

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Experiential Learning in Agriculture Education

Research Project

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Chapter One

Introduction

Background and Setting

Throughout history, educational professionals have noted that experiential learning aids the student in understanding course content. By participating in student-centered learning activities, the student is given the opportunity to experience the material himself through completing the activity, and therefore, is more likely to remember the content. John Dewey, who believed in “learning by doing,” created the Experiential Learning Theory (ELT) and believed that learning is a continuous approach, constantly building on prior knowledge. There have been many educational philosophers who have helped expand this method of teaching. David Kolb, for example, agreed with Dewey, but expanded the theory to include four stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation (Roberts, 2006). Hands-on learning involves using all of the senses to experience the situation at hand, and is included in the first stage of Kolb’s theory. The purpose of experiential learning activities is to generate a “stimulated situation designed to create personal experiences for learners that serve to initiate their own process of inquiry and understanding” (Kolb, 1983).

Experiential learning is learning from experience, as opposed to lecture and classroom learning. The latter is described by the learner who only reads or hears about the content but never comes into contact with it by using the senses (Kolb, 2014). “Experiential learning practices have been identified by Kuh (2008) as high-impact educational practices that have been shown through research to increase student retention and engagement.” (Austin, 2015)

When experiential learning was first created and on the rise, agricultural education was also developing in America. During the early 1900's, educational philosophers helped to shape the concept of experiential learning in agriculture education (Knobloch, 2003). Through this implementation, they found that the Experiential Learning Theory was beneficial to students in these courses. Through experiential learning, they were able to better understand the curriculum being taught. Kolb wrote "knowledge does not exist solely in books, mathematical formulas, or philosophical systems; it requires active learners to interact with, interpret, and elaborate these symbols" (Kolb, 1983).

Agriculture Science in Secondary Education

All of the agricultural education classes (Ag I-IV, Small Animal Care, Veterinary Science, and Equine Science) are science-related. Scientists must perform experiments in order to better understand if their hypothesis was correct or incorrect and why. Even in high-school courses, students are able to better understand the content if they are given the opportunity to experience the material through experiential learning activities.

Not only does experiential learning help students in STEM courses to engage in learning, but it is also beneficial for adolescents like those found in high school classes. In this stage of development, individuals are better able to learn and comprehend information through active learning methods rather than symbolic processes (Kolb, 2014). By incorporating experiential learning into high school courses, more students would understand and remember the curriculum.

Lab Instruction

In the Veterinary Science class, the external and internal anatomy and physiology of animals is taught. This includes instruction on all body systems, their functions, and how they work together to sustain the animal's life. By incorporating the Experiential Learning Theory into the curriculum and instruction, students are able to engage in activities including: making a bone model, making a blood model, making a lung model, creating a play-dough digestive system, completing a parasite lab, practicing different injection types on fruit, and playing pin-the-part-on-the-animal to learn anatomical terms. Each of these activities actively engages the students and gives them the opportunity to review what they've learned through regular classroom instruction in a fun group setting.

Using Experiential Learning Theory to Guide the Project

The veterinary science program used the Experiential Learning Theory to help improve students' perceptions about agriculture and veterinary science and enhance comprehension and knowledge retention of the content. Students participated in applied learning in the discipline of veterinary science. Working on applied learning projects enabled the students to make connections between what they had learned through lecture and the knowledge that is used to solve problems and reach solutions for the purpose of veterinary science. In addition, the students also participated in experimental activities where they used the knowledge from lecture and their experiences to create hypotheses and test those hypotheses to better their knowledge in the content area.

Statement of the Problem

Many students find it difficult to comprehend information and retain knowledge from regular classroom instruction alone. In addition, many students cannot remain focused on a certain task for an entire class period. By incorporating experiential learning activities into the lesson plans, students found it easier to recognize concepts being taught and remained focused longer by switching class activities from regular instruction to experiential learning.

Purpose of the Project

The purpose of this project was to determine if experiential learning activities proved beneficial in agriculture education. In agriculture education courses, experiential learning is vital for students to understand the content and retain the knowledge necessary to be successful academically and pursue an agricultural career. Specifically, many of the students enrolled in the Veterinary Science course wish to pursue a career in veterinary medicine. This type of career requires hands-on experience to aid unhealthy animals. To better prepare for a career in this field, it is beneficial that students experience the curriculum through experiential learning activities.

