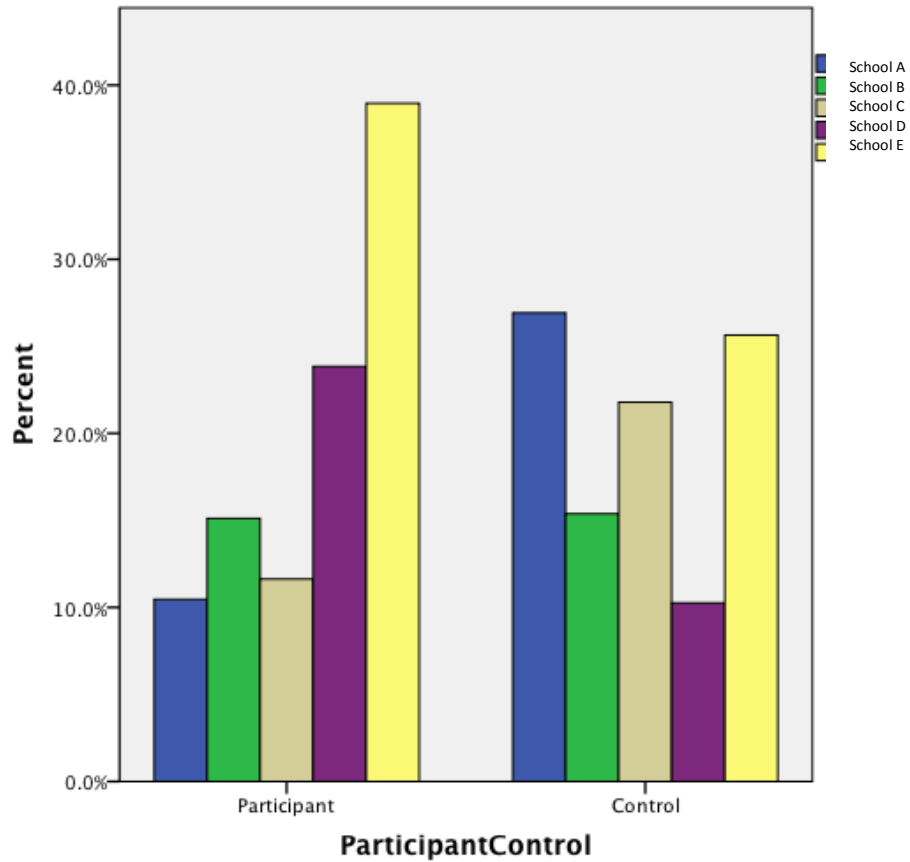


Figure 4.1 – Percentage of controls and participants from each school.



Figure 4.2 – High schools ranked by grade and score from best to worst.

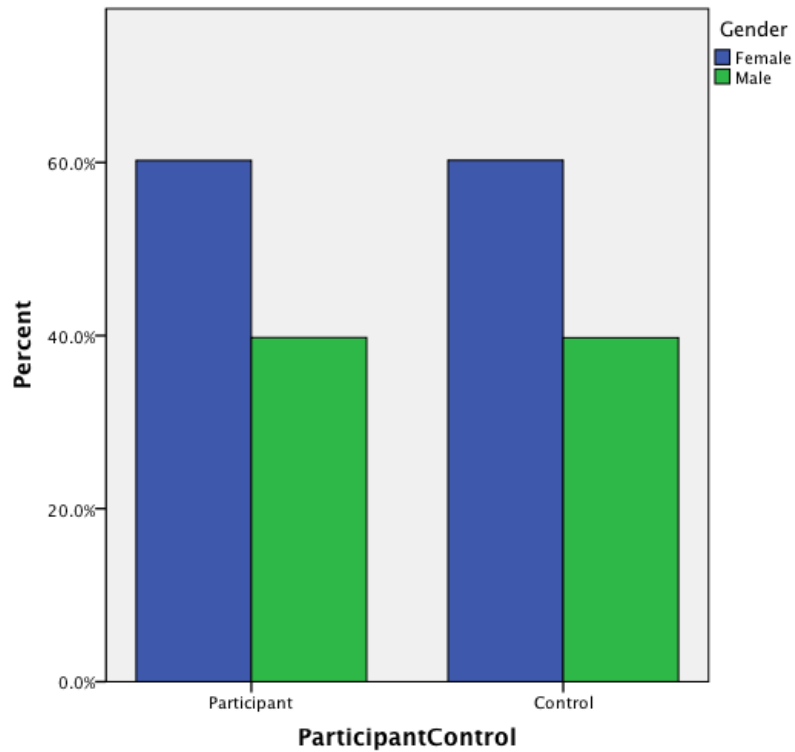


Figure 4.3 – Gender distribution is equal between participants and controls.

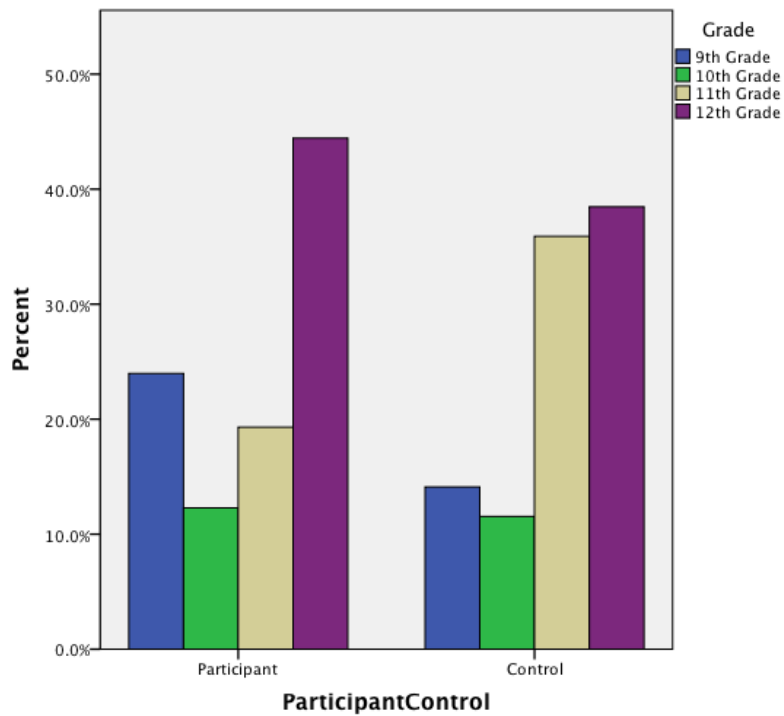


Figure 4.4 – Grade distribution between participant and control groups.

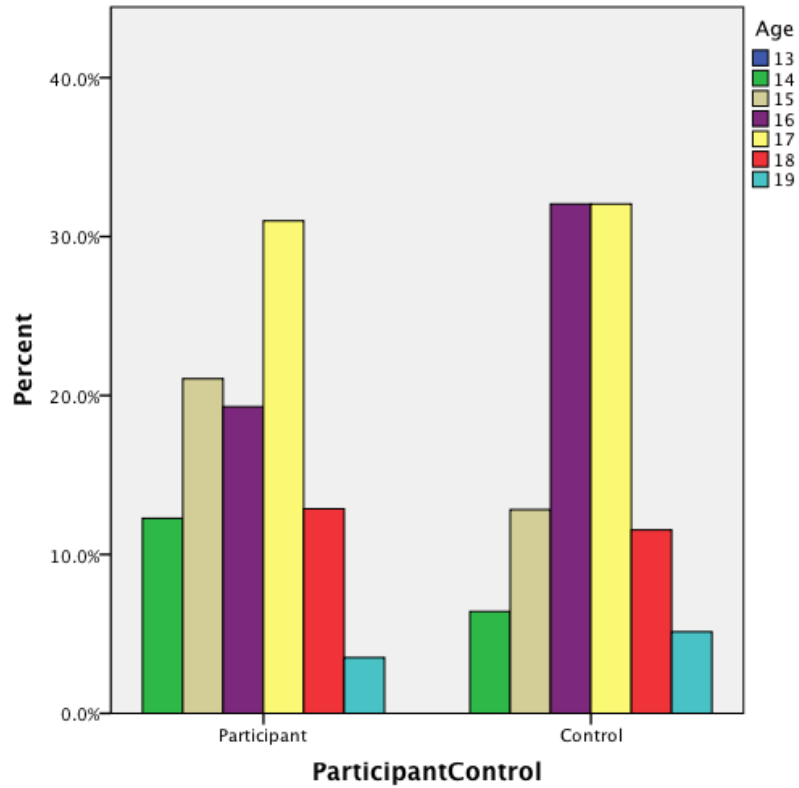


Figure 4.5 – Age distribution between participant and control groups

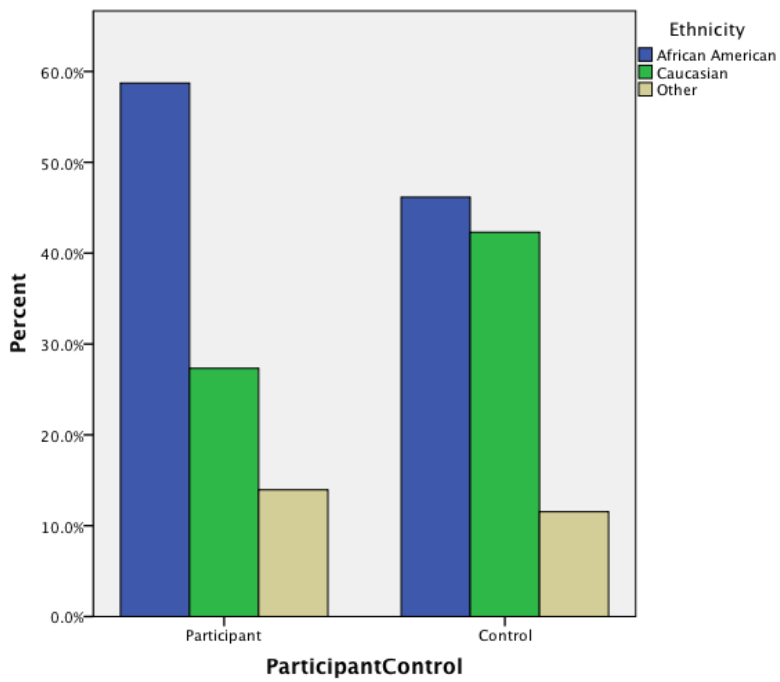


Figure 4.6 – Ethnicity distribution between participant and control groups.

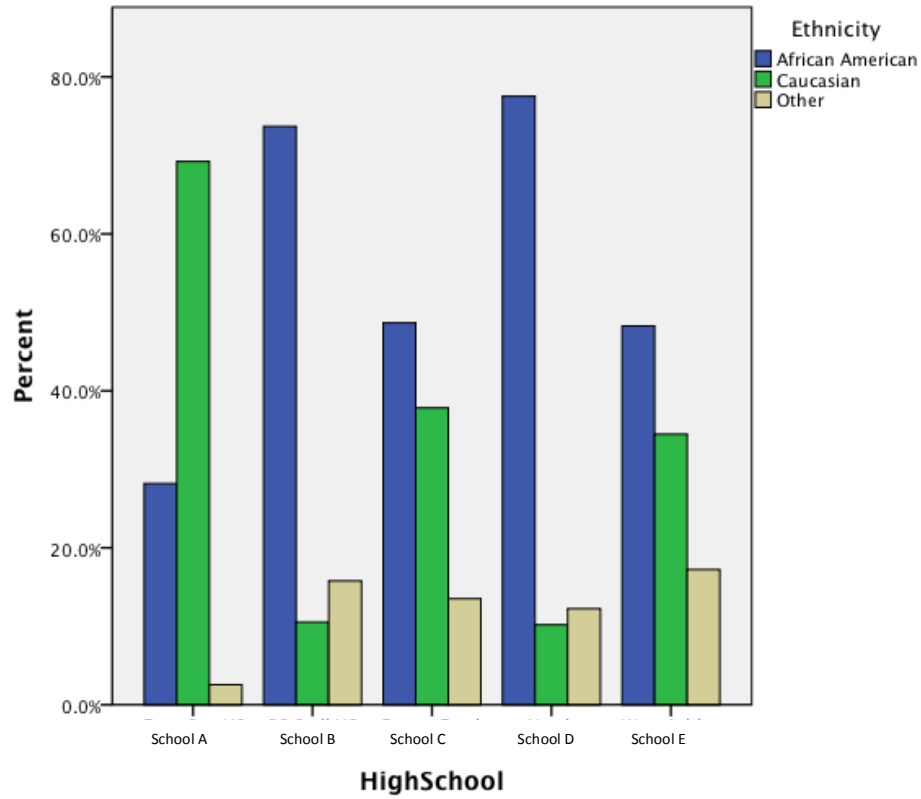


Figure 4.7 – Distribution of ethnicity between schools.

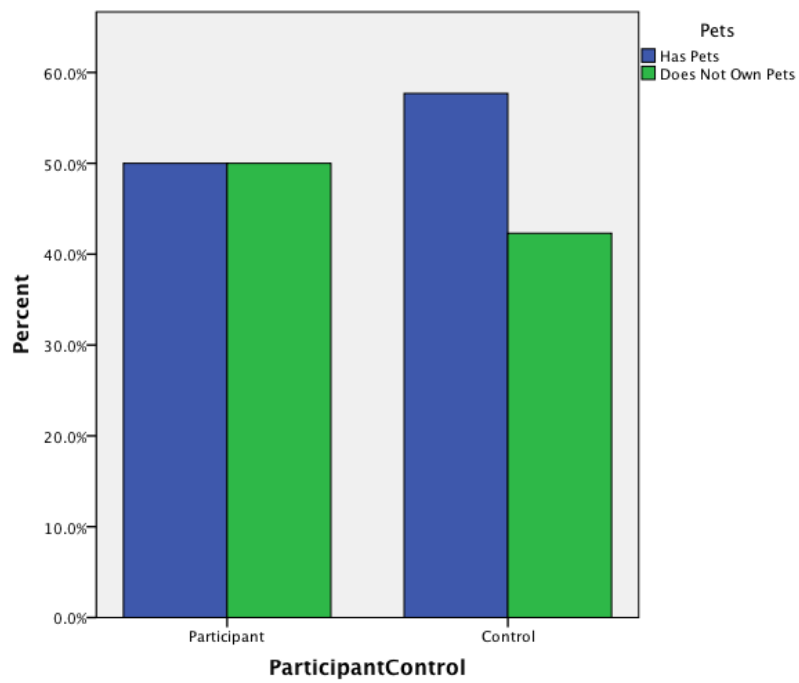


Figure 4.8 – Pet ownership between participant and control groups.

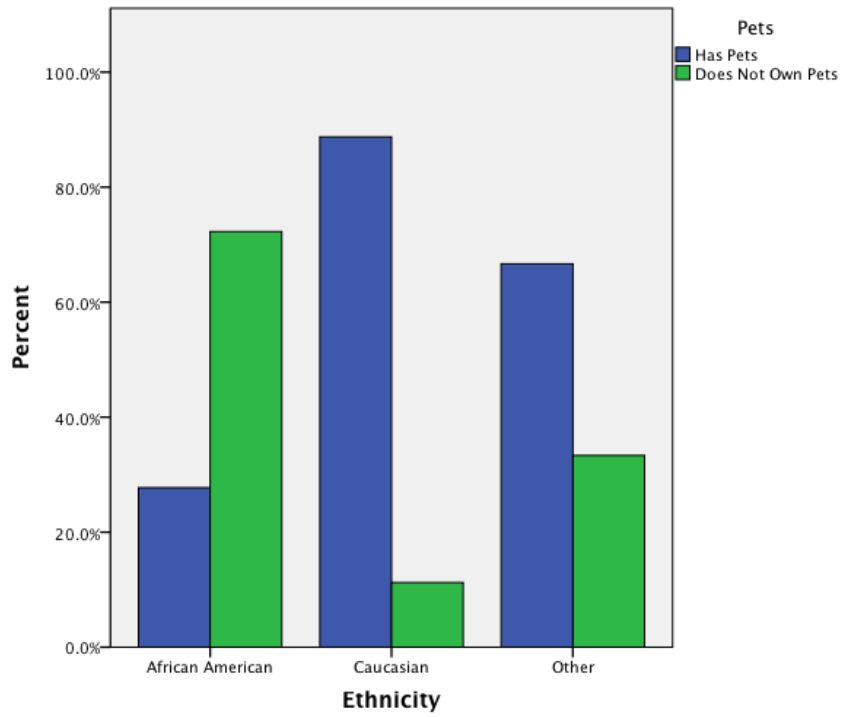


Figure 4.9 – Pet ownership according to ethnicity.

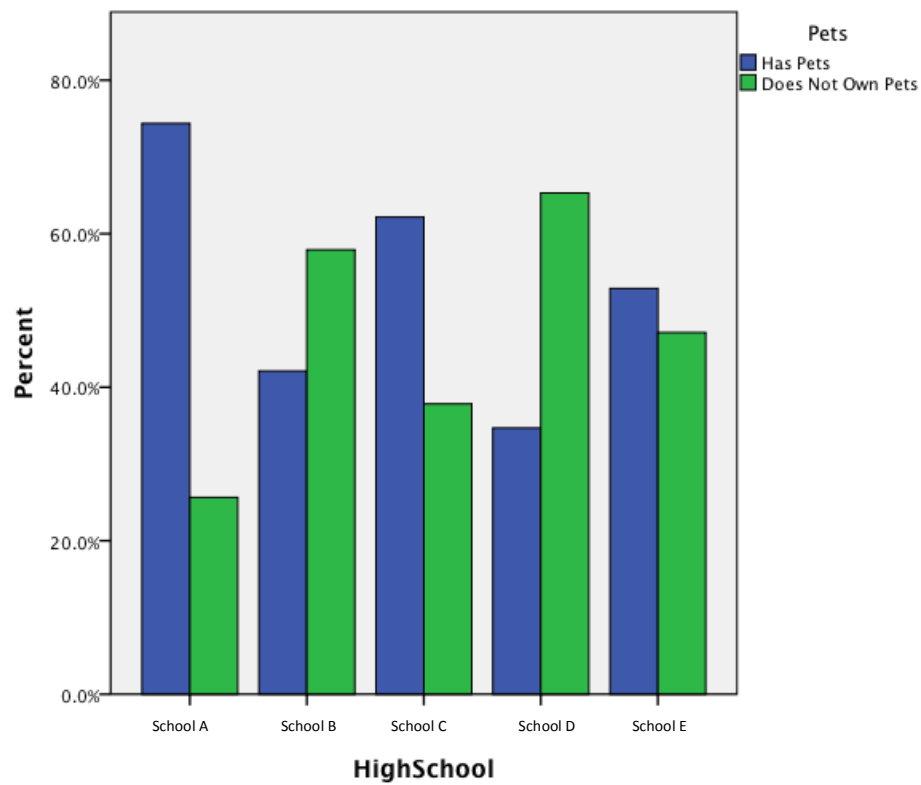


Figure 4.10 – Pet ownership between schools.