In the Veterinary Science course in this study, students participated in seven experiential learning activities. For four of the units, students were taught curriculum through regular classroom learning, and then completed an activity to reinforce what was taught in the unit. For the other three units, students completed the activity and then were taught through regular classroom instruction. After each unit, each individual student wrote a blog to express their feelings about the learning activity. This student feedback was used to determine if they

found the experiential learning activity helpful in understanding the content and retaining knowledge learned throughout the unit.

Project Objectives

Project Objective One: Determine which method of learning positively affects most students.

Project Objective Two: Improve students' perceptions about agriculture and veterinary science.

Project Objective Three: Increase the understanding gained by participants in the areas of anatomy, physiology, and veterinary medicine.

Project Objective Four: Increase comprehension and knowledge retention through experiential learning.

Definition of Terms

EL – (Experiential Learning). “Experiential learning is simply defined as “hands-on” learning and may involve any of the following activities: service learning, applied learning in the discipline, co-operative education, internships, study abroad and experimental activities” (Austin, 2015).

STEM – Curriculum based on Science, Technology, Engineering, and Mathematics (Gilmore, 2013).

Limitations of the Project

When selecting participants, an already existing or intact group was chosen. The Veterinary Science class was chosen which consisted of ten females and one male. The female to male ratio could be a limiting factor in deciding whether various learning styles exist among gender differences. In addition, students should have taken Small Animal Care as a prerequisite for Veterinary Science; however some students were placed in the class by the guidance department without having the prerequisite course.

One limitation to this project was time. If more time had been allowed, more activities could have been performed and additional data could have been collected, adding to the results. In addition, more time could have been allotted to show students how to properly write a blog and how to easily navigate the blogging website they were using.

This project took place from December to April of the current school year. Students did blog individually about their experience with experiential learning activities in the classroom. Limiting information from students in their blogs could be a limiting factor for this project.

Each experiential learning activity required components that needed to be bought. These components were bought by the teacher out of personal money.

Basic Assumptions

As a high school agriculture instructor in my 3rd year of teaching, I believe in the benefits of experiential learning. I personally learn best this way and with a background in both 4-H and agriculture education, I believe that experiential learning is the best method for teaching students about agriculture. Although I believe this theory would benefit all agriculture courses, this project was solely based on the integration of the Experiential Learning Theory and students' opinions in the Veterinary Science course.

In addition, when students individually blogged after an activity, their responses were guided by open-ended questions. Data collected was based on students' own opinions found in their blog writings and are considered their true feelings regarding their experiences.

Significance of the Problem

It is believed that students enrolled in Veterinary Science could benefit academically through increased comprehension and knowledge retention by using experiential learning

activities. Research shows that students enrolled in college-level Human Anatomy and Physiology were assigned to one of three experimental groups: organ dissections, virtual dissections, or plastic models. Data collected proved that students who used plastic models achieved higher scores on both initial and follow-up exams than the other two experimental groups (Lombardi, 2013).

Participants in this project participated in an experiential learning activity that corresponded with the regular classroom teaching in each unit. After completing each activity, participants blogged, being guided by questions to prompt their writing. Data collected using document analysis of students' blogs can be used by researchers and educators to improve the current teaching practices in agricultural education. This information will allow them to design lesson plans and activities to incorporate experiential learning into the curriculum.

Chapter Two

Review of Literature

Behaviorism vs. Constructivism

Throughout history, educational theorists have differed in their beliefs on social learning theories. B.F. Skinner, an American psychologist of the 20th century, created the concept of *behaviorism*. He believed that individuals learn based on rewards and punishments. If a person receives praise or other type of reward as a consequence of their actions, they will be more likely to repeat the action. In contrast, if a person receives punishment as the result of completing an action, they will be less likely to repeat the action. However, the concept of behaviorism is limited to the study of the individuals' external behaviors, with little contemplation on internal thoughts that lead to the external behaviors (McDevitt, 2010).

Another learning theory inspired by educational theorists including Jean Piaget and Lev Vygotsky, is that of *constructivism*. With this theory, it is believed that individuals gain knowledge constructively through their own experiences, either individualized or guided, rather than passively absorbing knowledge (McDevitt, 2010). Allowing students to comprehend the content through active learning is a precursor to experiential learning.

Individual students learn in different ways, and one classroom may be composed of students with a vast array of learning differences. Some may learn by hearing the teacher's instruction, others may need to see the concepts on paper or on the board, and others may have to actually complete a physical, hands-on activity to accomplish learning. It is believed by many that experiential learning combines auditory, visual, and kinesthetic learning to allow students to use all of the senses to better comprehend the content.