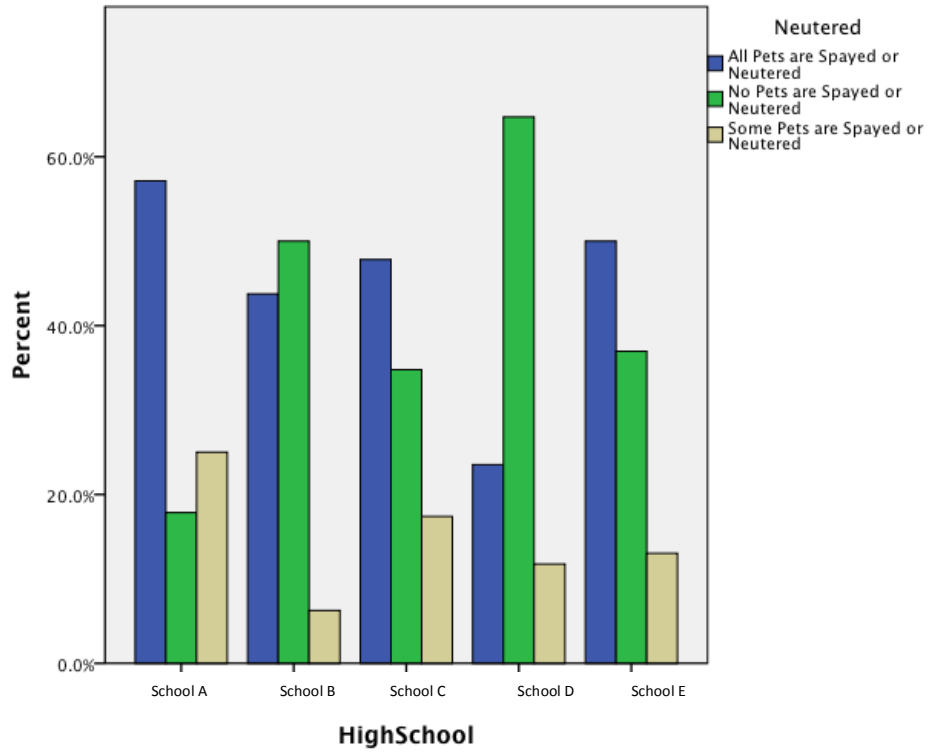


Figure 4.11 – Pets that are spayed or neutered according to school.

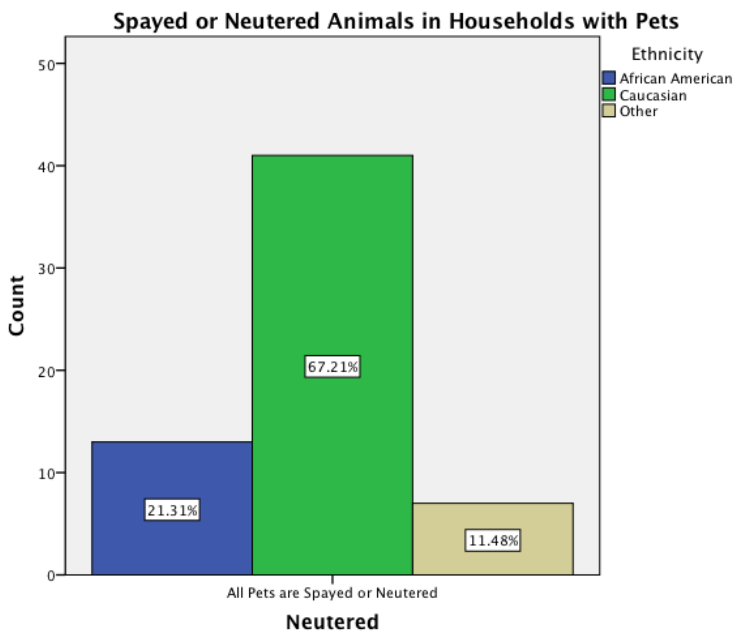


Figure 4.12 – Pets that are spayed or neutered according to ethnicity.

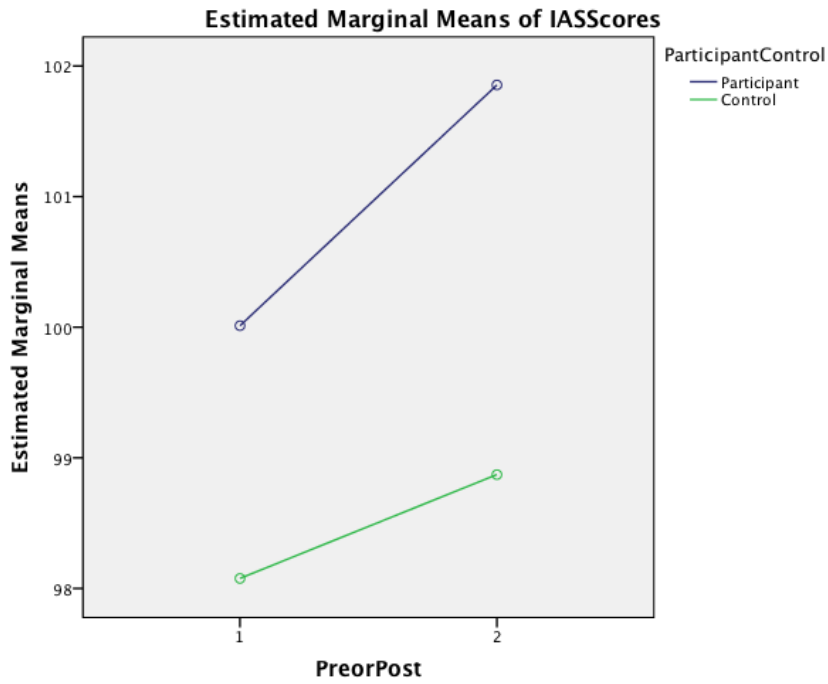


Figure 4.13 – Means of IAS Scores between participant and control groups.

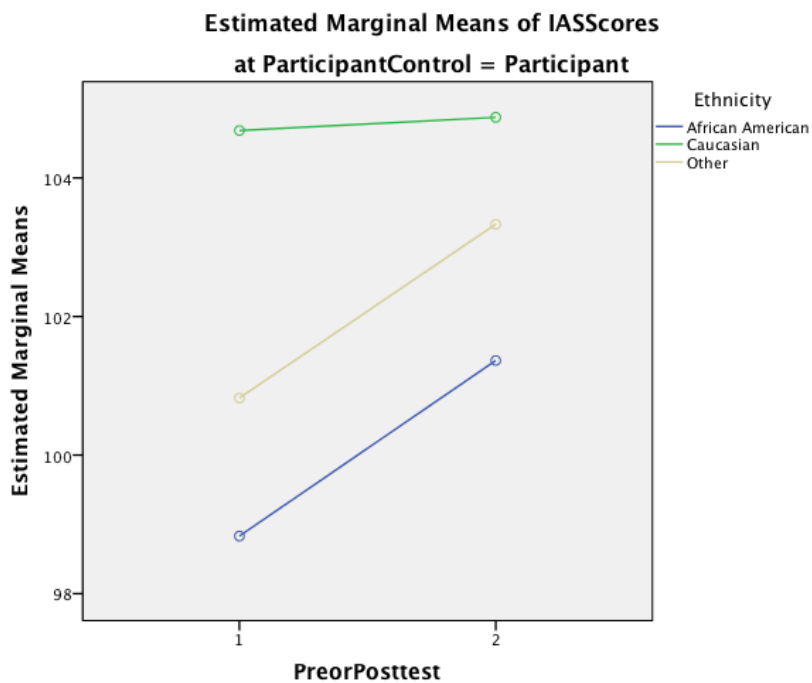


Figure 4.14 – Means of IAS Score between ethnicity for participants.

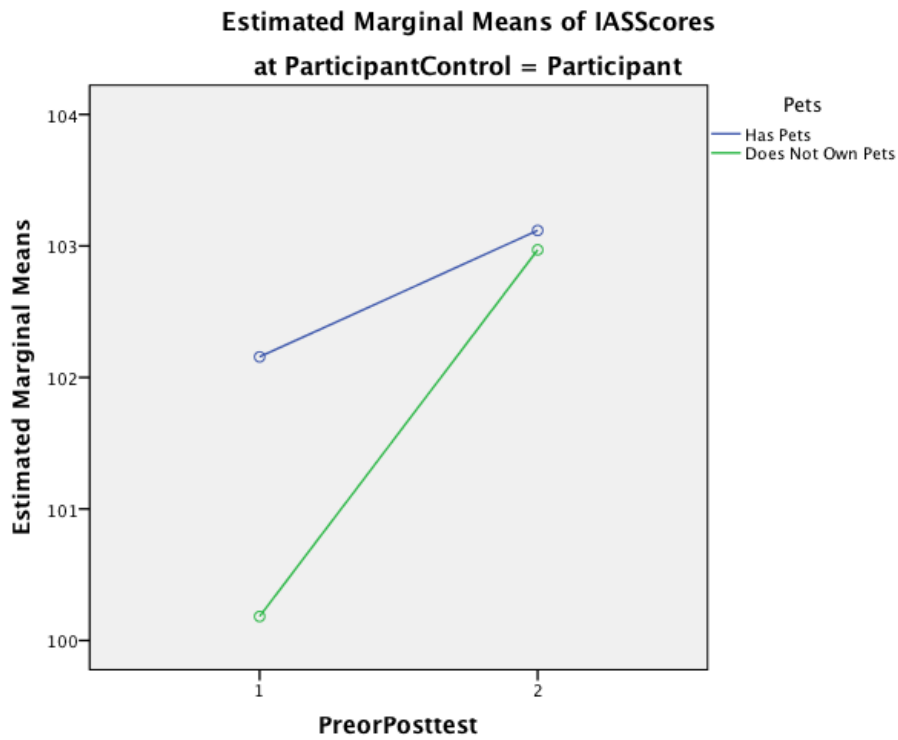


Figure 4.15 – Mean IAS Score for pet ownership for participants.

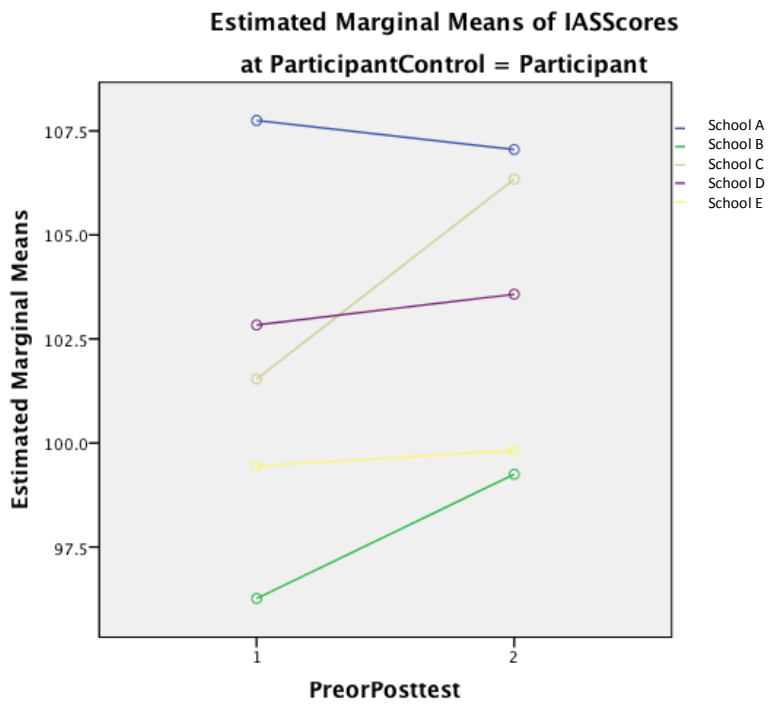


Figure 4.16 – Mean IAS Score between schools.

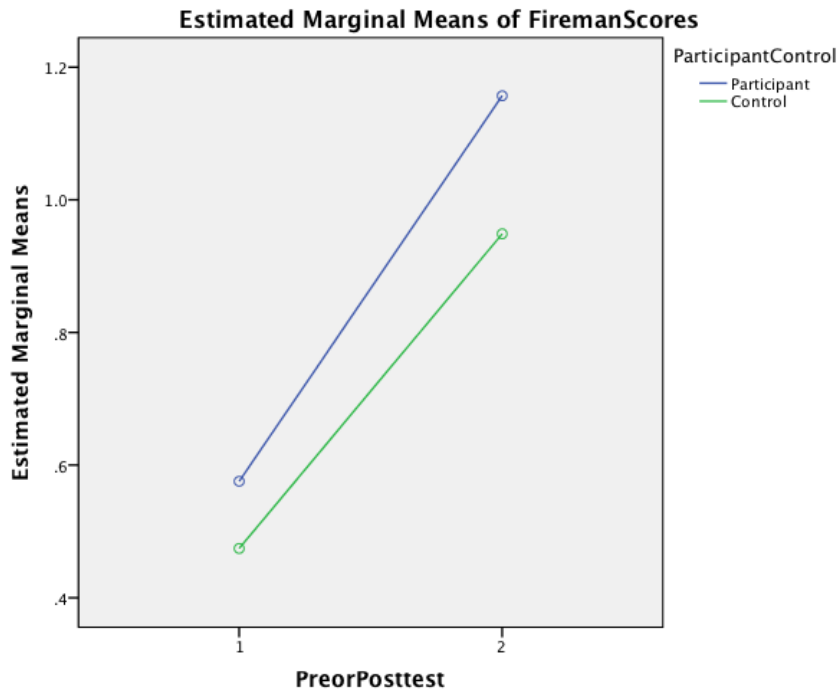


Figure 4.17 – Fireman Score between participant and control groups.

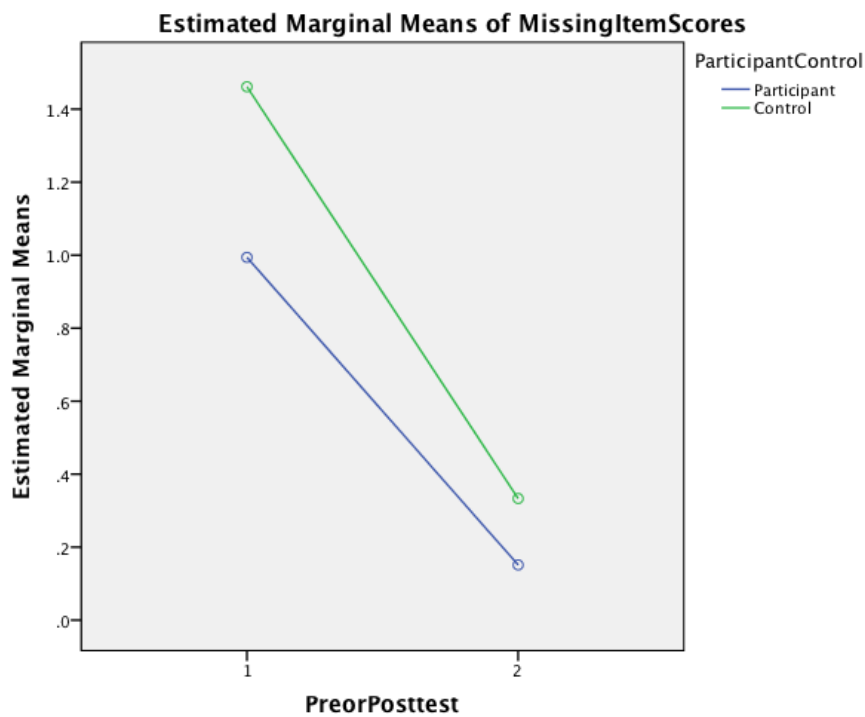


Figure 4.18 - Missing Item Score between participant and control groups.

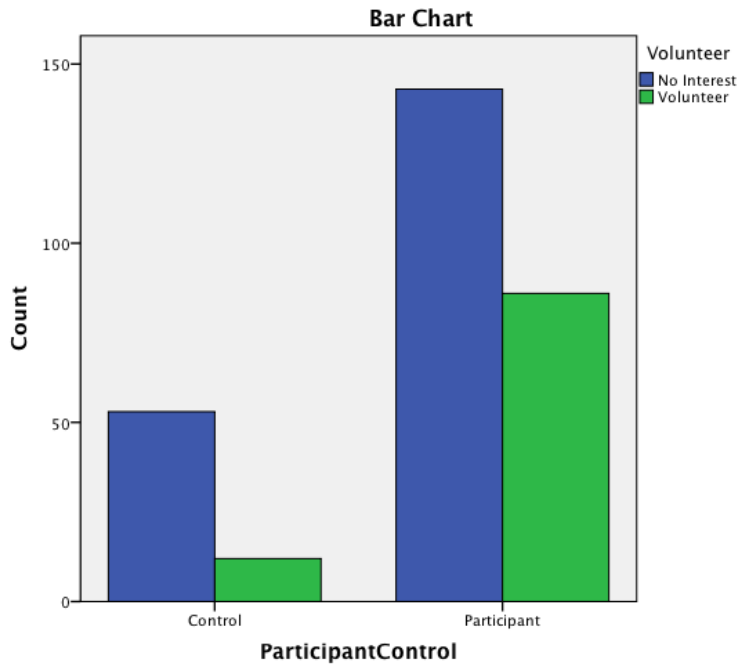


Figure 4.19 – Willingness to volunteer in participant and control groups.

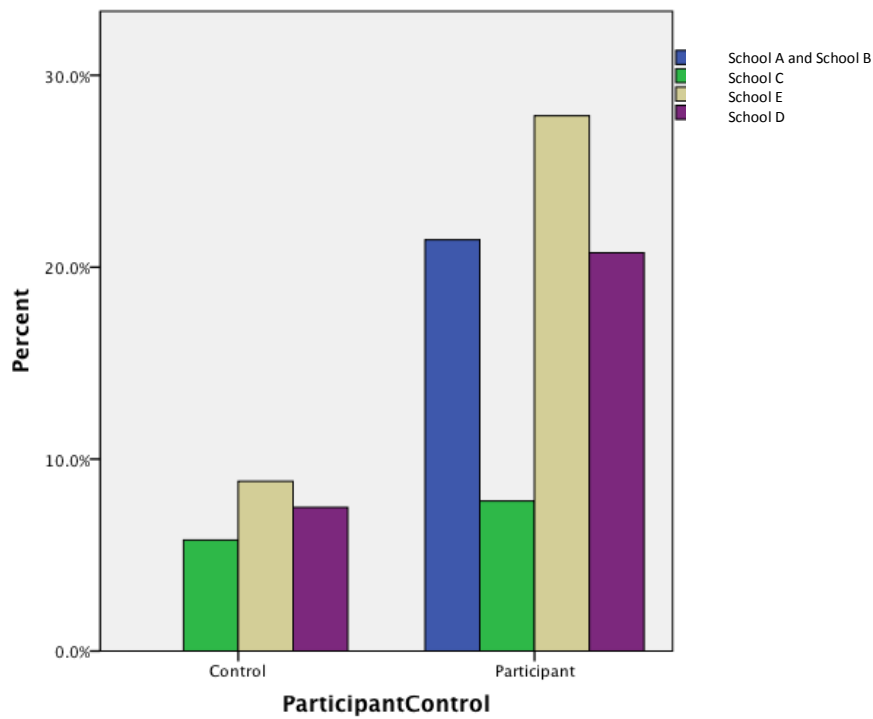


Figure 4.20 – Toy production as percentage of class for each school.

High School D	101
	Work together again
	Previous 4/5 with 53.8 F
High School E	100.3
	Work together again
	Previous 2/5 with 77.9 C
High School C	100.4
	Work together again
	Previous 3/5 with 65.3 D
High School A	90.2
	Work together again
	Previous 1/5 with 86.4 B
High School B	18.1
	Did not want to work together again
	Previous 5/5 with 34.0 F

Figure 4.21 – School rankings based on CAS teacher evaluations with scores for school to compare successful partnership with school.

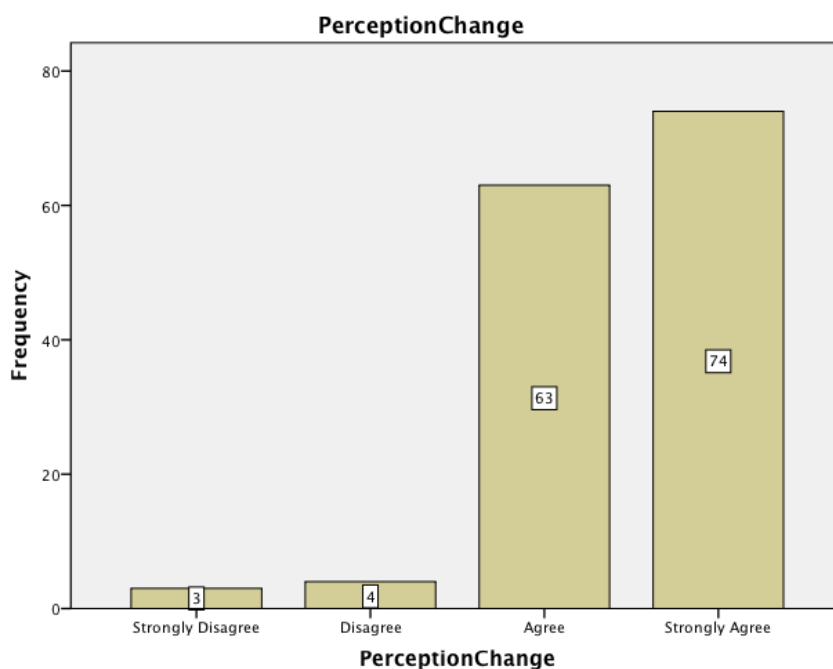


Figure 4.22 – Students felt their perceptions had changed about shelters.

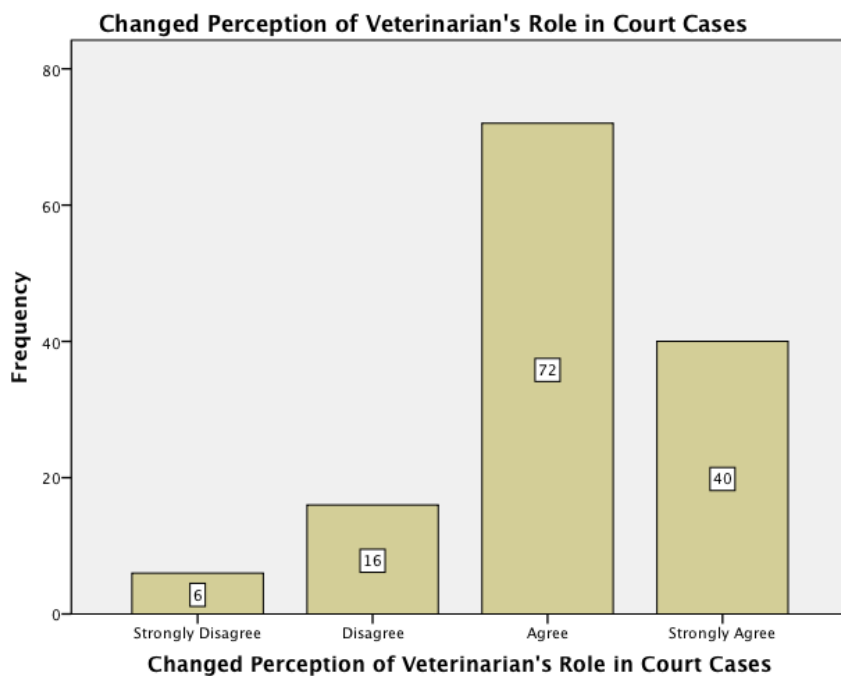


Figure 4.23 – Students felt their perception of a veterinarian’s role in court cases had changed.

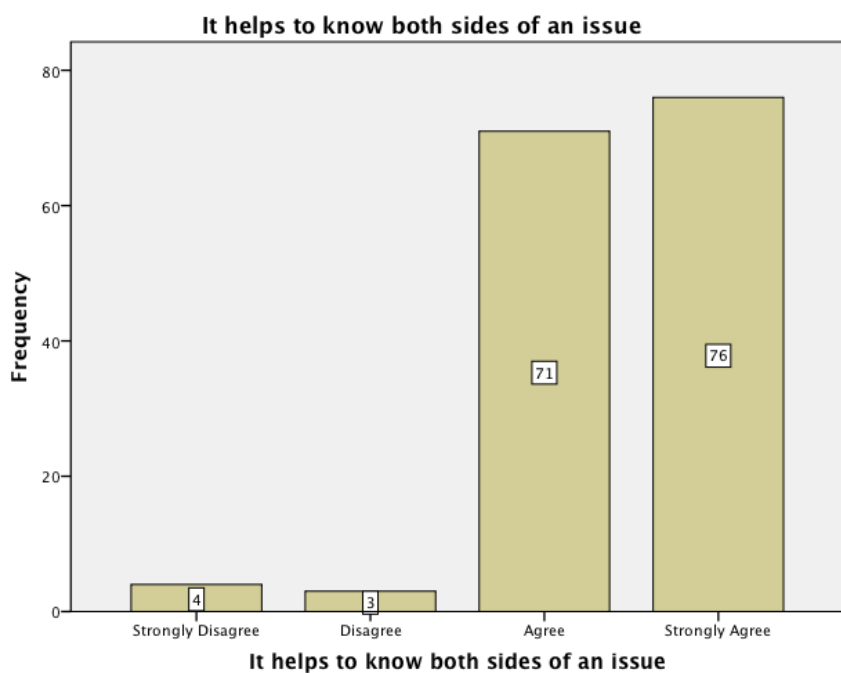


Figure 4.24 – Students felt that it helps to know both sides of an issue after lesson 3.

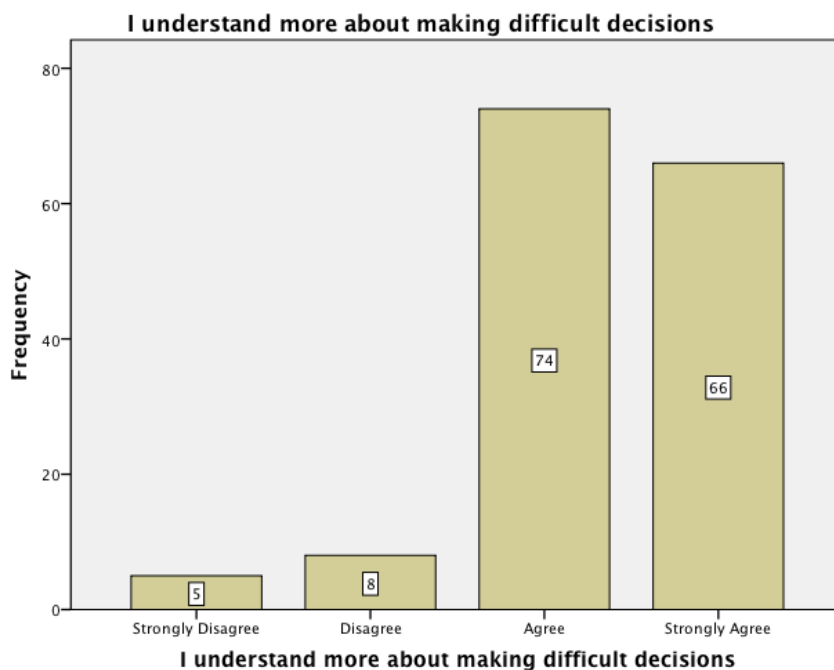


Figure 4.25 – Students felt after lesson 3 they understood more about making difficult decisions in the shelter.

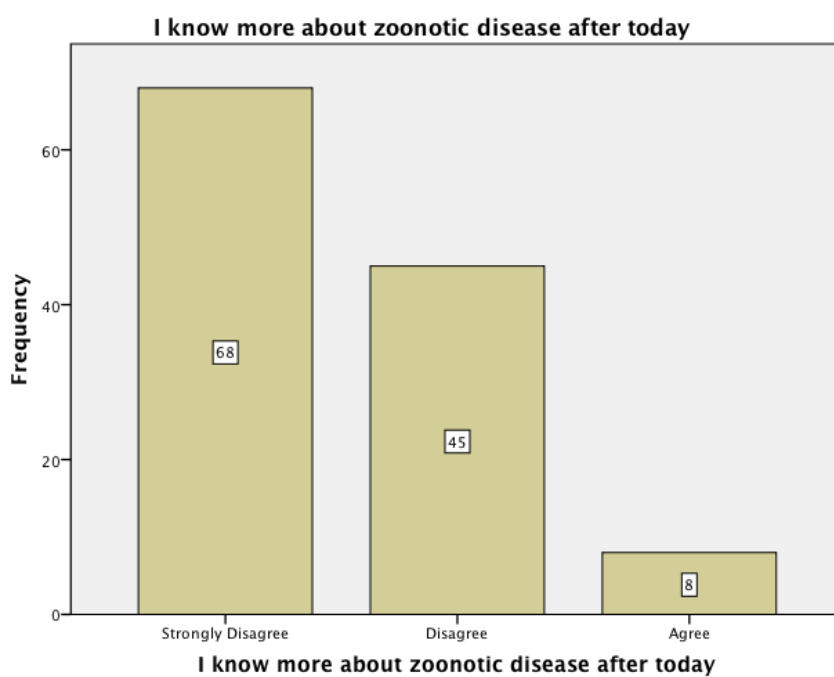


Figure 4.26 – Students did not feel that they knew more about zoonotic disease after lesson 4.

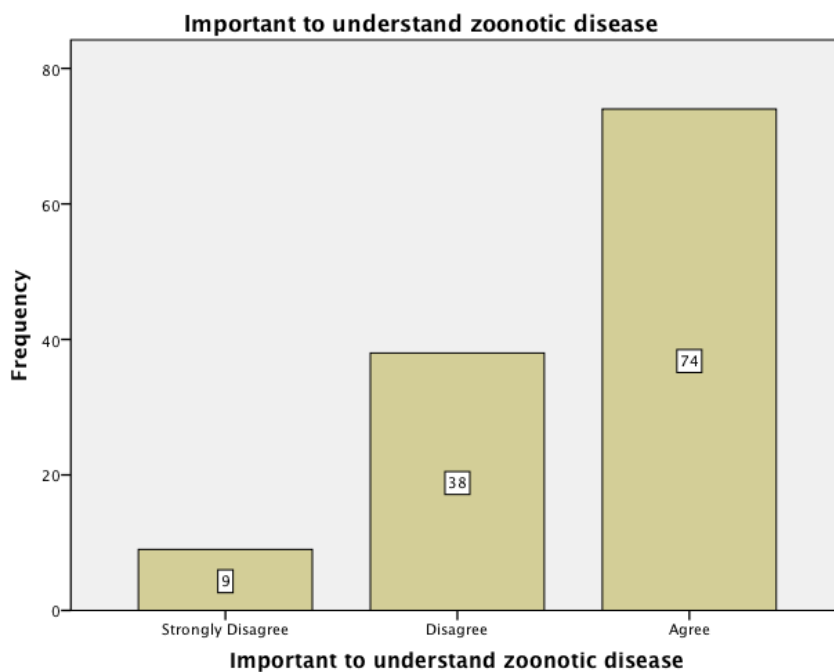


Figure 4.27 – Students felt it was important to learn about zoonotic diseases.

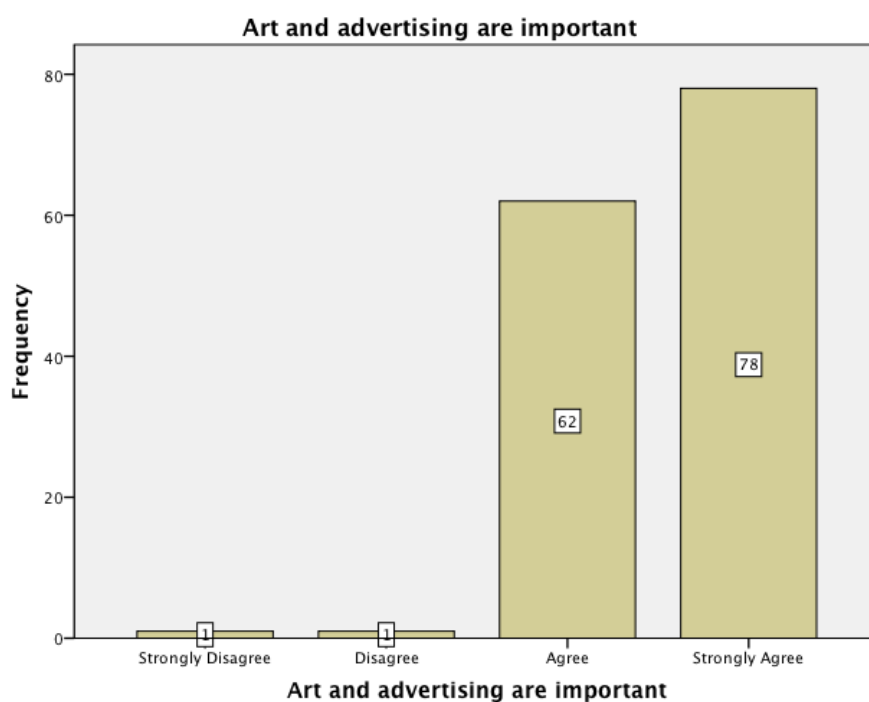


Figure 4.28 – Students felt art and advertising were important to science after lesson 5.

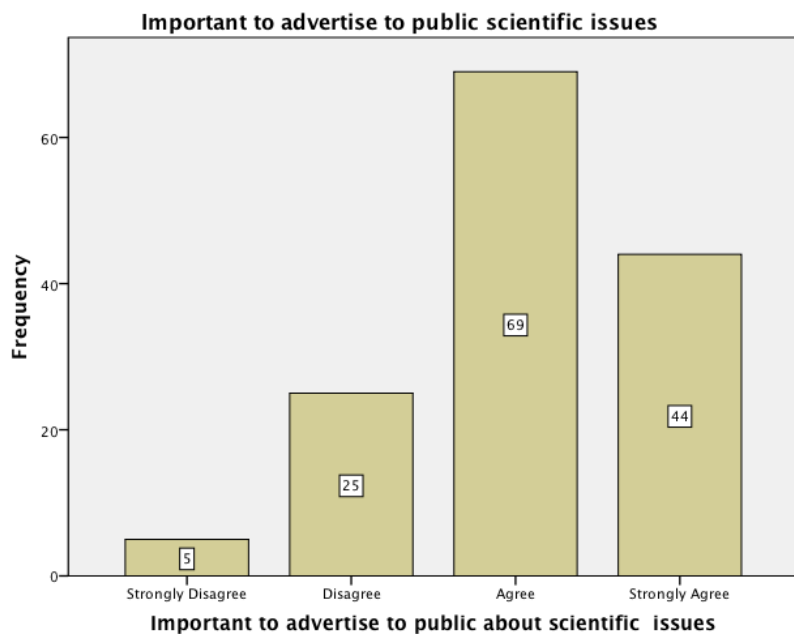


Figure 4.29 – Students felt it was important to advertise to the public about scientific issues after lesson 5.

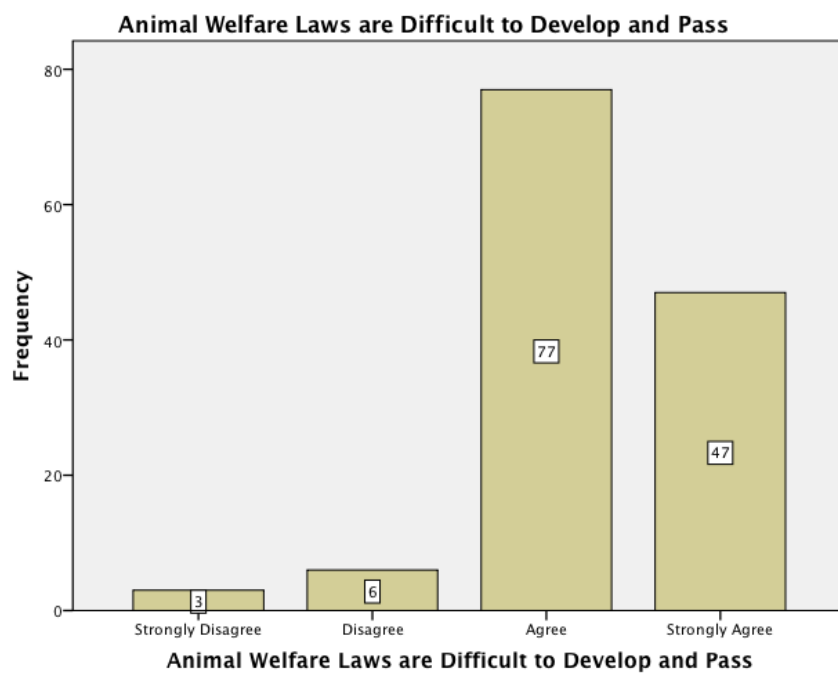


Figure 4.30 - Students felt that animal welfare laws were difficult to develop and pass after lesson 6.

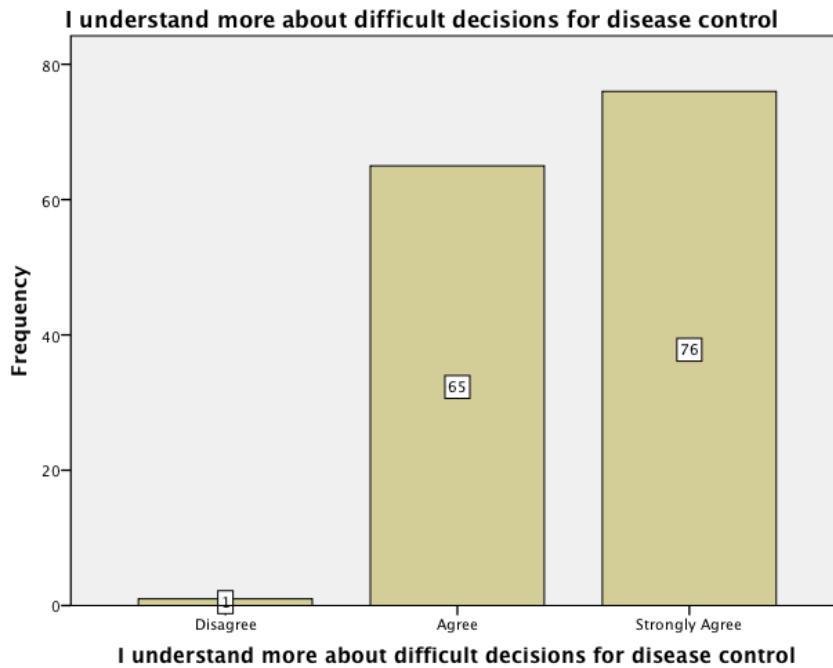


Figure 4.31 – Students understand more about difficult decisions for disease control after the outbreak activity.