The Experiential Learning Theory is a method of teaching that builds on students' prior knowledge to aid them in better understanding the content. Many researchers strongly believe that the use of experiential learning in the classroom enhances student comprehension (Austin, 2015). While this method of teaching could be beneficial in all disciplines, it is most used in content areas involving STEM education (Gilmore, 2013).

21st Century Work Skills

Throughout the past few decades, experiential learning has made a positive impact on the educational community. Nevertheless, with the dawn of the digital age and recent increases in technological advances, interactive tools, multimedia, and software, students have been able to manipulate an activity without having a true hands-on experience. This is leading

to a decrease in true experiential learning and an increase in digital education. However, this method of teaching does not lead to information retention as well as is does through the use of the Experiential Learning Theory.

Digital education activities can be beneficial for students to stay up-to-date with recent technological advances. However, by incorporating true experiential learning activities, they can also gain experience that will aid them in both the classroom and in future careers. Students who pursue a career in agriculture will find that, although many technological advances have been made with new equipment and computer systems, they will still need true hands-on experience. For example, an individual employed at a dairy farm with the newest robotic milkers would not only need to understand how to operate the computer system that activates the milkers, but also how to complete hands-on tasks in the event that the computer system would quit working.

Experiential Learning Research

Research regarding experiential learning activities proves that students who are given the opportunity for these experiences excel farther than the students who do not have the opportunity. Researchers claim that students who actively participate in experiential learning increase their knowledge more than they do from lecture alone (Goldberg, 2013). Students in science-based classes that strongly relate to Veterinary Science do better academically when experiential learning activities are incorporated.

“Experiential learning is an educational model that views learning as the result of an interaction between discovery and experience. This model is based on immersing

students in an environment with relevant, “real-world” experiences that allow students to build upon prior knowledge and learn in a more meaningful fashion. While this model is not ideal in every context, it often provides students with a unique realization of how their knowledge is relevant and useful” (Tussing, in press).

There are many ways that the Experiential Learning Theory could be used to create a successful learning environment. Some methods include internships, work/study programs, apprenticeships, studio arts, field projects, laboratory studies, and cooperative education. With these approaches, the learner is directly involved in the work being studied (Kolb, 1983). These methods can be used throughout secondary education, higher education, and as the individuals enter the workforce. “The acquisition of the knowledge, skills, and values that began in school is carried forward in the workplace, as successful performance in a specialized area of expertise is rewarded by the assignment of increasingly complex challenges in that area” (Kolb, 1983).

In a practical teaching approach, experiential learning could be used in a variety of ways. There are scenarios in which it would work best to teach using regular classroom instruction and then reinforce what was learned through an activity. Using this procedure allows students the opportunity to experience what they’ve already learned. In contrast, there are also scenarios in which it would work best to first have students complete the activity and then teach the curriculum using regular classroom instruction. In this situation, many students may struggle with the activity, never having learned the material before. However, having to complete the activity first, students will gain a better understanding of how the current concept works and will better comprehend the curriculum when it is then taught through regular

classroom instruction. In both scenarios, the Experiential Learning Theory is a useful concept that enables students to learn the curriculum by experiencing the activity first-hand.

Learning Styles and Gender Differences

Research has been conducted that proposes that there are differences in the way females and males learn and that all learning styles are not supported by traditional education. Females tend to learn better by hands-on experience, whereas males prefer a more logical or analytical method to learning (Kulturel-Konak, 2011). In addition, a survey in which individuals responded regarding their preference of learning materials found that “STEM major survey respondents (38.0%) were more likely to prefer hands-on materials than non-STEM major survey respondents (15.8%). Non-STEM major survey respondents (45.3%) were more likely to choose creative thinking materials than those survey respondents enrolled in STEM majors (20.5%)” (Kulturel-Konak, 2011).

Theoretical Framework

The Experiential Learning Theory was used as the framework for this project to guide activities for increasing understanding of the content in Veterinary Science. This theory has functioned as the framework for similar evaluations of hands-on activities. For example, Bauerle and Park (2012) used the Experiential Learning Theory in their study to prove that experiential learning would improve homework scores for students enrolled in a plant sciences course.

The Experiential Learning Theory was first created by John Dewey, who is thought to be America’s greatest educational philosopher. Dewey suggested that individuals “learn by doing”

and learn from their experiences. He also believed that learning did not always have to be accomplished through text books, but through hands-on activities where individuals could experience the content being taught for themselves and then reflect on what they had learned (Berman, 2013).

Dewey believed that the experiential learning theory was not a circle, but a spiral, continuously building on prior knowledge with every experience. In 1934, Dewey wrote that “Each resting place in experience is an undergoing in which is absorbed and taken home the consequences of prior doing, and unless the doing is that of utter caprice or sheer routine, each doing carries in itself meaning that has been extracted and conserved.” (Kolb, 2014).