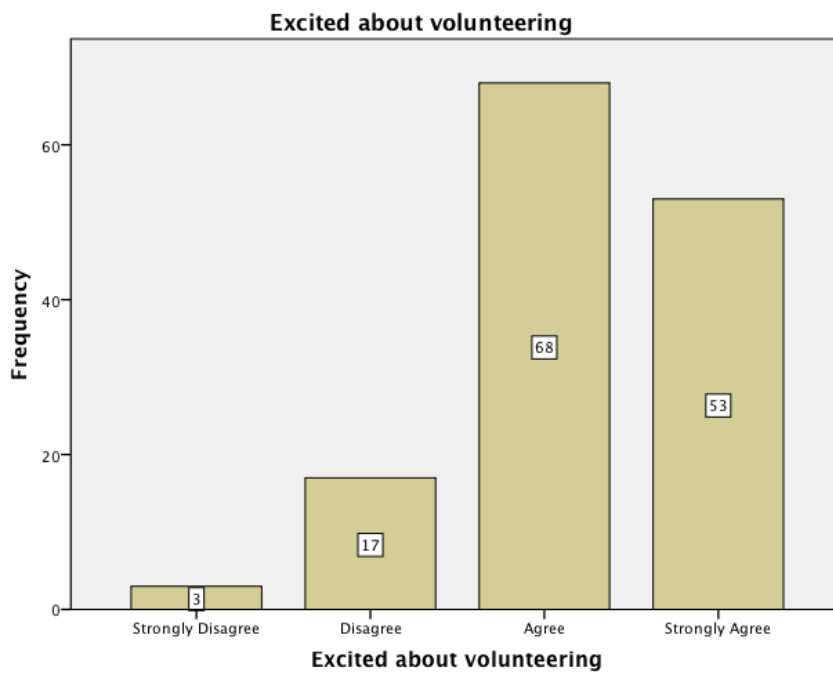


Figure 4.32 – Students were excited about volunteering after the program.

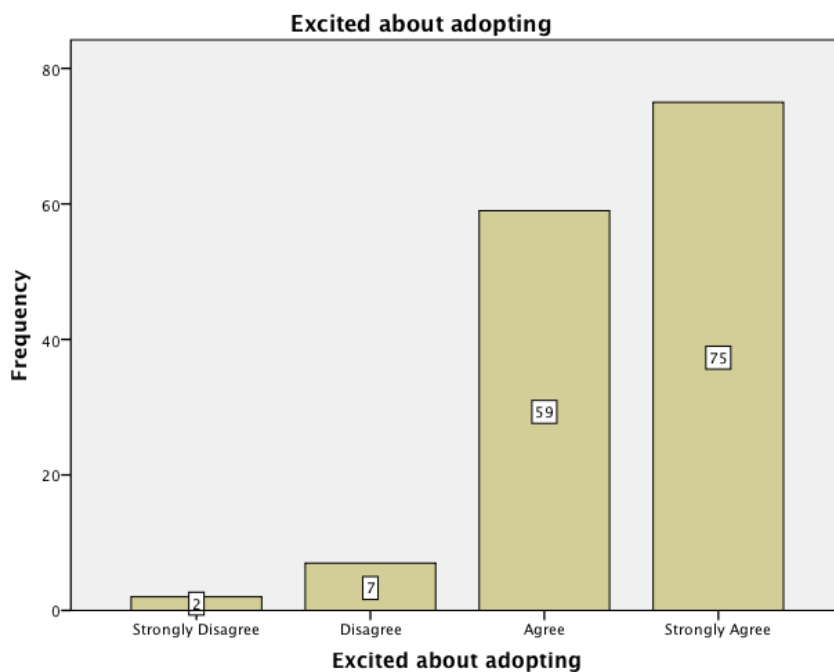


Figure 4.33 – Students were excited about adopting after the program.

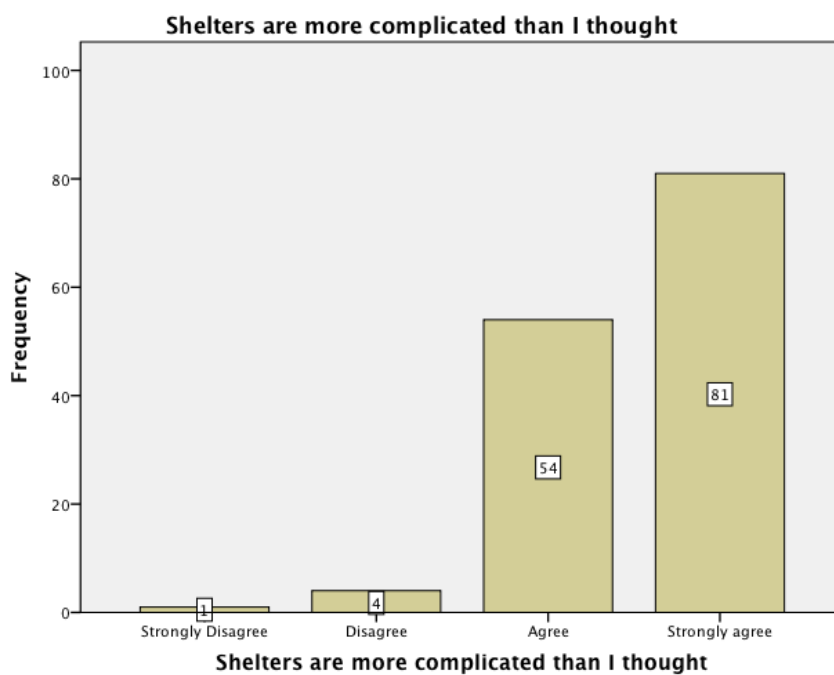


Figure 4.34 – Students felt shelters were more complicated than they thought after the field trip.

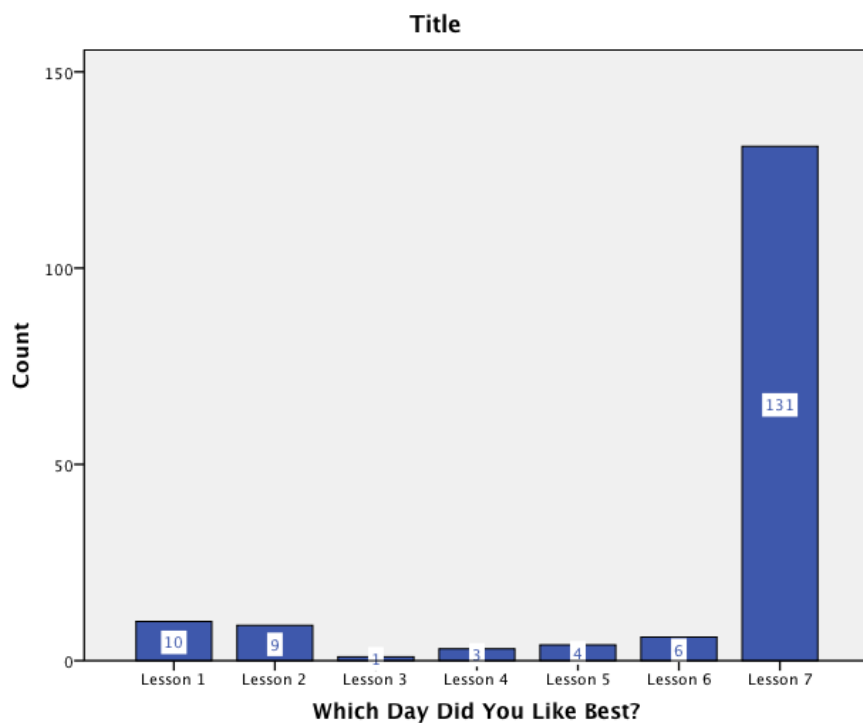


Figure 4.35 – Students liked lesson 7 best, with more equal distribution between the other lessons.

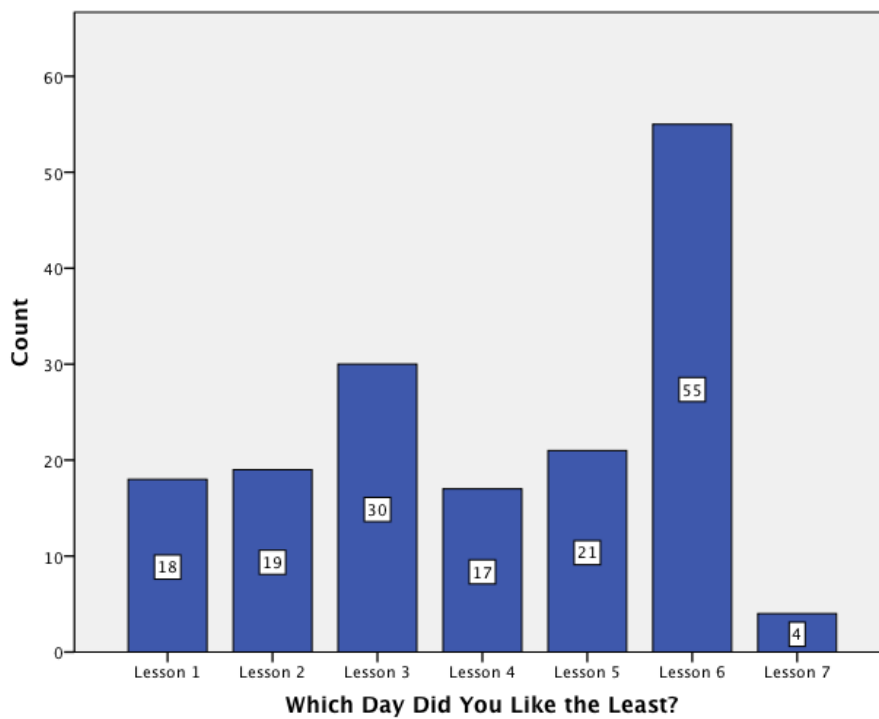


Figure 4.36 - Student selection for least favorite lessons.

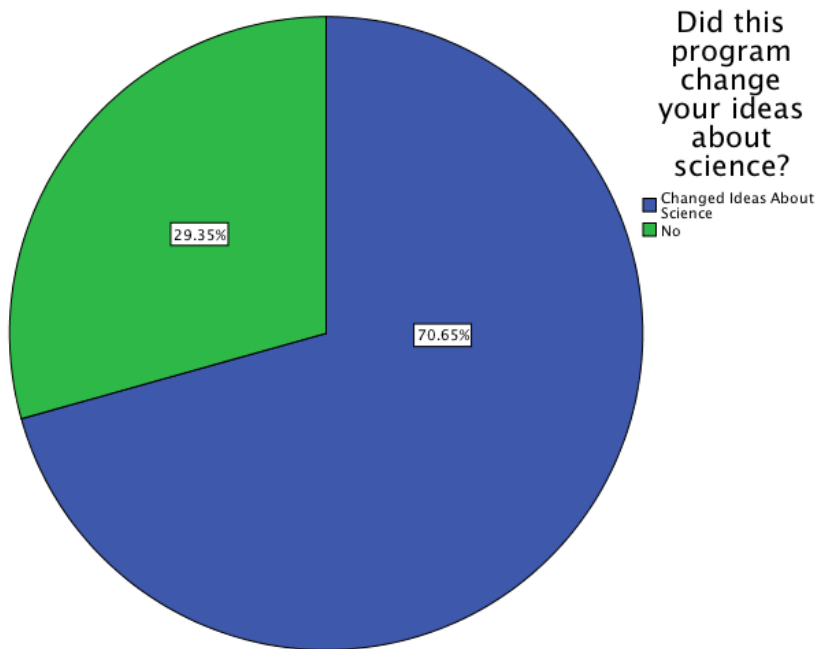


Figure 4.37 – The majority of students felt that VSI changed their ideas about science.

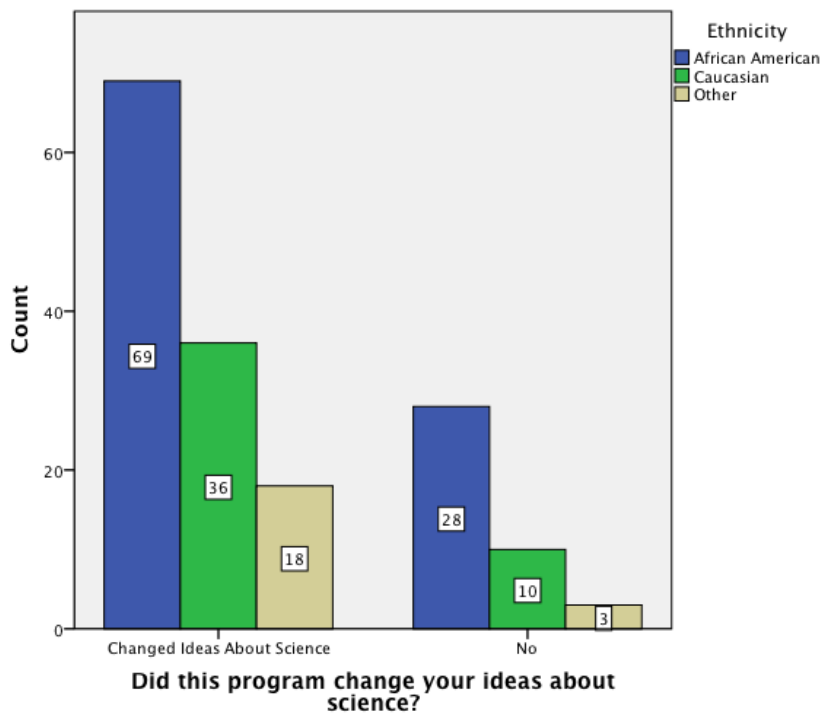


Figure 4.38 - Ethnicity differences about whether the program changed their ideas about science.

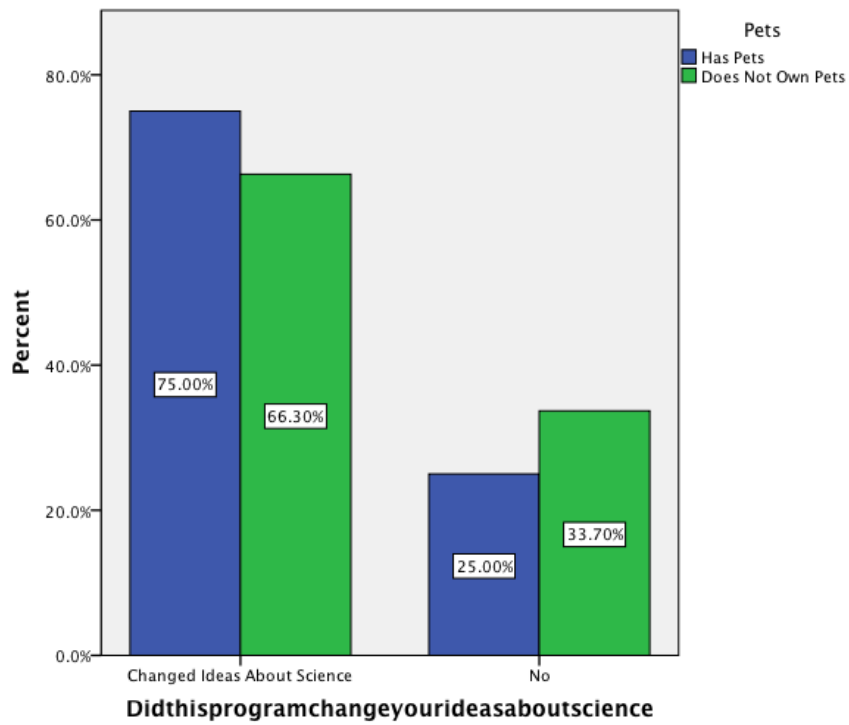


Figure 4.39 – Pet ownership and whether this program changed their ideas about science.

Chapter 5: Conclusions and Recommendations

The results of each question is reported separately first. Following individual analysis, an overall assessment for VSI program effectiveness, implications in humane education, impacts on general instruction, and comments on modeling for other areas of collaborative program leadership is presented. This section concludes with ideas for the future research and an overall summary of program findings.

Individual Results Discussion

Demographic Data on Groups Analyzed

Control and participant groups seemed to be a fairly accurate representation of each other despite slightly different classroom proportions. Pet ownership statistics might warrant further exploration including analyzing its effects on student responses and behavior. The documented differences in rates of pets in household for both ethnicity and school might have ramifications for which groups should be targeted for which type of information or programs. The disparities in animal ownership between different ethnicities and schools might play a role in shaping curriculum. Children that have not been around animals are going to act differently and have different needs than students that do have pets. Further exploration into the interactions of ethnicity, pet

ownership, and school might be necessary to ascertain the exact causations for these disparities. Also, looking at differences in scoring between students depending on where their animal lives might have an effect on animal bonding. Exploration using the CABS might yield insights into student achievement and changes in the program.

The 15-25% of students that had pets from shelters and 40-55% of students who had not heard of CAS before leaves an opportunity for increased awareness and an increase in this population's use of the facility and its resources. Spay neuter statistics varied between classrooms and students and might indicate that an education initiative based on spay neuter could have more impact in one population versus another.

Change in Knowledge

Questions reflecting student gains in knowledge showed mixed results. It is not surprising that a question that received close to 95% correct on the pretest (like the first question concerning humans catching disease from animals) might not have significant change compared to the posttest. This continued to be an important concept throughout the other forms of assessment used in VSI. If the population already had a large percentage with the correct answer or had scored highly on a scale, statistically significant differences were not observed.

The first question is about whether humans can get disease from animals was intended to be a kind of "positive control" for the classrooms. Almost every student got this question correct and therefore there was no statistically significant change for either the control or test group. All other knowledge questions (number one cause of death, how many animals are killed, what is a zoonotic disease) show statistically

significant difference between participants and controls on the posttest, but not on the pretest. This indicates that the program intervention likely caused increase knowledge gain in these areas. Few questions were included in the survey, and therefore it does not directly address all the information students covered. In the future, more diverse questions regarding knowledge should be included to confirm more specifically the extent of learning.

Rabies was chosen as a representative topic to explore more deeply because it was the most detailed information covered and was not directly stated in the videos and therefore the most difficult for students to attain. “Rabies is fatal in all cases” and “all bites from dogs must be reported” show significant difference between the posttest participants and controls, but not on the pretest. This is consistent with student learning from the VSI intervention. Students knew humans could get rabies from animals, correctly identified animals that can get rabies, and knew that it was fatal before the program (between 80-100% on all four questions) and there was no statistically significant difference between participant and control on the pre or posttest. Students did not have a difference between participants and controls on the pre or posttest regarding that all rabies cases do not foam at the mouth and attack people, but they did not have a high percentage of correct answers. This information was not covered directly in the text or program so it would be difficult to learn strictly from the program. However, vaccine requirement for dogs question had a statistically significant increase on the posttest for the control group. This fact was not covered in the materials and no difference was expected between pre and posttest participants or

controls. It is unknown why the control group had a significant difference and a higher percentage of correct answers, but it may be because discussion during VSI about unvaccinated animals might have confused participant students and made them think the rabies vaccines is not required.

Shelter Purpose Score

This score indicated a change in knowledge about the function of the shelter. It showed statistically significant difference not only for the pretest and posttest, but also participants and controls. Direct functions for the shelter are covered only briefly in the first lesson and field trip, but students still showed they had learned about these purposes during the program. It is important for the public to understand the function of shelters. Any increase in understanding through educational programs allows the community to correctly utilize the shelter and might increase the likelihood for support via adoptions, time, or money. Impact on public understanding of the shelter is the first step to nurturing their support and encouraging students to grow into an adult ally of the facility.

Change in Attitudes

Likert Scale Type Questions

Statements Concerning the Veterinary Field

No change was seen in desire to pursue a career in science or with animals or take more science classes. At first no change in desire to pursue a science career or veterinary medicine was unexpected, but on further reflection it is consistent with the

core purpose of the program. The purpose of VSI is not to have more students go into veterinary medicine or science specifically, but to use veterinary medicine to teach science concepts to students. Changes in emphasis on veterinary care and perceptions of veterinarians did occur, but the goal of the program is not centered on developing future veterinarians like some of CAS's other career focused programs. However, this does not mean that veterinarians should not care about humane education programs. Creating a scientifically literate and empathetic public creates more informed clients willing to spend more on their pets. Students did show statistically significant change between pretest and posttest for participants, but not controls, for the questions asking about taking their animal to the veterinarian every year and not only using the veterinarian when a pet is sick. Preventative care and perception of the veterinarian as a resource for a healthy animal is the foundation for a good veterinarian, client, and pet relationship. By being a part of a program like VSI, veterinarians can change public perceptions and gain more clientele for their practice and respect within the community.

Putting students on an equal playing field as far as animal experiences might lay the preliminary groundwork in changes in value for veterinary medicine as a career in minorities, even though it does not immediately or directly cause these changes based on this research. Interest in veterinary medicine as a career continues to be different between Caucasians and other ethnicities. Without first valuing veterinary care or animals, students will not elect to pursue such an expensive, competitive, and poorly compensated career field. Long-term follow-up or a program targeting a different age

group might be beneficial to identify whether this type of non-career focused program can eventually change the desire to pursue a science career and whether this is affected by age. It can also help determine if students had already decided on a career path outside science by that age and if their career path could actually change in the future when these students are in college.

Statements Concerning Animal Welfare

Before the program started, students agreed that mental stimulation is an animal welfare issue, disagreed that as long as an animal has food and water it is being humanely treated, and agreed that euthanasia is an important tool for animal welfare. There was no difference between pre and posttest for either the control groups or the participant groups, but this is not unexpected due to their initial responses. Students strongly disagreed that cock fighting was acceptable, but both control and participants had statistically significant increases on the posttest. Therefore, the program did not seem to change these beliefs, just taking the exam a second time. The medians for the question show overall favorable statements towards animals. There was a statistically significant change between pre and posttest for participants, but not pre and posttest for controls on the topic of whether dog fighting is acceptable. Students might have felt even stronger that dog fighting was not acceptable after the program even though they already strongly disagreed with it before the program started. Students have direct contact with dogs and specifically investigate a cruelty case based on a dog. This might make their feelings even more strong or extreme against dog fighting. This might not be reflected in cockfighting because of the different animal species or lack of time spent on

avian issues. Exploring more about whether direct contact with the animal is the cause for the more significant change in feelings might have implications for classroom animals. If a larger impact is shown when students are directly exposed to a live animal, using these animals for learning might be important to attain more significant results. Using live animals is a controversial topic in humane education and animal welfare communities, so linking this to achievement is critical.

Choosing statements that have more possibility for change during the program might yield more significant results after the program. Also, the VSI program encourages empathy for all parties involved in animal welfare, so a more extreme response might not always be encouraged by the format of the program. This is also the difficulty in using Likert Scale-type questions to evaluate a gray issue. If understanding complexity of ethics and empathizing is a goal, questions might not universally move “up” or “down” a scale, but cluster more at one point or part of the scale. Therefore, results might not show in an absolute change in median.

Statements Concerning Interdisciplinary Concepts

Students agreed that passing animal welfare was important, agreed that communication skills are important for scientists, disagreed that animal welfare legislation was easy to pass, and disagreed that scientists did not have to learn about art. However, there is no difference in these statements between the pre and posttest. There was a significant difference in the question of whether art and advertising are important for scientists to learn in the pre to posttest for participants, but not controls. The heartworm poster talked specifically about this topic and it might be the

connotation of “advertising” versus communication word choice that initially caused students conclude it was not relevant for scientists.

Statements Concerning Spay-Neuter Perceptions

Every spay-neuter associated question showed significant change between pre and posttest for participants, but not controls. Although spay-neuter concepts are not covered directly via a whole lesson, they are integrated in the curriculum through the introduction, ethical dilemmas, surgical suite visit, and overpopulation discussions. Comprehensive changes in attitudes ranged from individual pet health to societal implications of overpopulation indicating learning on many levels of Bloom’s Taxonomy. Factual changes about spay-neuter as well as attitudinal changes are reinforced here.

Statements Concerning Behavioral Changes

Students were asked about their intention to do two actions: fostering at the shelter and adopting their next animal at the shelter. Both showed statistically significant increases from pre to posttest in participants, but not controls. This information can be used in conjunction with survey questions and foster and adoption numbers to paint a more complete picture of behavioral intentions and change for participant students.

Numbered Scale Data

None of the numbered scale data showed changes between participants and controls, but it did show differences between pre and posttest. The use of these scales should be limited to controlled studies where increases in the scale are not attributed to

taking the examination for the second time. Each scale is individually addressed below. It is suspected that students did not provide especially reliable responses on the scale or score questions and this might have affected the validity and hidden possible significant results. Providing more support and encouraging commitment to the test might be important for the future, but this might be difficult in different school cultures and atmospheres.

IAS: Intermediate Attitude Scale

Although this scale was selected because it reflected past research documenting changes in empathy in children, it was hypothesized that it might not reflect changes in student attitudes due to the content of the assessment. There is no significant change in the control versus test group using the IAS scale. The scale likely does not test exactly what it is intended to document. By using statements implying hunting is wrong or vegetarianism is right, students' attitude changes are based on developing an agenda reflecting political perspectives. Also, statements like "I would like to become a veterinarian" are not necessary to students becoming animal advocates in their own lives as is evident by previous Likert Scale-type question results. Students can be more aware of animal issues, sympathize with those animals, and choose to change their behaviors based on those actions without thinking hunting or eating meat is wrong. As a field, humane educators have to decide whether they are trying to make a political statement or advocate for empathy and compassion for animals. If agreeing that "hunting all wild animals is wrong and shouldn't be allowed under any circumstances" is the primary goal of the program, this does not necessarily help animals. For example,

many nature-based organizations practice population control and some would argue that a quick death is preferred to starvation. It degrades credibility of educators if the complexities of an issue are not fairly presented, especially at the high school and adult level of education. Depending on Likert Scale Type Questions solely as a measure of humane education goals might not be able to fully illustrate the changes taking place in student mentality, especially with considerable ethical complexities.

Broad simple statements can destroy constructive conversation and animal welfare discussion in farm animal forums often falls into this trap. Two extremes cannot come together to function and create a better environment for the animals. VSI specifically focuses the animal welfare lesson on empathy toward all parties involved. It encourages students to be informed about all sides and make their own decisions. Advocating for one moral viewpoint can decrease impact and be fleeting when students are exposed to more information or stress on their beliefs. Arming students with the scientific facts and the ability to discuss ethics makes them better advocates for animals and creates bigger impact to these types of programs. Students are actually encouraged not to make these judgmental sweeping statements and deal with things on a more practical, informed, constructive level. All this might make using a simplified scale of limited benefit.

If a scale could be developed that more reflected a complex understanding of welfare issues, it might be a more truthful assessment of the value of humane education programs. A student-based project or reflection like an essay or journal might also provide clarification of the learning process. Also, humane education groups might be

more able to integrate their programs into the curriculum of schools with less resistance without the overtones of a political agenda. If the statements of the IAS evaluation tool were used as a reflection of goals for the program, many veterinary schools would not sponsor such a program. Also, control group importance was also shown. In general, by taking the assessment twice, scores will increase slightly in both the control and test groups. This calls into question any changes seen in previous research that did not involve a control group.

In addition, when looking through the survey results many students, especially from the more at-risk schools, checked all the same answer in each screen of questions implying that they might not have read the statements when answering. This could have changed the data and make the scale less significant. Also, the students were likely tired because the IAS scale was at the end of the survey. This could have been exacerbated by the low reading levels of most participating classrooms.

Fireman Score

Fireman score did not yield significant changes. If students chose three and not four objects (different studies use each number), perhaps more significant changes could be attained. Many students did not follow directions closely for the number of selections and this might have also hidden any significant results. However, African American students did score lower in general than their Caucasian counterparts. This could indicate that programs where empathy is a goal should be focused toward African American students, who might be able to benefit the most.

Missing Item Score

This score was used as an indication of student intent to follow directions and complete the assessments. Both participants and controls significantly decreased for missing item score on the posttest, but there was no difference between the two groups. Perhaps, even receiving the packet from their teachers and completing the toys caused some increase in completion, or alternatively listening to directions regularly increases completion based on the number of times a student takes an exam.

Hours of Volunteering

Students did not seem to read this question closely or take it seriously and hours provided were not reliable. Some students even wrote more hours than are in an entire month. It is unknown whether this is due to the time span selected or lack of ability to conceptualize a reasonable amount of volunteer time. The question was not reliable, despite having been used on previous studies and should be removed. The decrease in participant group could attributed to a more careful assessment of the question during the posttest. Changing this question to a multiple choice question with choices between once a week, once a month, once a year, and never might be more clear.

Animal Welfare Statements Scale

There was no difference between participants or controls for any of the welfare statements. Students at the beginning of the program ranked each statement on the scale at 8.5 or higher. The lack of difference between pre and post program might be attributed to the high level to which students ranked each animal welfare statement at

the beginning of the program. It was difficult with this high baseline to document significant increases. A question more focused on balancing all of these perspectives might display more growth in the area of animal welfare. Using one essay type question graded with a rubric might yield more significant results than simply asking for the importance of different animal welfare parameters. It might also cut down on fatigue caused by too many Likert-Scale type questions and provide more unprompted and qualitative understanding of student perceptions of animals.

Feelings Towards Animals

There was not a significant difference between controls or participants in their responses to any of these words. Only a small number of subjects changed responses at all. Although the statistics were not statistically significant, there was five less participants who were scared, twenty-two more participants who thought of animals as family or friends, and three less participants who didn't care about animals.

Change in Behavior

Participant Survey Behavioral Question

Students in the participant group reported a statistically significant difference from the control group on the posttest for the intention to volunteer, foster, adopt, attend training, or complete another educational program. Student frequency for those not interested in animals did not change between participant and control. These statements showed a strong association between participating in the program and the intention to participate in shelter associated activities in the future. Without the ability

to measure actual student actions, these questions can document the intention to change behavior. Also, when used in context with actual student behaviors, research concerns surrounding lack of follow through are addressed.

Bark Scholarships

Statistically significant difference between participant and control Bark Scholarships was established. Students changes are supported by knowledge about spay-neuter, feelings on spay-neuter, intentions to spay-neuter, and now finally the actual action of spaying or neutering their own pets. This implies either the VSI program or topic is a more motivating way to get students to spay and neuter their pets. Also, high school age students might be more able and willing to take action when taught about something like spay and neutering animals. If VSI could be adapted to a different age level it would be good to track whether this stratification exists because of the program curriculum alone or if it is linked to the age at which the students are in the program.

High school VSI students seem to turn in these Bark Scholarships at a much higher rate than the elementary and middle school programs. Although it cannot be definitively stated, high school students might have a more active and mature voice in the household that allows them to take significant actions themselves. Whereas an elementary student can grasp the ideas of good or bad, they might not be able to change behavior or convince their family to spay or neuter their pet. High school age students have many verbal and physical skills (driving) that enable them to take action themselves. At least two VSI students actually brought their family's animals in

themselves for surgery. Humane education might need to shift focus and maintain more high school-targeted programs that capitalize on the developmental stage of the older students.

To compare this education program to another technique for recruiting spay and neuter, a North Charleston spay-neuter grant used over \$7000 on printing and mailing and sent approximately 45,000 postcards. A huge media blitz was instituted with radio, TV spots, and advertising with many staff members devoted to the promotion. In the same time period from the first intervention to final data collection as VSI (5 months) 1132 surgeries came into the clinic, which is 2.5% of the targeted mailing. This is similar to the 2% return rate on the bark scholarship offer for control students. Participant students returned slips at the rate of 8.1%, or four times that rate. Obviously, replacing postcard drops would be impractical and foolish because it targets a larger audience. However, the VSI intervention has a higher rate of return via educating the students than direct adult advertising. Strategies covering both numbers (like postcard drops) and quality (like educational programs) might help maximize the spay-neuter efforts in an area.

Also, even more simplified educational programs than VSI could be tested to see if the same type of results would occur. If so, this might be even less costly and take less time than VSI while still providing a new outlet for shelters to get more people to spay and neuter their pets. Getting the public to spay and neuter their pets can be a valuable aspect of humane education that shelters can capitalize on to justify funding with concrete parameters.

Visits

The data collection methodology with certificates for a free prize risked drawing students to the shelter for the wrong reasons (just to get a water bottle), but only 10 total students turned in certificates. Of the students that submitted Bark Scholarships, only 2 actually bothered to bring in the certificate for the gift. Although there is no way to specifically calculate this, it seems like turning in the “slip” was not a high priority for students when faced with the surgery versus slip. This could also be due to parents dropping off animals for surgery versus students. Taking actual action with their animals might be more motivating for students than something superficial like a water bottle. A longer period of collection might also be beneficial. However, these slips are probably not an accurate or valuable way to track or discuss student behavioral changes in the future due the lack of interest. Perhaps giving student another outlet for support, like programs for walking with animals, would show the intention to continue to interact with the facility.

Fosters

Participant and control students did not have a statistically significant difference in foster enrollment. However, with more time and students for observation these numbers might become more significant. Parents are also required to sign these forms, which might make student action more difficult or slower. Fostering takes a significant amount of family time and might require a longer collection period to yield relevant results. The percentage of students who did turn in applications as participants in the

program shows promise considering none of the control students turned in an application.

Adoptions

Unfortunately, when this information was gathered, adoption counselors were not checking that this section of the forms were finished or properly answered. Over half of these adoptions did not have the question properly filled out. The problem has been addressed at the facility, but unfortunately the data was lost. Parents filling out the adoption paperwork versus the actual students completing the question can compound issues with this data collection method. In the end, sending out a follow-up survey at the end of the school year asking about whether they or their family had adopted, which could also include some follow up questions, might be more effective. This survey might also provide some ability to assess long-term changes made by students, inquire about sciences/career selections, and test for long term changes in attitude and knowledge.

The two students from VSI and three that simply checked “education programs” still could end up showing significance over a longer data collection time. American Humane says 17 million Americans get a new pet each year (this also includes exotics and other animals) (American Humane Association). The July 2012 Census Bureau says that the population of the United States is 313,914,040 and therefore this is 5% per year. This study only collected data over 5 months so if this same rate continues there might be a significant finding despite over half the data is lost (8.6 students total would equal national rate including exotics).

Taking in a pet as a family member is a large decision and responsible pet ownership is emphasized in the program, so it might take longer to determine whether these students will adopt from the shelter when given the opportunity. A five-year long cross-section might be more beneficial, but collecting these numbers via survey is difficult and probably not very practical.

Volunteers

The volunteer list shows how the VSI program can inspire students to be a part of the shelter system. If the work of students can be captured, benefits to shelters can be considerable. However, shelters must be willing to organize a youth volunteer system, which takes thought and planning. It is preferable to directly assess who came to the shelter to volunteer, but unfortunately the shelter does not allow high school minor students to volunteer without adult supervision. In the future, tracking this directly when the high school volunteer program is in place would be more definitive. For the general public, the number of volunteers who sign up initially to train for the program versus the number of volunteers that end up being active in the general CAS program is about 25% according to the volunteer coordinator at CAS. Students might have a higher success rate because of many school requirements for community service, but actual tracking would need to be used to confirm this hypothesis. In the future, tracking volunteer retention, hours, and commitment versus the general volunteer group might show differences between VSI members and the general public. This was not addressed in this study. Percentage of students willing to volunteer drastically

changed based on classroom, which might be an indication of the impact of school and classroom culture.

Toys

Cat toy enrichment yielded statistically higher values for participant versus control groups. Providing opportunities for student service that do not depend on resources or parents can be valuable for the shelter and provide an outlet for the students. Future expansion of options or more elaborate projects could help identify motivations in students and further justify participation in humane education programs.

Also, different schools had drastically different number results. Despite the attempts to standardize administration, it is likely that varying teacher enthusiasm in control and participant classrooms affected the results. For instance, School B has the lowest ranked teacher and produced no toys, but School C had 1.23 toys per control student and 2.3 toys per participant student. The control rate at School C is higher than any other schools participating rate. Although many other factors contribute to this, teacher execution of this portion of the program likely affected student participation directly, or indirectly through their enthusiasm for the VSI program.

Creation of Student Products

Student product scores allowed analysis of student achievement in each lesson. Because of the complex nature of the rubrics and products, students with low-end reading level can prove success in one way while an advanced student may prove success to a different degree. School B and School D seemed to have lower scores

overall. Exceptions to this were lesson 5, which does not require as much reading or writing, but still shows ability to create a public health announcement while integrating interdisciplinary knowledge and concepts. Lessons using art might give confidence to students that are normally unable to achieve at a high level in the sciences. Also, School D actually had the highest scores on the pig essay. Perhaps the atypical setting helped to motivate these students more than the other lessons. Also, African Americans seemed to score lower than Caucasians on most products. Exceptions to this include the lesson 4, lesson 5, lesson 6, and lesson 7. The final four lessons follow more active interdisciplinary learning and do not include as much reading or writing as lessons 2 and 3. Therefore, approaching science by integrating different subject areas and skills might allow more equal achievement between ethnicities. Pet owners also scored higher than non-owners on lesson 2, perhaps because of the reaction they might have to animal abuse. More elaborate statistical analysis to determine whether ethnicity, pet ownership, or school is the overriding factor might be important to understanding achievement in the program. Companion Animal Bonding Scale (CABS) scores might help link these ideas on future evaluations.

Views of VSI

Part-Time Science Teacher Evaluations Summary

Teacher evaluations provided insight into the importance of partner selection. Two classrooms in the same school with the same age students and different teachers had remarkably different successes with the VSI program. Also, part-time teachers at

CAS felt rewarded with teachers that followed the criteria examined, but frustrated and stressed by other classrooms. One CAS part-time teacher commented if they had one of the excluded teachers first they might not have thought VSI was a successful program. When running VSI with different shelters in different areas, emphasizing quality of partner is essential for success. In addition, school grade or reputation did not effect whether the program was effective or whether the part-time teachers wanted to renew their partnership. The rate of return for teachers is very high and indicates a valuable partnership in the eyes of the teacher and school, which do have to make accommodations in their schedules and complete additional work for the program.

Teacher Evaluations of Lessons

Teacher insights on lessons also led to changes in selected video length, more explicit directions for the pig lessons, addition of video of a pig farm, a meeting at the facility with the teacher before the program, and trivia as an optional review. Also, teacher desire to continue the partnership next year was overwhelming. Teachers wanted to add additional classrooms to the program and space is the limiting factor in VSI participation. Relevance in the curriculum was documented for each lesson. Asking a question on relevance not only helps confirm the content, but also reinforces to teachers how the program can add to their classroom. Two teachers have already completed another set of VSI students for the spring semester.