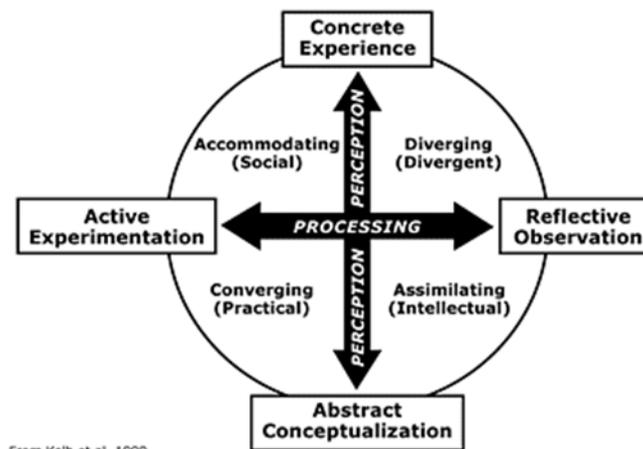
David Kolb is another educational theorist that agrees with the work of John Dewey. He believes that the Experiential Learning Theory is a continuous spiral or cycle, consisting of four stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. During the “Concrete Experience” stage, the student directly interacts with the content being studied. It is during this stage that “hands-on” learning takes place, using all of the senses to experience the situational content for oneself. In the second stage, “Reflective Observation,” the student reflects on their own experience. It is Kolb’s belief that in this stage, the knowledge learned during the experience is mentally broken down and stored. The next stage, “Abstract Conceptualization” enables the student to form a hypothesis and gain a better understanding about the content they have experienced. The fourth and final stage of “Active Experimentation” is where the student is allowed to test the hypothesis that they created. David Kolb defines learning as “the process of creating knowledge” (Roberts, 2006).

Kolb expanded on Dewey's work to describe experiential learning based on these

aspects:

1. Learning is best conceived as a process, not in terms of outcomes.
2. All learning is relearning.
3. Learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world.
4. Learning is a holistic process of adaptation to the world.
5. Learning results from synergetic transactions between the person and the environment.
6. Learning is the process of creating knowledge (Austin, 2015).

Figure 1. Experiential Learning Theory



Chapter Three

Methodology

Project Overview

The goal of every teacher is to instruct their students in a way that they truly comprehend the curriculum being taught and are able to retain the knowledge learned for future use. While all individuals learn differently, many teachers feel it is best that students enrolled in agriculture classes “learn by doing,” combining learning methods of auditory, visual, and kinesthetic learning to meet the needs of all students. Experiential learning activities allow

students to achieve this combined method of learning to better understand the content and retain the information.

This project used a variety of experiential learning activities to reinforce the curriculum learned throughout each unit. At least one experiential learning activity was used per unit. The lesson units were: Musculoskeletal System, Circulatory System, Respiratory System, Digestive System, Immune System, and Veterinary Terminology.

Participant Selection

This study was focused on adolescents and their participation in experiential learning activities and how that affects comprehension and knowledge retention of the subject matter. The sample of this study was voluntary for the participants. Participants were not chosen randomly from the population of interest. Instead, the entire existing group, or intact group (Schoonenboom, 2014) of students that are presently enrolled in the Veterinary Science course were invited to participate. There was one group of 11 high school students, ten female and one male. Some lack of diversity occurred due to the fact that participants had to be enrolled in Veterinary Science to also be a participant in this project study; the limits of who was enrolled help to aid the representation. All students should have taken Small Animal Care as a prerequisite to this course, but this was not the case in all individuals, as some were placed in Veterinary Science by the guidance department.

Instrumentation

The instrumentation used for this project was a blog with guided questions. After completing the experiential learning activity for the current unit, students were given the opportunity to blog about the activity, their understanding of the content, and the knowledge they gained from their experiences. The students were given open-ended questions to guide their writing. Each question represented at least one of the four objectives for the project. The questions were as follows:

1. In which of the following ways do you feel that you learn best: auditory learning (hearing the content), visual learning (visualizing the content), kinesthetic learning (hands-on activities), or a mixture of the three? (Obj. 1)
2. To better understand the curriculum in Veterinary Science, which learning method works best for you: hearing the information from the teacher or peers, seeing the information in text or on the board, or performing an activity that relates to the curriculum? (Obj. 1)
3. Before beginning this unit, how would you rate your understanding of the unit content on a scale of 1 to 10 (one being no knowledge and 10 being very knowledgeable)? Explain how well you knew the content at the beginning of the unit. (Obj. 2)
4. Did you find the use of regular classroom instruction helpful or not helpful in increasing your knowledge and understanding of the unit content? Explain. (Obj. 3)
5. Did you find the use of the hands-on activity helpful or not helpful in increasing your knowledge and understanding of the unit content? Explain. (Obj. 4)
6. When comparing regular classroom instruction to the hands-on activity, which one do you feel increased your understanding the most? (Obj. 3 & 4)
7. At the end of the unit, how would you rate your understanding of the unit content on a scale of 1 to 10 (one being no knowledge and 10 being very knowledgeable)? Explain how well you know the content at the end of the unit compared to how well you knew it at the beginning. (Obj. 3)
8. Was the hands-on activity connected to the curriculum in a way that you could relate the two? (Obj. 4)
9. Would you recommend the hands-on activity be completed by next year's Veterinary Science students? (Obj. 1)
10. Do you believe students in other agriculture courses would benefit from hands-on activities related to the curriculum they are learning? Why or why not? (Obj. 1 & 2)

11. Given your favorite learning method (auditory, visual, or kinesthetic learning), what has been your favorite activity? (Obj. 1 & 2)
12. Which scenario did you feel that you were better able to understand the concept being taught: regular classroom instruction followed by the hands-on activity or the hands-on activity followed by regular classroom instruction? (Obj. 1 & 3)
13. What previous experiences have you had that relates to the Veterinary Science class or the current curriculum? (Obj. 2 & 3)

The blogging instrument measured students' thoughts and opinions on the experiential learning activity. This instrument was suitable for high school participants, as blogging gave them a way to express their feelings about the activity by using modern technology practices. Blogging allowed the students to answer the questions and explain their answers in their own words, rather than by simply completing a survey.

A qualitative research project is one in which data can be observed but not measured and is found through "real-world" situations where statistical practices or other methods of quantification are not used (Golafshani, 2003). In this project, methods were used to heighten the trustworthiness, validity, and reliability of the data. Trustworthiness was established by allowing each student to write their own opinions in each of their blogs. Each student's individualized blog provided credibility for their own work. The blog instrument was not used in class as a consistently used tool prior to data collection for this project. Therefore, students learned to use the instrument during a pilot test to ensure they understood the concepts behind the instrument. The instrument was explained to students and established for their use in a way that enhances the validity of the project. Students were guided by the same questions when writing in their blogs about each experiential learning activity.

Data Collection

Data was collected using document analysis of students' blogs to determine if the students found the activities beneficial in conjunction with lecture in learning the course content. Due to having already covered some of the units before the research and data collection officially began, a portion of the data was found using reflections from activities the students had already completed. In addition, four of the hands-on activities were conducted after regular classroom instruction on the unit while the other three activities were conducted before regular classroom instruction on the unit. Data collected from the students' blogs was in the form of quotes and electronic communication. This data was collective writing of the students' experiences and perspectives on experiential learning in the classroom (Ary, 2010). Students' blogs were guided by questions to help to prompt their writing. Students were given approximately 30 minutes to answer the questions in their blogs. This exercise was completed after each experiential learning activity. Data was collected from December to April of the current school year, covering multiple units in the course of Veterinary Science. Each student's blog was read and analyzed, comparing it with the others in the class. This allowed the instructor to see how well the students believed they understood the curriculum both before and after instruction in conjunction with the experiential learning activities.

Data Analysis

Document analysis was useful to examine data provided in the students' blogs. This type of document analysis is called *tracking*. Within this method, there are three steps. First, one must form objectives for the project. Next, one must decide what words or phrases

(tracks) should be found in the document associated with these objectives. Last, the documents should be analyzed to determine how the objectives are supported (Caulley, 1983). Within this project, certain pre-determined words or phrases were established from the experiential learning literature. These *tracks* include but are not limited to: experiential/hands-on/kinesthetic learning was useful/ valuable/ positive/ beneficial/helpful; better understood/comprehended the curriculum/content/subject.

These results were beneficial in determining if the students believed that experiential learning activities were helpful in reinforcing the content learned through regular classroom instruction. If the objectives were met, experiential learning activities could be included in lesson plans in all aspects of agricultural education, in addition to other disciplines. In addition, this would allow the instructor to compare the learning styles of students based on their gender.