Student Program Evaluations and Posttest Survey

Although students might be providing answers they think VSI wants, the Likert-Scale Type question answers showed at the time of each lesson students largely felt their perceptions were changing during the program. Student comments were beneficial to the VSI structure including shortening the length of lesson 3. Also, student feedback led to shortened video length on a couple of lessons. Students also discussed their aversion to large amounts of writing and answering long exams. Comments helped to illustrate student perceptions of each lesson. More elaborate analysis of open text might show additional gains.

The final survey showed most students felt their perceptions of science were changed during the program. The field trip was identified as the favorite part of the trip, but other lessons were equally identified when you remove the field trip. This possibly helps confirm the different activities and topics appeal to different students. The slightly higher dislike of lesson 6 is most likely due to a graphic video one of the teachers showed in their classroom. A question that asks for the students' favorite lesson, but does not give the field trip as an option might better elucidate the benefits of this interdisciplinary curriculum.

Tweet Boards

Students seemed to enjoy using the Tweet Boards throughout their visit. The comments, although colloquial, helped document their feelings during the field trip. Surprisingly, the VSI team members observed the people most excited by the tweet boards were staff at the animal shelter. Each time the students came for their field trip,

the staff would rush to the boards to read their comments. They also talked about the students and their responses after reading these tweets. It served to make each person in contact with the students (or inconvenienced by them) to feel a part of the program and understand how it is impacting the students, even if the participants are quiet or difficult to read. This might provide an easy way to get staff involved and excited about a program in any facility, by providing positive reinforcement directly from the students involved.

In the future, an actual twitter handle might connect students across the country that are inspired by the program and provide real time reactions online. CAS was surprised by how many students had cell phones and twitter accounts, even in Title I schools. This might allow more long-term impact from the program, although the paper boards did allow direct staff interaction at the time of the event, which might not be worth losing for the technological advancement.

Comments on Exclusions

The teacher from School F originally contacted CAS to only complete the second lesson of the program. CAS explained that she is required to do the entire program to participate. She reluctantly agreed, but after completing the required lesson decided it was too much work and told the students they would not be going on the field trip. The students' distress at this change is reflected on their surveys on this day. CAS used grant money to pay for the bus to get the students to the school, but it ended up only being about half of her students. After the program, she declined to get either her control group or the participant group to take the post-test after many reminders.

On her field trip, all CAS instructors noticed students were segregated and she only seemed to primarily socialize with the Caucasian students (whom she chose to sit with after the students entered the classroom). By the end of the field trip, CAS had students interspersed and all students communicating regardless of ethnicity, but this obviously might have had a detrimental effect on the classroom environment, engagement, and execution during other phases of the program.

Commitment to the overall vision of the program and respectful communication between leaders and participants is essential and something that was lacking in this classroom. Screening out individuals without a serious commitment or willingness to cooperate will help facilitate successful partnership.

To address this issue, the CAS team felt that forcing an initial display of commitment would help screen for successful partnership. As a result, an after-school meeting with the semester's participating teachers is now organized. This is used to review the program, discuss time and resource commitments, and create a relationship between the researchers/educators. However, the underlying purpose is as a screening tool because it is an indirect indicator of a teacher's willingness to commit because they are taking their personal time to meet with the team. Meetings occurred for the spring semester, but if teachers could not make the meeting CAS did not prevent them from participating because they were promised a spot in the program before being required to attend. Program meeting attendees filled out a survey after the event and gave very positive responses regarding the experience.

The excluded teacher from School D did not attend the meeting after being asked. She ended up not completing the program and was forced to participate by her superior. Unfortunately, the students in her classroom were unable to experience the VSI field trip. She did not have students fill out the slip from the school for a field trip and students only found out as they were boarding the bus that they could not attend. She also left the state and did not contact any CAS staff about her lack of attendance for the field trip. The CAS part-time teacher finally came in to teach the lessons because the teacher was unwilling to actively encourage the students to participate and did not collect lesson surveys or products. Classroom management was also an issue for the CAS part-time teacher. Lack of commitment or desire prevented successful collaboration between CAS and her classroom, not School D itself. Another classroom from School D had no issues and teacher was a successful partner.

It does not mean the pre-meeting made the other teacher better or necessarily more likely to succeed, but probably serves to screen a large number of factors to make it more likely the teacher is going to commit to the program and execute it properly. The staff at CAS were very upset the students could not come and wanted to find a way to provide a field trip, asking about the missing students weeks after their scheduled field trip. CAS asked if the students could come on a future field trip and the school refused to let the class come due to the teacher's lack of preparedness. The extreme disappointment from participating CAS staff indicates how much they value the program and their desire to make an impact for students. Exploring the differences from the two

School D partnerships might show how much teachers impact learning in this type of program in a future study.

Overall Discussion and Conclusions:

Reflection on Overall Benefits of VSI Program

Selected benefits and hypotheses were significant for all five main areas: traditional humane education benefits, student benefits, teacher benefits, direct organizational benefits, and benefits to the veterinary field.

Students showed statistically significant increases in knowledge regarding pets and the shelter, showed changes in attitudes, and were more likely to take action to support the shelter as participants of the VSI program as compared to the control group. Traditional empathy scale assessments did not show changes, which could be due to lack of increase in empathy, length of the assessment, or poor measure of changes for the VSI program. Participating students were more likely want to foster, adopt, participate in educational programs, and volunteer. In the five months after the program, they were more likely to volunteer, create enrichment for animals, and spay and neuter their pets.

Students completed each product and demonstrated varying skills and levels of knowledge. However, impact for minorities or low socioeconomic students was not consistently different between groups. More exploration in this area is needed. Student reported that their perceptions about science have changed and described overall positive experiences in the VSI program, but no changes in career preference.

When evaluating lesson plans, the field trip had overwhelming preference as the favorite part of the trip, but all other lessons were distributed equally between favorite lessons. The least favorite lessons were also evenly distributed besides the field trip and lesson 6, which had some logistical issues in certain classrooms including a very graphic video that one teacher added that students did not seem to like. It seems like the wide-range in selection of favorite and least favorite in classroom lessons indicates the program caters to different learning styles and preferences. A question without the field trip as an option might have showed more about the other lessons.

Teachers reported an overall positive experience with VSI and the educational team. Insights helped improve lessons, which was noticed by teachers that have repeated the program. Teachers were able to recognize relevance and benefits to students for each phase of the program. Finally, of the teachers that completed the program all but one of the teachers already signed up for another semester of the program with the last teacher not declining, just not committing to the program as of March 2013.

Direct benefits to the shelter are through changes in action of the participants as well as changes in knowledge and perception about shelter relevant issues. The large number of students that had never heard of CAS now not only know it exists, but know more about its function in their community. Changes in perception of key shelter issue like spay-neuter especially help address the issue overpopulation. Change in perceptions of animal issues like dog fighting help add value to the shelter in the community and should encourage more financial and time donations to the facility.

Behavioral parameters such as volunteering, spay-neutering, and providing enrichment through service projects are documented and can help shelters by increasing resources.

Although students did not indicate they wanted to pursue veterinary medicine or science as a career in any higher numbers than before the program, other indicators such as willingness to bring their animal to the veterinarian for annual visits was increased. They did see care as more important after the program via their responses to Likert Scale Type questions. Also, students' views of the roles of veterinarians in other areas like court cases helps provide a more favorable view of their role in public health and law. Although not evident immediately after the program, this change in perceptions of the value of veterinary medicine might still be the foundation to changing their mentality towards veterinary medicine or science in their career path. At the very least, it provides a more educated and open client and public regarding animal health.

Program Changes Based on Results

An initial teacher meeting and optional trivia recap were developed as a result of student and teacher feedback. Videos for the art lesson were condensed and the pig video was refocused on logistics of student movement and including an actual video clip of a pig farm. One of the four ethical scenarios was moved to the field trip to decrease length on that day. Including lined paper for the screenplay and pig lesson helped encourage longer student engagement in the activities. The same activity completed with and without lined paper, caused the line paper group to develop much longer, detailed screenplays.

Major changes in evaluation will also occur based on future research questions. Careful selection of questions in the future or creative structuring of questions might allow for more significant changes regarding animal feelings. This should also shape target areas for a program. Perhaps a pilot attitudinal assessment of humane education programs should happen so that teachers can use answers to select relevant curriculum. For instance, if students already believe spay and neutering their pets is valuable and their pets are already spayed and neutered, less time should be spent on this topic as compared to a population that does not have their animals spayed or neutered. Changing curriculum based on ability level happens daily in the regular classroom and this change could also help humane educators more effectively use their time. Although not included in this study, an AP class did complete the program in the spring of 2013 with positive results. The teacher has already signed up her class for the program next year. This helps to confirm VSI has the ability to impact learning of students with different abilities, learning styles, and background knowledge.

Removing the IAS Scale from the study or creating a similar scale with slightly different questions to help alleviate some of the errors discussed previously. This will also decrease test length. More diverse content questions can also prove a broader integration of knowledge. Changing the survey Likert Scale Questions and Knowledge Questions to reflect the pre/posttest questions might help show what aspects of the program are causing which changes to student perception. This might better delineate effective parts of the program. In the future, asking a more open-ended question that can be rubric graded regarding ethical scenarios and animal welfare might allow for

more consistent comparisons. If these types of questions are put on the pre and posttest instead of solely at lessons, control group responses can also be included in the evaluation. Certain student products, like the pig essay, can also be completed online.

Doing different versions of the program might be beneficial to ascertain which parts are the most important or critical for change. For instance, since the field trip was the students' favorite part of the program moving the field trip first after the initial visit might allow more enthusiasm for other parts of the program. In this instance, a service-learning project that is student motivated might be added at the end of the program as a capstone. Alternatively, evaluating the effects of just a field trip versus the entire program or field trip and student lessons might help determine whether it is an interaction between all three types of instruction or primarily one or two that causes students change. Although breaking apart the program might destroy some of its integrity, it might also provide a controlled experiment from which educators can determine what parts cause change and how adding sections affects student results.

CAS is holding a training conference in 2013 for humane educators across the nation to implement the program in their communities. This will provide for test groups in different communities. Surveys will be digital to facilitate reporting. Student products will also be digital when possible to facilitate data collection.

Long-term follow up would be beneficial in a number of categories including whether students pursue a career in science, adoption of animals, volunteer hours at the shelter, pet ownership as adults, perception of science, and knowledge gain long-term. Long-term tracking of percentages of students entering science careers between

participant and controls and assessing scientific literacy as an adult, is more revealing than just a self-reflective statement. In one study, only 40% of students responded in a follow-up survey (Marcelin, Goldman, Spivey, Eichel, Kaufman, & Fleischman, 2004). If in the future, VSI elects to pursue a follow-up study, contacting students and ensuring participation will be a large concern.

Evaluating Humane Education

Traditionally, humane education studies have focused on empathy scales or tests to document effectiveness amount the students enrolled in the programs. This program did not show statistically significant differences on these type of tests, but tremendous differences between participant and control groups existed for many knowledge and behavioral changes including making toys and interest in volunteering. It might be more effective and impactful to focus on analyzing the actions that these students take after humane education. This shows both a change in attitude towards animals and the ability of those students to take action to help animals. Long-term assessment of changes in attitudes might not only be a more powerful assessment of student engagement and changes or attitudes, but also helps document directly and tangibly the benefits of such programs to nonprofit organizations.

Test questions tended to focus on attitudes that student might already hold. Knowing where students' knowledge is before a program begins is an important tool for any teacher. Humane educators should make a collective focus to cater topics to their groups of students. For example, if everyone in the classroom already believes that dog fighting is unacceptable there is no reason to focus the majority of the program on this

topic. It might be more beneficial to use this topic in an ethical case, but focus more on spay and neuter. Lack of documented benefits and standardized curriculum makes humane education less viable and productive. If curriculum can be focused and adapted to each classroom using a pretest, not only is the documentation of knowledge gain more reliable, but it is a tool for those instructors to mold the curriculum in the most productive way possible during the time they are given. Although many teachers might make these changes by instinct in a classroom that is filled with students that are fearful of an animal, a more conscious systematic approach to curriculum adjustment can make humane education more effective. Also, the majority of the research on humane education focuses on primarily Caucasian cohorts. More research and targeted efforts toward other ethnicities might yield promising changes or differing results.

Behavioral assessments are indicative of higher-level changes in thinking and actions that can be more permanent and have longer lasting impacts on an individual. The quality of these assessments might mean more than just an empathy scale in regards to genuine change and continuity into action. Although many types of behavior can be displayed, a behavior can cover the sum total of many nuanced changes in attitudes. Also, these assessments transcend some of the political intricacies of some animal welfare issues. For example, instead of focusing on whether someone is more apt to be a vegetarian (as in the empathy score), which could anger or upset a farming community, the focus is on showing actions that support animals like making enrichment. In addition, most people can relate more directly to tangible goals, which can be important when discussing value of humane education programs to boards,

schools, or the public. This does not cross as much into political banter or venture towards animals rights which is negatively viewed and an explosive issue in the veterinary community let alone the general public. For instance, going into a school to teach about the negative effects of guns on people and gun control would likely be met with resistance, but supporting victims of gun violence with service projects can find bipartisan support. This is important in a community of educators that contains considerable numbers of animal rights advocates. It also makes the goals of such programs more universally acceptable and more easily supported by corollary communities such as the veterinary field. It also decreases judgment in the classroom and encourages a more empathetic approach towards different human viewpoints.

The success in behavioral change and future fosters, adopters, and volunteers should encourage humane educators to do more high school programs. Efforts of humane education to adapt their focus and curriculum to this age and incorporate ethical complexity could result in positive impacts for shelters. Although humane educators can find older students difficult, pursuing this area might maximize resources for shelters. Ethnicity also shows differences in learning, spay/neuter, pet ownership and focusing on this group can yield positive impacts for shelters.

Implications for Instruction

Results from the VSI program also inform daily instruction and evaluation within the classroom setting. Evaluation using pre and posttests and control groups when possible can give more complex and complete results reflecting the actual impact of instruction. Higher scores can be achieved without instructional impact due to taking a

test or evaluation a second time. Also mixed methods, both qualitative and quantitative research methods, can help paint a more complete picture of student achievement. Student open text answers, quotes, and feedback helped give clarity to more quantitative results that would have been difficult to achieve without the qualitative data. The concept of knowing a student's previous knowledge and catering instruction is a tool teachers are taught, but often do not implement due to complex logistical issues. VSI shows the importance of knowing what questions students know before and after a lesson or unit and using that to illustrate the actual impact of the instruction, not being misled by students previously knowledgeable in a particular area.

Authentic instruction using real life relevant situations help students connect to the information or instructional material. Required standards are addressed during the program. It is not just a "fun" topic that kids want to learn, they are learning because they can connect to the information. In addition, information is interdisciplinary and presented on multiple learning levels and types, encouraging student achievement. VSI was successfully executed in classrooms with high school students reading at the 3rd grade level all the way through an AP level course. This reflects a more realistic picture of the type of curriculum that teachers must create when their classroom is not monochromatic, but filled with different students, backgrounds, talents, cultures, abilities, and knowledge.

Using changes in knowledge, attitudes, and behaviors might also be an effective evaluation tool for teachers to utilize in their lessons. Reflecting on whether students can "do" rather than just passively take in information is addressed more classically by

Bloom's Taxonomy. Perhaps using service learning projects, interactions within the community, and providing students an outlet to make a difference could inspire more students at a higher level to achieve and retain learning goals. Planning and encapsulating lessons in this more existential manner is complex and might involve trial and error, but benefits to students and the community might outweigh the logistical challenges.

Also, VSI showed that teaching on an individual level makes a difference. Student achievement in the program was more impacted by classroom than the grade their school was given. For instance, School C consistently scored highly despite having a poor grade. This should encourage teachers that their individual efforts, talents, and classroom culture directly affects students enthusiasm, ability to connect to the information, and knowledge gain. In addition, leaders in schools cannot force a teacher to participate (such as was attempted in School D), but need to try to get the teacher to embrace a strategy willingly. Commitment cannot be artificially imagined and trying to figure out how to gather this enthusiasm from those who work under a leader might make the difference in a school's success.

Modeling for Application for Other Programs

Proper screening of partners and an evaluation based on knowledge, attitudes, and behavior might make community partnerships more appealing to all parties involved. Selection of partners was critical to success and strategies to finding appropriate collaborators helps any industry when establish learning initiatives. VSI also organized multiple types of feedback from teachers, shelters, and students regarding

efficacy and suggestions, which helped improve the partnership and the program. Also, using the knowledge, attitudinal, and behavioral components to analyze program effects could lead to more understandable goals and achievements. Behavioral concepts discussed above can also be used as an evaluation change for other fields, for example having students visit children in the hospital. Service learning opportunities can also provide actual resources and support for other organizations.

In the Future

More analysis should be completed on already collected data. Correlating results more between ethnicity and answers to questions in the program might show which types of students are most impacted by the program and in what way. Also, using this technique to look at success on student products or the way students ranked lessons might also show a statistically significant correlation between groups.

Expansion of participating classrooms across the country allows for more valuable assessment using more complex logistic regression and statistics to examine what factors might affect score such as ethnicity, school, gender, etc. Many of these factors might interact with each other and it would be beneficial to explore more about the differences demonstrated in demographics. More elaborate modeling of affects on students learning can inform target groups for humane education and other programs. Expansion through the VSI training conference will be possible in the fall of 2013, which can provide a larger more diverse test group to use in logistic regression modeling of the data.

A longer data collection period and tracking would also be beneficial for capturing actions that might take longer amounts of time such as foster and adoptions. Possible five and ten year follow up with students could be initiated in the future.

Summary

VSI: Veterinary Science Initiative showed significant changes in knowledge, attitudes, and behavior for students involved in the program. Using these actions as evaluation tools for future humane education studies as well as other student outreach programs might be beneficial and capture important changes in student populations. Also, results illustrated best practices for general instruction and community partnerships for education. Continued analysis of data and expansion of program evaluation can be important to clarifying results of this dissertation and delving into other corollary issues such as the interactions between ethnicity, pet ownership, school, gender, and student achievement. VSI: Veterinary Science Initiative has proven itself as an effective, interdisciplinary curriculum to teach science and humane education topics to high school students and inspire them to take action in their own household and community.

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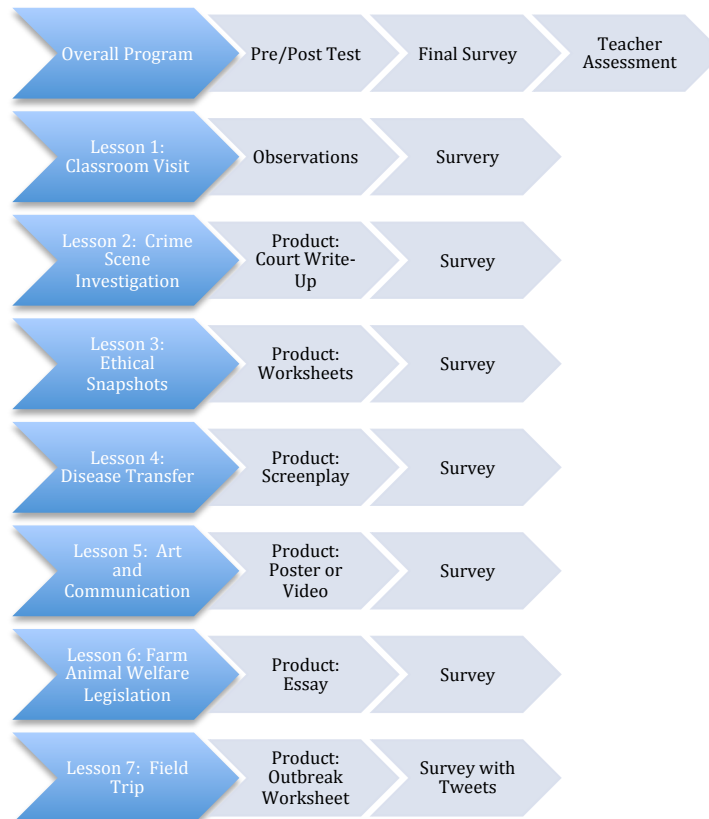
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Appendix A: Overall Summary of VSI Lessons

VSI: VETERINARY SCIENCE INITIATIVE						
						
LESSON 1: INTRODUCING SHELTERS AND THE HUMAN-ANIMAL INTERFACE <ul style="list-style-type: none"> • "Heartbeat, Heartfelt" - Charleston Animal Society Program Introduction • Humane Education Introduction • Shelter Issues Introduction including overpopulation • Five Freedoms of Animal Welfare • Ultrasound • Abdominal • Heart with Blood Flow 	LESSON 2: PATHOLOGY AND CRUELTY INVESTIGATION <ul style="list-style-type: none"> • "CSI (Crime Scene Investigation)" - Cases on Zoonotic Disease and Parasites • Identification of parasites and use of the microscope • Introduction to radiographs • How to write a scientific court report for cruelty investigation • Interpretation of necropsy findings, blood splatter, housing, exam findings, and patient management 	LESSON 3: ETHICAL SNAPSHOTS <ul style="list-style-type: none"> • "Weight on Your Shoulders" - Managing Difficult Shelter Population Decisions • Ethical Scenarios presented via video for discussion • 1- Human-Animal Interface <ul style="list-style-type: none"> • Feral Cats and Wildlife • 2- Overpopulation <ul style="list-style-type: none"> • Puppy Mills, Spay-Neuter, and Growth Models • 3- Animal Advocacy <ul style="list-style-type: none"> • Animal Welfare versus Rights, Open and Closed Admission Shelters • 4- Common Medical Conditions <ul style="list-style-type: none"> • Heartworm Disease and Fleas 	LESSON 4: ZOO NOTIC DISEASE <ul style="list-style-type: none"> • "Don't Drink Out of That Glass" - Disease Transfer and Investigation Activity • Discover point source of outbreak like epidemiologic intelligence service • How to identify, prevent, and treat disease in an animal • Create screenplay focused on either Rabies or Cryptosporidium using real information on these zoonotic diseases 	LESSON 5: COMMUNICATION AND ADVERTISING <ul style="list-style-type: none"> • "You Know the Science, Now Get It Out There!" - Creating public health advertising • Art and communication essential to science • How to present information to the public to catch someone's attention and make it understandable • Students create either poster or public service video announcement 	LESSON 6: EMOTIONAL INTELLIGENCE, EMPATY, AND LAW <ul style="list-style-type: none"> • "Can't We All Just Get Along?" - Farm Animal Ethical Issues • Developing legislation as scientists and invested parties; working together • Students write essay after activity to reflect on the realities of passing legislation, especially on animal welfare • Role play allows students to empathize with the humans and animals involved in all sides of the animal welfare debate 	LESSON 7: CAPSTONE FIELD TRIP TO THE SHELTER <ul style="list-style-type: none"> • Four hour minimum shelter visit • "Behind the Scenes" rotating stations <ul style="list-style-type: none"> • Intake and Processing • Meet Your Match and Adoptions • Surgery Suite • Necropsy Demonstration • "Outbreak!" - Biosecurity plans and disease control techniques are created • "Race for Space" - Interactive activity showing importance of shelter flow for animal well-being • Listening to Hearts and Animal Time
•CLASSROOM VISIT	•LESSON PLAN	•LESSON PLAN	•LESSON PLAN	•LESSON PLAN	•LESSON PLAN	•FIELD TRIP
*Green sections indicate lessons given by CAS staff either in the classroom or at the shelter						

Appendix B: Summary of VSI Lesson Evaluation Tools

Pre and Posttests	Individual Lesson Surveys	Individual Lesson Products	Teacher Assessment	Behavioral Tracking
<ul style="list-style-type: none"> • Mostly Quantitative • Some Qualitative • Given online before and after the program • Includes Fireman Test, Intermediate Attitude Scale, Demographics, etc. 	<ul style="list-style-type: none"> • Mostly Qualitative • Some Quantitative • Given on paper immediately after each lesson • Tweets for final lesson 	<ul style="list-style-type: none"> • Qualitative and Quantitative • Lesson Rubrics • Collected from lessons 2-7 for evaluation 	<ul style="list-style-type: none"> • Qualitative and Quantitative • Interview, Survey, and Evaluation 	<ul style="list-style-type: none"> • Quantitative • Bark Schoolships, Volunteer List, Cat Enrichment, Adoptions, Fosters



Appendix C: Summary of Hypotheses

Change in Knowledge	<ul style="list-style-type: none">• Students will increase their knowledge of CAS, science, and shelters in general.• Students will have a more awareness of CAS and shelter issues in general.
Change in Attitudes	<ul style="list-style-type: none">• Students will score higher on empathy assessments after the program's completion.• Student perceptions of animals and science will change during program.• Students will have a more positive view of the veterinary profession and see veterinary care as more important.• Students will have changed their perception and understanding of shelter issues such as cruelty, euthanasia, five freedoms, spay-neuter, and overpopulation.• Students will be more likely to consider a career in veterinary medicine, especially minorities.
Change in Behaviors/ Actions	<ul style="list-style-type: none">• Students will be more likely to take action to support the shelter after the program's completion.• There will be an increased percentage of volunteers, fosters, adoptions, spay-neuter surgeries, and visits after the program.
Creation of Student Products	<ul style="list-style-type: none">• Students will be able to complete student products that demonstrate multiple levels of learning and knowledge.
Views on VSI Team	<ul style="list-style-type: none">• Students will like different aspects of the program, not just one, as it caters to different learning styles.• Teachers will have a positive perception of VSI and real benefits described for students have been demonstrated during the program.• Teachers will feel like part of a "team" with their interactions with the VSI staff and want to participate in the program again.• Students will have a positive perception of VSI.
Differences in Groups	<ul style="list-style-type: none">• Students that have pets will score higher initially during the program for empathy and animal knowledge.• There should be larger impact for minorities and low socioeconomic status (SES) areas in both their attitudes and knowledge.

Appendix D: Overview of Data, Statistical Evaluation, and Assessment

Overall Assessment Goal	Type of Data	Why?	General Statistical Evaluation	Pre or Post	Control and VSI Group	VSI Group Only	Ethnicity, Pets, or Schools
Population Description	Demographics	To Characterize Study Participants	Chi-Square Test if necessary	no	yes	no	some
	School, Gender, Grade, Age, Family Structure, Pet Information (Ownership, Spay/Neutered, Living Conditions), Awareness of CAS						
Change in Knowledge	Knowledge Questions	Representative Sample of Factual Gain During Program	Chi-Square Test	yes	yes	no	some
	Humans get disease from animals, what is zoonotic disease, number one cause of death, how many killed from overpopulation, rabies facts						
Change in Attitudes	Likert-Type Questions	Sample of Change in Perspectives During Program	Wilcoxon Signed Rank Test, Kruskal-Wallis Test, Mann-Whitney U Test	yes	yes	no	yes
	Statements Concerning Veterinary Field, Statements Concerning Animal Welfare, Statements Concerning Interdisciplinary Concepts, Statements Concerning Perceptions of Spay-Neuter, Statements Concerning Behavioral Changes						
	Empathy Scale Questions	Look at Change in Empathy	Repeated Measures ANOVA with Tukey Test if Applicable	yes	yes	no	some
	Intermediate Attitude Scale, Fireman Test, Missing Item Score, Animal Welfare Self-Score, Self-reported Volunteer Hours						
	Animal Descriptions	Look at Change in Perspective/Feelings	Chi-Square Test	yes	yes	no	some
	Scared, Interesting, Aggressive, Not Interested, Family Members/Friends						
Change in Behavior	Behavioral Tracking	Sample of Change in Action During the Program	Chi-Square Test	no	yes	no	no
	Self-reported Intention to take Action, Volunteer List, Toy Production, Fosters, Adoptions, Visits to Shelter, Bark Scholarships						
Creation of Product	Lesson Product Scores	Look at Differences Between Groups and Describe Student Products	ANOVA with Tukey Test if Applicable	no	no	yes	yes
	Pig Essay, Ethics Questions, Outbreak Biosecurity Plan, Heartworm Posters, Court Report from Cruelty Investigation, Disease Screenplay						
Views of on VSI by Team	Student Evaluations	To Look at Student Feelings about VSI Both Overall and by Lesson	Wilcoxon Signed Rank Test or Chi-Square Test as Applicable	no	no	yes	some
	Lesson 1, Lesson 2, Lesson 3, Lesson 4, Lesson 5, Lesson 6, Lesson 7						
	Teacher Program Evaluations	Look at Relevance for Teacher	Descriptive Only	no	no	yes	no
	Actual Teacher Evaluations	Look at CAS Perspective of Teacher	Descriptive Only	no	no	yes	no

Appendix E: Significant Results Summary

Colors are used to indicate results below. Green indicates a positive or expected result from the program. Green with squares indicates questions students already knew the answer or felt similarly before the program. Finally, purple had some other result (no difference or odd results). The gray headings describe the statistical comparisons and whether they were statistically significant (yes or no).

	Control versus Participant		
Question	Pretest	Posttest	Comments
<i>Knowledge</i>			
Can humans catch disease from animals?	No	No	Question mostly correct before program. Positive Control.
What is a zoonotic disease?	No	Yes	
What is the number one cause of death in dogs and cats?	No	Yes	
How many animals are killed every year because of overpopulation?	No	Yes	
Humans can get rabies from animal.	No	No	Question mostly correct before program.
Vaccination is required by law for dogs.	No	Yes	Control had higher response. Fact not covered in resources. It was supposed to be negative control.
Rabies is fatal in all reported cases.	No	Yes	
Only animals can get rabies.	No	No	Question mostly correct before program.
Rabies is not fatal.	No	No	Question mostly correct before program.
Raccoons, dogs, horses, cats, bats, coyotes, and foxes can get rabies.	No	No	Question mostly correct before program.
All cases of rabies foam at the mouth and attack people.	No	No	Question not covered directly in text or program. Difficult to

			learn.
All bites from dogs must be reported to prevent rabies transmission.	No	Yes	
	Pretest versus Posttest		
Question	Control	Participant	Comments
<i>Attitudes</i>			
I am interested in pursuing a career in science.	No	No	Different medians between control and participants before starting. No change.
I am interested in pursuing a career involving animals.	No	No	Before program agreed.
I would like to take more science classes.	No	No	
It is unnecessary to take your animal to the veterinarian unless it is sick.	No	Yes	
Taking an animal for veterinary visits each year is important.	No	Yes	
Mental stimulation is an animal welfare issue.	No	No	Before program agreed.
Dog Fighting is acceptable.	No	Yes	
Cock Fighting is acceptable.	No	No	Before program strongly disagreed.
As long as an animal has food and water it is being humanely treated.	No	No	Before program disagreed.
Euthanasia is an important tool for animal welfare.	No	No	Before program agreed.
Passing animal welfare legislation is important.	No	No	Before program agreed.
Communication skills are important for scientists to learn.	No	No	Before program agreed.
Animal welfare legislation is easy to pass.	No	No	Before program disagreed.
Scientists do not have to learn about art and communication because that is not their job; they must concentrate on research.	No	No	Before program disagreed.
Art and advertising are important for scientists to learn.	No	Yes	
I feel like most animals should be spayed/neutered (fixed).	No	Yes	
Neutering (fixing) a male dog affects masculinity.	No	Yes	
Neutering or spaying (fixing) an animal prevents other animals from being euthanized.	No	Yes	

Spaying or neutering an animal is beneficial for its health.	No	Yes	
I would like to foster at the shelter.	No	Yes	
I would adopt an animal from the shelter for my next pet.	No	Yes	
Question	Pretest to Posttest	Control to Participant	Comments
Scales of Attitudes			
IAS Score	No	No	
Fireman Score	Yes	No	
Missing Item Score	Yes	No	
Hours Volunteering	Yes	No	
Purpose of Shelters	Yes	Yes	
Statements Importance for Animal Welfare			
Freedom from fear and distress	No	No	Ranked highly before program.
To live in a comfortable environment	Yes	No	Ranked highly before program.
To have enough space and behave as they wish	No	No	Ranked highly before program.
To be stimulated	No	No	Ranked highly before program.
To have hunger and thirst satisfied	No	No	Ranked highly before program.
To be healthy	Yes	No	Ranked highly before program.
	Control versus Participant		
Question	Pretest	Posttest	Comments
Feelings Toward Animals			
Aggressive	No	No	
Interesting	No	No	
Scared	No	No	
Family Members/Friends	No	No	
Don't Care About Animals	No	No	
	Control versus Participant		
Question	Participant		Comments
Changes in Behavior			
Bark Scholarships	Yes		
Fosters	No		Too few overall. Could be significant with larger numbers.
Adoptions	No		Too few overall. Could be significant with larger numbers.
Volunteers	Yes		
Toys	Yes		
Intention of Behavior			

Not interested	No		This statement was not expected to increase in frequency, but decrease or stay the same.
Foster	Yes		
Adopt	Yes		
Volunteer	Yes		
Attending Training	Yes		
Other Educational Programs	Yes		

Appendix F: Pre and Posttest Document

Thank you for participating in this survey. Programs like VSI: Veterinary Science Initiative depends on data from these surveys. We will be gathering information from both student participants and non-participants. Both groups are critical to our research. Please take it very seriously and answer the questions to the best of your ability. It is very important for us to learn your opinions. Your survey responses will be strictly confidential and data from this research will be reported only by student number. If you have questions at any time about the survey or the procedures, you may contact Dr. Brittany Watson Tisa at 843-747-4849. Thank you very much for your time and support. Please start with the survey now by clicking on the Continue button below.

If you have any difficulty understanding the questions, words, or directions please ask your instructor.

VSI Student Number

What school do you attend?

School A
School B
School C
School D
School E
School F
Other

Are you taking the pre-test (before the program/first time) or post-test (after the program/second time)?

Pre-test (before the program/first time)

Post-test (after the program/second time)

What class are you taking this survey in?

Intro to Health Science
Health Science II
Physical Science
Biology
Advanced Biology Class (II, AP, etc.)
Forensics
Chemistry
Advanced Chemistry Class (II, AP, etc.)
Physics
Advanced Physics Class (II, AP, etc.)
Zoology
Other

Please select gender:

Female
Male

Please select ethnicity:

African American

Asian

Caucasian

Hispanic

Native American

Other

Please select age:

13

14

15

16

17

18

19

Please select grade level:

9

10

11

12

What is your zip code?

What adults live in your house (Select all that apply)?

Mother

Father

Stepmom

Stepdad

Grandma

Grandpa

Other _____

How many children (including yourself) live in your house? (For example, if you have two brothers, you will select 3.)

1

2

3

4

5

6

Other _____

Do you have any pets in your house?

Yes

No

How many pets do you have?

1

2

3

4

5

Other

From where did you get your pets (Select all that apply)?

Friend/family

Pet store

Charleston Animal Society

Animal Shelter other than Charleston Animal Society

Online

Stray

Other

Are your pets spayed or neutered (fixed)?

Yes

No

Some of them are.

In the following table, please tell us how many of each type of pet you have.

	How many
Dog	<input type="checkbox"/>
Cat	<input type="checkbox"/>
Fish	<input type="checkbox"/>
Guinea pig/hamster/mouse/small mammal	<input type="checkbox"/>
Bird	<input type="checkbox"/>
Reptile	<input type="checkbox"/>
Other	<input type="checkbox"/>

Where do your animals live?

Primarily Inside

Primarily Outside

I have some pets that live outside and some pets that live inside

Where do your dogs primarily live/sleep?

Inside

Outside

I have some inside and some outside dogs

I dont have any dogs

Where do your cats primarily live/sleep?

Outside

Inside

Indoors and Outdoors

I dont have any cats

Have you heard of the Charleston Animal Society?

Yes

No

Where did you hear about the Charleston Animal Society (Select all that apply)?

Friend/Family

School

TV

Radio

Magazine/Newspaper

Other _____

Filler text

Oh No! There is a fire in your house and you only have time to grab a few of your possessions. You can only save four objects of the ten objects listed below. Please select ONLY FOUR of the following that you wish to save. The rest will be lost in the fire. No human lives are at risk to save these objects.

Your Pet Frog

Your Pet Chicken

Your Pet Cat

Your Nintendo Wii

Your Stereo/Speakers

A Photograph of Your Family

Your iPod

Your Cell Phone

A 3-D Television

Your Journal

Oh No! There is a fire in your house and you only have time to grab a few of your possessions. You can only save four objects of the ten objects listed below. Please select ONLY FOUR of the following that you wish to save. The rest will be lost in the fire. No human lives are at risk to save these objects.

Your Pet Stick Insect

Your Pet Turkey

Your Pet Monkey

Your Nintendo Wii

Your Stereo/Speakers

A Photograph of Your Family

Your iPod

Your Cell Phone

A 3-D Television

Your Journal

What do animals need to live?

What best describes your feelings towards animals (Select all that apply)?

Scared of them

Family members/friends

Don't care about animals

Interesting

Aggressive

What is the purpose of animal shelters (Select all that apply)?

- Adopt animals (find them homes)
- Investigate cruelty cases
- Treat household pets
- Advocate for animal welfare
- Prevent disease
- Board animals for the public
- Take in strays or unwanted animals
- Help people find their lost pets
- Spay and neuter pets
- Spay and neuter shelter animals
- Provide animal training classes for the public

Can humans catch diseases from animals?

- Yes
- No

What is a zoonotic disease?

- A knowledge base of nose-related studies of animals.
- A disease that transfers between animal species.
- A knowledge base of zoo-related studies of animals.
- A disease that transfers between animals and humans.

What is the number one cause of death in dogs and cats?

- Rabies
- Overpopulation/Euthanasia
- Abuse
- Disease

What is true about rabies (Select all that apply)?

- Vaccination is required by law for dogs.
- Rabies is NOT fatal.
- Rabies is fatal in all reported cases.
- Only animals can get rabies.
- Humans can get rabies from an animal.
- Raccoons, dogs, horses, cats, bats, coyotes and foxes can get rabies.
- All bites from dogs must be reported to prevent rabies transmission.
- All rabies cases foam at the mouth and attack people.

How many animals do you think are killed every year in the US just because of overpopulation (they cant find homes)?