Timeline

The following are the project activities with their corresponding unit instruction and date of instruction:

- “Bone Model” (Musculoskeletal System Unit) December 7th, 2015
- “Blood Model” (Circulatory System Unit) January 13th, 2016
- “Lung Model” (Respiratory System Unit) January 14th, 2016
- “Play-Dough Digestive Systems” (Digestive System Unit) March 29th, 2016
- “Parasite Lab” (Immune System Unit) April 5th, 2016
- “Fruit Injection” (Immune System Unit) April 7th, 2016
- “Pin the Part on the Animal” (Veterinary Terminology Unit) April 12th, 2016

Summary

Some of the experiential learning activities were completed before the research and data collection officially began. With these activities, the student participants were asked to use the same guided questions to reflect on their experiences. Then, after the research and data officially began, students created a blog website and blogged using their reflections. Activities completed after this were written about on students' blogs within 24 hours of the completion of the activity. Students were given the same guided questions. After all of the activities and blogs were completed, students' blogs were analyzed using document analysis and the tracking method. Particular words or phrases were highlighted that would suggest that students did or did not find experiential learning beneficial. Their words or phrases were then compiled to determine the results of the project. These words or phrases for each question are found in Table 1 and Table 2 of the "Results" section.

Chapter Four

Results

Observations

One male and ten female students participated in the experiential learning activities conducted in the Veterinary Science class. All eleven completed the Parental Consent and Student Assent forms to participate in the study. Each student created a blog site in wordpress.com, and after conducting each activity, the students were given questions to guide them in writing their blogs. While all student participants completed their blogging after each activity, many students answered their questions very thoroughly.

Project Objective One

Project objective one was to determine which method of learning positively affected most students. After analyzing the students' blogs, it was found that they preferred either experiential learning, experiential learning combined with visual learning, or a mixture of auditory, visual, and kinesthetic learning. Fifty-five percent of the responses favored kinesthetic learning, while an additional 36% favored a mixture of the three learning methods, and 9% of participants favored visual learning.

Female10 wrote in her blog: "I learn equally between visual, auditory, and kinesthetic learning, but hands-on learning is much better because you can visually see and put together how it works. For example, in our blood model, we used red food coloring as blood and cheerios for red blood cells. We added other things and it helped me learn about clotting and such much quicker."

All of the students recommended that students in next year's Veterinary Science class and students in other Agriculture classes should complete experiential learning activities.

Female3 wrote in her blog: "I believe the students in other agriculture courses would benefit from hands-on activities related to the curriculum they are learning because it will help them learn more and be more interested in learning about it."

The majority of the student participants preferred regular classroom instruction followed by the activity, rather than vice versa. Female10 also wrote: "I believe seeing the information and hands-on activities are highly useful. I like to be able to take notes from PowerPoints and visually see it and add onto that in means of putting together a model showing me what I was writing."

Project Objective Two

Project objective two was to improve students' perceptions about agriculture and veterinary science. When asked if she recommended using experiential learning activities in other agriculture courses, Female8 wrote: "Yes, agriculture isn't something you can learn proficiently solely by classroom instruction."

At the beginning of each unit, all students had a low to moderate understanding of the material. Referring to Table 2, Question 3, one could see that all students wrote a low to medium number on a scale from one to ten to symbolize their knowledge and understanding of the content.

All students had at least some previous experience related to either the Veterinary Science class or the curriculum we were covering, and many had a personal interest in the material. Some students had previously or currently been enrolled in other agriculture classes, biology or anatomy classes, or had first-hand experience in an agriculture environment such as a family farm. To aid in understanding students' perceptions of agriculture and Veterinary Science, they were asked what their favorite activity was. Female1 wrote: "My favorite activity would be the vaccine lab. I liked the fact that we learned the different sizes of needles and syringes, because I am wanting to become a veterinarian."

Project Objective Three

Project objective three was to increase the understanding gained by participants in the areas of anatomy, physiology, and veterinary medicine. The majority of students found regular classroom instruction helpful with every unit we covered. Female6 wrote in her blog: "I found

the use of regular classroom instruction helpful because without the classroom instruction, I would be lost doing the lab and not know what I am doing.”

When comparing regular classroom instruction with experiential learning activities, the majority of students found the activities more beneficial to their knowledge and understanding. A few students answered that on certain units, regular classroom learning was more effective. Two students answered that both teaching methods were equally effective. Every student participant felt that their knowledge of the current material had increased significantly from the beginning of the unit. This can be seen in Table 3, Question 7, where students’ numbers for understanding on a scale from one to ten were much higher than they were in Table 2, Question 3. This can also be seen in Table 1, where the student averages are stated for each activity performed. Female 1 stated: “I would rate my understanding at the end of the unit a 10. When we used the hands-on activity made with the water bottle, Cheerios, marshmallows, and fluff balls, I could see everything in the blood stream and what the ratio was.”