- Hundreds
- Thousands
- Millions
- Billions

How important are the following things to animal welfare (well-being): Please move the slider to the appropriate place on the scale (0=not important, 10=extremely important)

											0
To have hunger and thirst satisfied											

To be healthy (free from pain/injury/disease)											
To have enough space to behave as they wish											
To be stimulated (not bored)											
To live in a comfortable environment (for example- fresh air, shelter)											
To be free from fear and distress (for example- bullying, predation)											

Please tell us how you feel about the following statements.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I am interested in pursuing a career in science.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mental stimulation is an animal welfare issue.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication skills are important for scientists to learn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel like most animals should be spayed or neutered (fixed).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is unnecessary to take your animal to the veterinarian unless it is sick.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please tell us how you feel about the following statements.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Art and advertising are important for scientists to learn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dog fighting is acceptable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am interested in pursuing a career involving animals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Neutering (fixing) a male dog affects its masculinity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to foster at the shelter.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please tell us how you feel about the following statements.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Neutering or spaying (fixing) an animal prevents other animals from being euthanized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Taking an animal for veterinary visits each year is important.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Passing animal welfare legislation is important.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to take more science classes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As long as an animal has food and water it is being humanely treated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please tell us how you feel about the following statements.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Spaying or neutering an animal is beneficial for its health.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Animal welfare legislation is easy to pass.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Euthanasia is an important tool for animal welfare.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would adopt an animal from the shelter for my next pet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cock fighting is acceptable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scientists do not have to learn about art or communication because that is not their job; they must concentrate on research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How many hours would you be willing to volunteer at your local animal shelter per month?

Please select the most appropriate answer:

	Strongly Disagree	Disagree	Agree	Strongly Agree
It is better to abandon a pet than to bring it to an animal shelter to be killed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All cats like to be taken on trips.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pet animals should not be allowed to roam free in their neighborhood.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's wrong for other people to tell you what kinds of animals you can and cannot hunt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A cat might feel lonely if it had no one to care for it over a weekend.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wild animals are not able to preserve their own habitats and need help from people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
You can never know how an animal feels because animals can't talk.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People who abandon pets do not really care about pets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's exciting when you see a galloping horse fall down on a TV show.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There are good things about all animals even those I don't like.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please select the appropriate ranking:

	Strongly Disagree	Disagree	Agree	Strongly Agree
We will always have room in our world for all the pet animals that are born.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People should not try to make wild animals become pets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I owned a place that keeps animals I would try to keep as many animals in a pen as I could fit in.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Watching birds with binoculars is more fun than shooting pheasants.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A dog that strays away from home can make its owners sad, but it won't affect other people in the neighborhood.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pet cats can usually take care of themselves when a family goes on vacation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like being a veterinarian.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A littered environment is a bad environment for most animals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bearskin rugs are beautiful, and I would love to own one.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operating on pets so they can't have babies is horrible, and these operations should not be performed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please select the appropriate ranking for each statement:

	Strongly Disagree	Disagree	Agree	Strongly Agree
The people I know do not all feel the same way about pets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Whether or not an animal will adapt well to a human environment should be a concern when you are choosing a pet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I had a dog, I would want it to run free around the neighborhood.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to spend some of my time telling people about the problems that face an endangered animal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's mean to leave your pet at a place that keeps animals if you can't take it on vacation with you.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People who are vegetarians and don't eat meat are just being silly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Listening to a canary sing makes me feel happy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
None of the needs that animals have are similar to human needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Products made from animals should only be used if these products are a necessity for humans.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think that operations to keep animals from having any baby animals would help solve the pet overpopulation problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please select the most appropriate ranking for each statement:

	Strongly Disagree	Disagree	Agree	Strongly Agree
Laws that tell us what kinds of wild animals can be kept as pets are unfair.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hunting wild animals should not be allowed under any circumstances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keeping farm animals in small spaces is not good even if it increases food production.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's wrong to have animals fight just so people can be entertained.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If a neighbor's cat scratches a baby, it's the cat's fault.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Destroying wild animals habitats is always acceptable if it leads to increased food production.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please select one of the following options:
I am taking the pretest (before the program)
I am taking the posttest (after the program)

Did/will you participate in VSI: Veterinary Science Initiative or are you a control classroom?
I am or will be a participant in VSI (classroom visit, field trip to Charleston Animal Society, and lessons in your class)
I am a control classroom and did/will not do the program.

What did you like about the VSI program?

What school do you attend?

School A
School B
School C
School D
School of the Arts
School F

Which day did you like the best?

Lesson 1: Classroom Visit
Lesson 2: CSI Crime Scene Investigation
Lesson 3: Ethics Snapshots
Lesson 4: Disease Transfer and Screenplay
Lesson 5: Art and Communication
Lesson 6: Swine Welfare Legislation
Lesson 7: Field Trip to Charleston Animal Society

Which day did you like the least?

Lesson 1: Classroom Visit
Lesson 2: CSI Crime Scene Investigation
Lesson 3: Ethics Snapshots
Lesson 4: Disease Transfer and Screenplay
Lesson 5: Art and Communication
Lesson 6: Swine Welfare Legislation
Lesson 7: Field Trip to Charleston Animal Society

What would you change about the program?

Did this program change your ideas about science?

Yes
No

Are you interested in doing any of the following with Charleston Animal Society in the future? Please select all that apply.

- Volunteering at the Shelter
- Fostering an Animal
- Adopting an Animal
- Attending Training Classes
- Doing another educational program through the Charleston Animal Society
- Not interested

Appendix G: VSI Lesson Rubrics

Student Name _____

SCREENPLAY RUBRIC

Category	4	3	2	1
Scientific Accuracy	All scientific information appeared to be accurate.	Almost all scientific information appeared to be accurate.	Most of the scientific information was accurate.	Very little or none of the scientific information was accurate.
Scientific Information Included	Can clearly show in dialogue all 6 pieces of information specified by the assignment.	Can clearly show in dialogue 4-5 pieces of information specified in the assignment.	Can clearly show in dialogue 2-3 pieces of information specified in the assignment.	Cannot show in dialogue the pieces of information specified in the assignment or only 1 piece of information.
Character Utilization and Roles	All five characters utilized in script. Point-of-view, arguments, and solutions proposed were always consistent.	3-4 characters used in script. Point-of-view, arguments, and solutions proposed were consistent.	1-2 characters used in script. Point-of-view, arguments, and solutions proposed were sometimes consistent.	No provided characters used in script. Point-of-view, arguments, and solutions proposed were not consistent.
Formatting and Setting	Student utilized an appropriate format for writing a screenplay. Setting and characters used were always appropriate.	Student utilized an appropriate format for writing a screenplay with minor errors. Setting and characters used were mostly appropriate.	Student utilized an appropriate format for writing a screenplay with errors. Setting and characters used were sometimes appropriate.	Student did not utilize an appropriate format for writing a screenplay. Setting and characters were not appropriate.

Student: _____

HEARTWORM POSTER RUBRIC

Category	4	3	2	1
Design of poster	The poster is designed in an interesting and imaginative way. The poster is exceptionally attractive in terms of design layout and neatness. The imagery and wording captures the essence of the message.	The poster is designed in an interesting way. The poster is attractive in terms of design layout and neatness.	The poster is designed without detail and imagination. The poster is acceptably attractive though it is a bit messy.	The poster lacks interest. It shows an attempt at detail. It is messy and not attractive.
Planning & Organization	The poster demonstrates a logical plan of organization and coherence. It gives a vivid idea of the topic. It is easy to read.	The poster demonstrates an acceptable plan of organization. It gives an idea of the topic. It is easy to read.	The poster demonstrates an attempt to organize the topic. It gives a general idea about the topic. It is not easy to read.	The poster lacks a plan of organization. It minimally addresses topic. It is difficult to read.
Information	The ideas on the poster include clear and understandable information about the topic. All information is correct and it is evident the student put a lot of time into the research.	The ideas on the poster include satisfactory information about the topic. All information is correct.	The ideas on the poster give some understandable information about the topic. The information is correct but basic and more could be done.	The ideas on the poster convey little or no sense of information about the topic. The majority of the information is missing or incorrect.
Effort	The student put forth best effort on the poster, no grammatical or mechanical mistakes.	The student put forth good effort. There are a few grammatical or mechanical mistakes.	The student put forth some effort on poster. There are multiple grammatical or mechanical mistakes.	The student did not put forth effort on poster. Many grammatical or mechanical mistakes.

Student: _____

ESSAY GRADING RUBRIC

Category				
	4	3	2	1
Critical Thinking:	Shows student thought about multiple perspectives and analyzed process	Student did not grasp all of the perspectives but did attempt to analyze the process	Basic analysis of activity, minimal interpretation of results	Little or no critical thinking demonstrated
Report on Activity:	Student documented the process and final results of law development	Student reported on final results or process, but not both.	Student minimally documented results or process during activity.	No project results were documented
Transferring Ideas to Welfare & Government:	Student showed ability to transfer the activity to real-life government situations	Student made an attempt to transfer legislation activity to government	Student briefly mentions activity relating to real-life	Student does not mention how activity relates to real-life
Evaluation of Execution of Goals:	Student shows what goals of their interest group were met and which were not met.	Student was general and not specific about what goals were met and which were not met.	Student only mentions goals that were met.	Student does not mention interest group goals.
Reporting Goals to Media:	Demonstrates way that they would frame and articulate accomplishments to media.	Generally states media approach.	Provides only a repetition of previous goals; no changes for media.	Does not mention media.

Appendix H: Other VSI Lesson Worksheets

Student VSI numbers: _____

High School: _____

CRIME SCENE WORKSHEET

During your investigation, there are two things that you will need to account for:

- 1.) Money and Time— you are allotted 10 units of money and 10 units of time. Each decision you make will cost different amounts of time and money. Document each decision on the Time and Money Log below in order to keep track of your time and money. If you run out of time/money, your investigation immediately stops and you have to complete your case report based on whatever info you have gathered so far.
- 2.)
- 3.) Evidence – As you make decisions, you will be led to different exhibits where you will gather information about Angel’s condition. At each exhibit, write down any information gathered on your Cruelty Case Report. Whatever you write down is the evidence that you will use in court. Be detailed in your information! If you do not write it down, you cannot use it in court.

TIME AND MONEY LOG

Choice Made During Activity	Cost in Time	Time Left (out of 10)	Cost in Money	Money Left (out of 10)

CRUELTY CASE REPORT

History/Presentation (what happened/was documented before the animal came to the shelter):

Exam Findings and Test Results (write all details you discover – remember, this is the evidence that you will use in court):

Conclusion (what happened according to the evidence):

Is this cruelty in your professional opinion and why?

Score Sheet for Cruelty Case Report

Your score: _____

YOUR DAY IN COURT:

Use the score sheet to determine how well you did in court. Remember, you can only score what is written above, not info that you remember seeing but did not write down.

Using your report calculate the total points:

- Add 1 point for describing the animal's condition on arrival
- Add 1 point for including the history from the Animal Control Officer (ACO)
- Add 2 points for including external examination results with the body condition
- Add 2 points for including lesions on feet
- Add 2 points for describing the wound
- Add 2 points for including internal examination results with the heartworms
- Add 1/2 point for each left-over time and money
- Add 3 points for identifying fleas and ticks in the report
- Add 3 points for identifying roundworms and giardia in the report
- Add 3 points for identifying metal fragments as bullets in the radiograph
- Add 3 points for indicating organ damage from the bloodwork
- Add 1 point for documenting blood splatter pattern consistent with gunshot
- Add 1 point for identifying weapon as gun found at scene
- Add 3 points for describing the living conditions and how they affected the animal
- Add 4 points for describing the cause of death (bullet wound) and *also* documenting the long-term neglect including body condition
- Add 4 points for listing medical conditions as: heartworm disease, parasites, starvation, gunshot wound (minimum)
- Add 3 points for documenting cruelty and providing reasons **why** the evidence shows neglect or cruelty

Results:

Between 0-7 points:

You have lost the case in court. Findings were not sufficient for a guilty verdict.

Between 7-12 points:

You barely won in court. The accused were given a citation.

Between 12-17 points:

You did very well in court. The accused were given high fines, citations, and are no longer allowed to have animals in their custody.

Above 17 points:

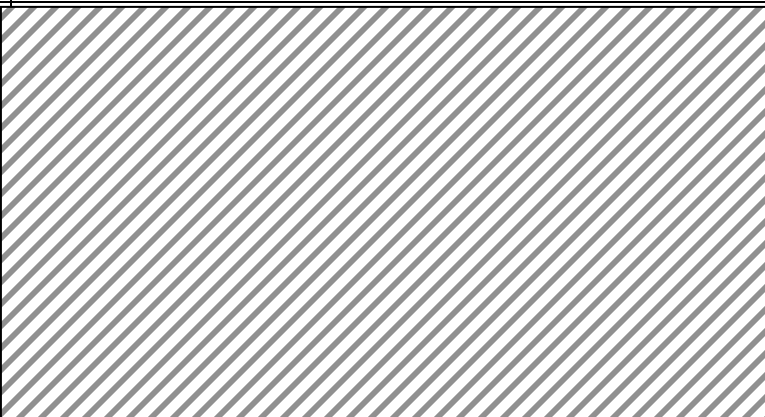
You were a superstar expert witness in court. Not only were the accused given high fines and are not longer able to have animals, but they are also facing jail time for their crimes.

Student VSI #: _____

High School: _____

WEIGHT ON YOUR SHOULDERS

Welcome to our animal shelter! We are very excited to have you on board as our new manager. Unfortunately, your first task is a difficult one. We have just taken in 10 dogs, but we only have 9 spots available. We have two foster homes available, two spots in a rescue shelter have just opened up and our adoption floor has five spaces available. Due to a lack of money and resources at this time, one of the dogs will have to be euthanized. We need you to take a look at the dogs and decide where each dog should go. Please list the adoption floor dog #'s below. For the dogs being placed in foster homes, rescues or being euthanized, please list the animal # and the reason behind your decision.

ANIMAL SLOT	ANIMAL #	REASON
Adoption		
Adoption		
Adoption		
Adoption		
Adoption		
Foster home		
Foster home		
Rescue		
Rescue		
Euthanized		

Student VSI #: _____

High School: _____

ETHICS SNAPSHOT: Human-Animal Interface – Video # 2

Feral Cats

You are the only shelter veterinarian in your area and run the spay-neuter clinic. Your animal control department comes to you asking about what you recommend about a feral cat trap-neuter-release program. The officer explains their current method of trapping and euthanizing has been met with a lot of resistance from locals and they do not have a lot of funding.

Using your professional knowledge, what would your recommendation to the animal control officer be and why?

Otter Situation

You are a veterinarian asked by your local media to explain the issue with cats and otters in your area in California. Summarize the situation in a two sentence statement. What would your recommendations be to address this toxoplasmosis problem (think about humans, cats and otters)?

Student VSI #: _____

High School: _____

ETHICS SNAPSHOT: Overpopulation - Video # 4

Cat Reproduction

Follow an unspayed cat through 3 years of reproduction, taking into account that her kittens are maturing and reproducing along with her. Cats can begin having kittens at the age of 6 months. Use the following statistic: an unspayed cat can have 5 litters every year, with 5 kittens per litter.

At the beginning (year zero), the population is 1. What is the population after year 3?

Fill in the population chart as you go. You can use math or diagrams. If you choose to draw it out, it is useful to use a different color pencil for each generation. The first year is done for you.

Year	New Kittens	Total Population
0	0	1
1	25	26
2		
3		

Puppy Mills

Your friend tells you that she is going to buy a puppy online. The website posted a picture of the puppy and assured her that it is in great health. The company will even ship it to her free of charge. Knowing that online-based puppy sales usually indicate a puppy mill, what can you say to your friend to try and change her mind?

Spaying/Neutering

Your neighbor, Mr. Watson, just brought home an adorable puppy named Scout. While you are playing with Scout, Mr. Watson tells you that he has no intention of neutering him. He thinks neutering is out of the question. He wants Scout to be a great guard dog and hunter and thinks that if he is fixed he will not be as “manly.” Do you agree with him? Why or why not?

Student VSI #: _____

High School: _____

ETHICS SNAPSHOT: Animal Advocacy Issues – Video # 3

Animal Rights vs Animal Welfare

Your friend, Laura, is a self-proclaimed diehard animal rights advocate. She shows her horse at competitions and she trains therapy dogs. Her primary concerns are better welfare for farm animals and better cruelty legislation.

After talking with her about her opinions, you realize that – not only is she extremely annoying – but she is not an animal rights advocate at all! The opinions she has all fall under the animal *welfare* campaign.

What do you say to her to explain the difference between animal rights and animal welfare without offending her?

Closed vs Open Admission Shelters

Closed and open admission shelters are very different types of shelters and they both serve an important purpose.

List two positive and two negative aspects of each.

How could these two facilities work together to combat animal overpopulation?

Which facility would you support in your community, open, closed or both and why?

Student VSI #: _____

High School: _____

ETHICS SNAPSHOT: Common Medical Care & Parasite Conditions – Video # 5

Heartworm Disease

Look at the diagram of the circulatory system (on back of paper). If worms are living in and blocking vessels in the pulmonary arteries and heart what will happen to the rest of the system?

What do you think would happen if a worm would die and break apart in the vessel (which can happen)?

Economics of Heartworm

Heartworm can cost \$1,000 to treat. Monthly preventative costs \$60/year and dogs usually live an average of 13 years. From an economic standpoint, does it make more sense to take the chance of letting your dog get heartworms or to use monthly preventative heartworm medication? What would you say to an owner unwilling to pay for heartworm preventative?

LESSON 4 SCREENPLAY

WRECKED

You and your friends have been working on a screenplay for a new TV drama. Having done your research, you know that the two most popular types of TV dramas right now are those that involve medical investigations (CSI) and those that involve a random group of people suddenly thrown together in a novel situation (Lost). You are planning on combining the two.

After sending your idea away to several networks, you finally heard back from one that they are interested and would like to see a 5-minute pilot, demonstrating what the show would be like on camera.

The title of your screenplay is Wrecked. It is about a plane that has an emergency landing on a tropical, deserted island. Immediately after the wreck, it is discovered that one of the passengers has had an unfortunate incident with the surrounding wildlife. The group of people on board must now attempt to work together not only to survive the elements but to also survive a possible disease epidemic as well.

You already have the very beginning of the screenplay written. Now you just have to use the characters and the situation to create a 5-minute representation of the show.

SCREENPLAY REQUIREMENTS:

Your screenplay is just a teaser to get the TV network interested in the show. This means that the duration of the screenplay should only be about 5 minutes long. Your screenplay must include the following information about your zoonotic disease:

- What is a zoonotic disease?
- Symptoms of the disease
- How the disease is transmitted
- How the disease is diagnosed
- How the disease is treated
- How can the disease be prevented?
- You must use all of the supplied characters, although how you proceed with the story and how you choose to use each character is entirely up to you.

Student #: _____

High School: _____

PIG WELFARE ESSAY

Please write an essay on this activity. Address each of the following questions:

1. What went well?
2. What was more difficult than expected?
3. How do you think this translates to real government issues? What about welfare issues?
4. Did you accomplish your interest groups goals?
5. How would you report your concerns or successes in this process to the media?

Student #: _____

High School: _____

DISEASE OUTBREAK WORKSHEET- WHAT IS YOUR PLAN?

In your group, come up with a plan to address each focus area. Be prepared to share your ideas with the class and defend your decisions. Write *at least* three things you will do for each station.

Station 1: Kennel Inside

How will you address this animal? Will you treat it? Where will it stay?

Station 2: Outside Yard

How will you prevent the disease from spreading the facility? What problems do you see? How will people and animals get around?

Station 3: Future Plans

What can you do to stop another outbreak from happening? What medical plans do you have? What information do you want to provide to staff?

What did you like about the VSI program?



Did this program change your ideas about science?

[illegible]

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