Table 1

Activities	Before	After
Bone Model	5.1	9.3
Blood Model	4.6	9.0
Lung Model	4.5	9.1
Digestive System Model	4.3	9.2
Parasite Lab	3.2	8.4
Fruit Injection Lab	4.0	9.3
Vet. Terms Model	4.0	9.4

Project Objective Four

Project objective four was to increase comprehension and knowledge retention through experiential learning. All eleven students responded in every blog that the use of experiential learning activities were helpful in increasing their knowledge and understanding of the unit content.

Female3 wrote: "The use of the hands-on activity for the Veterinary Science Terminology Model increased my knowledge and understanding of the Veterinary Science Terminology Model content because it made me understand a little more than I did. We took a pig picture and a cow picture and we matched terms up to where they went. When it came to the test, I could remember it and look back on what we had done."

All eleven students also responded in every blog that the activity was connected to the curriculum in a way that they could relate the two. When referring to the lung model activity, Female10 wrote in her blog: "In this model, we used a straw as our trachea, a bottle for a thoracic cavity, and balloons for lungs. I learned how the respiratory system worked in our bodies, and using this hands-on activity was very helpful."

Table 2

Student	Q1	Q2	Q3	Q4	Q5	Q6
Female1	Mixture of all three-x7	Performing activity that relates to the curriculum.-x7	5,4,3,4,5,5,6	Helpful-x5 Slightly Helpful-x1 Very Helpful-x1	Very Helpful-x6 Helpful-x1	Hands-on-x6 Regular classroom learning-x1
Female2	Visual & Hands-on-x3 Visual-x3 Hands-on-x1	Seeing & Hands-on helps the same-x2, Visual-x4, Hearing teacher and seeing model-x1	6,5,6,6,3,3,6	Helpful-x5 Very useful-x2	Helps me understand-x2, Very Helpful-x2, Helped my knowledge-x1 Useful-x2	Hands-on-x3, Regular classroom learning-x4
Female3	Mixture of all three, but mostly kinesthetic.-x7	Performing an activity that relates-x7	6,6,5,5,6,7,7	Regular classroom learning increased my knowledge and understanding-x7	Hands-on activities increased my knowledge-x7	Hands-on increased learning the most.-x7
Female4	Hands-on-x2, Auditory-x1 Mixture of three-x4	Performing an activity that relates.-x7	2, 2, 2, 1, 2, 5, 5	Regular classroom is really hard but kind of helpful.-x7	Very helpful and fun-x7	Hands-on-x7
Female5	Kinesthetic-x7	Kinesthetic-x6, Visual and Kinesthetic-x1	2, 1, 1, 1, 2, 3, 6	Helpful-x7	It was helpful.-x7	Hands-on helped the most.-x7
Female6	Mixture of the three.-x4, Kinesthetic-x3	Performing and activity.-x7	5, 7, 6, 6, 6, 4, 6	Very helpful-x2, Helpful-x5	Very helpful-x7	Hands-onx7
Female7	Kinesthetic-x3, Visual and kinesthetic-x4	Performing an activity-x5, Mixture of three-x2	0,0,0,4,4,5,5,5	Helpfulx3, Helped mex3, Helped further my knowledge-x1	Very helpful-x4, Helped to better understand-x2, It excelled the knowledge I had previouslyx1	Hands-on-x7
Female8	Kinesthetic-x7	Performing an activity-x7	4, 5, 7, 3, 7, 5, 5	Helpful-x5, not helpful-x2	Helpful-x7	Hands-on-x7
Female9	Hands-on activity-x4, Kinesthetic-x3	Performing an activity-x7	5,5,5,5,3,8,8	Not helpful-x6, Helped some-x1	Helpful-x4, Very helpfulx3	Hands-on-x7
Female10	All three ways-x2, Hands-onx5	Hands-on-x1, Performing activity-x2, Visual and Hands-on-x3, Hearing teacher-x1	6, 5, 5, 5, 8, 6, 7	Regular strengthened my knowledge-x1, Always helps me-x1, beneficial-x3, both, helps fill me in-x1, Before activity helps me understand much better-x1	Helps me much more besides just hearing.-x1, Helped me to greatly increase my knowledge-x3, breaks down the unit more.x-3	Hands-onx2, Kinesthetic teaches me morex1, Regular helped me morex2, Both helpedx2
Male 1	Hands-on-x7	Performing activity related to curriculum-x6, Hearing the information-x1	1x7	Not helpful-x3, Helpful-x4	Helpful-x7	They help me learn the same-x3, Hands-on-x4

Table 3

Student	Q7	Q8	Q9	Q10	Q11	Q12	Q13
Female1	9,9,9,9,10,10,10	Yes, it was connected.-x7	Yes, would recommend.-x7	Yes, would recommend.-x7	Vaccine-x2, Fecal-x1, Bone-x2, Blood Model-x2	Regular Classroom Learning-x7	Being around veterinarian.-x7
Female2	8,9,9,9,7,9,9	Yes, it was connected/related.-x7	Yes, would recommend.-x7	Yes, would recommend.-x7	Bone model-x5, Injection lab-x2	Hands-on first, then regular classroom learning-x4, Regular classroom learning then hands-on-x3	Raised horses and pigs-x5 grandma had cancer-x1, want to be an RN-x1
Female3	10,8,8,9,9,10,10	Yes, it relates.-x7	Yes, I found it helpful.-x7	Yes, I found it helpful.-x7	Kinesthetic learning.-x7	Regular classroom learning and then hands-on.-x7	Small animal care-x7,
Female4	10x7	Connected very well with curriculum.-x7	Yes, recommende d.-x7	Yes, recommende d.-x7	Bone model.-x7	Regular classroom learning and then hands-on.-x7	Other agriculture classes.-x7
Female5	9,9,9,10, 8, 9, 10	Yes, it linked the units very well.-x7	Yes, recommende d.-x7	Yes, recommende d.-x7	Bone model.-x7	Teaching then hands-on.-x7	Anatomy class.-x7
Female6	9,9,8,9,9,8	Was related to the unit.-x7	Recommend ed-x7	Recommnde d-x7	Bananax2, Lungx5	Regular classroom learning then hands-onx7	Small Animal Care class-x7
Female7	10,10,9, 10,10,10,10	Yes, it related.-x7	Yes, recommende dx7.	Yes, recommende d.x7	Lung modelx7	Regular classroom instruction followed by hands-on-x7	No previous experience-x5, anatomy class-x2
Female8	10, 9, 9, 9, 9, 7, 8	Yes, it related.-x7	Yes, recommende d.-x7	Yes, recommende d.-x7	Lung model-x7	Hands-on-x7	Small Animal Care-x7
Female9	10, 10, 8, 10, 10, 8, 9	Yes, it was related.-x7	Yes, recommende d.x7	Yes, recommende d.x7	Banana-x2, Blood model-x2, Lung-x3	Hands-on to regular classroom learning-x7	Agriculture Classes-x7
Female10	9, 9, 8, 9, 10, 9, 8	Related or connected.-x7	Yes, recommend.-x7	Yes, recommende d.-x7	Bone model-x7	Regular classroom instruction then hands-on-x7	Owning horses-x7, Family health problems-x1
Male1	5, 7, 7, 10, 7, 10, didn't answer one	Yes, it was related.-x7	Yes, recommende d.-x7	Yes, recommendd -x7	Bonex2, Bloodx1, Lungx1, Bananax2, Digestive-x1	Bothx4, Regular classroom learning then hands-onx3	Small Animal Carex6, Biologyx1

Chapter Five

Conclusion

The purpose of this project was to determine if experiential learning activities would prove beneficial in agriculture education. As previously mentioned, individual students learn in different ways, and a single classroom may be composed of students with a vast array of learning differences. Some students may learn by hearing the teacher's instruction, others may be visual learners, while others may have to complete a hands-on activity to increase their knowledge and understanding of the content. It is believed by many that experiential learning combines auditory, visual, and kinesthetic learning to allow students to use all of the senses to better comprehend the content and that the use of experiential learning in the classroom enhances student comprehension (Austin, 2015). As predicted, all eleven students felt that experiential learning activities were beneficial in learning the content in each unit. Although students' answers varied, the objectives were met that indicated that experiential learning was beneficial for the Veterinary Science class. Student participants also felt that next year's Veterinary Science class, in addition to other Agriculture courses, would benefit from participating in experiential learning activities.

Implications of the Findings

There are several implications as a result of the findings in the project. As the objectives were met determining that experiential learning activities were beneficial in agriculture education, the Experiential Learning Theory will be incorporated into next year's Veterinary Science class, in addition to other agriculture classes. As 100% of the student participants answered, experiential learning activities would be helpful in understanding the curriculum in

all agriculture-related courses. As Female4 answered when asked if experiential learning would benefit other agriculture classes, “Yes, it would help everyone because it would catch their attention in a fun learning way.” Female2 answered “Yes, because agriculture sometimes is hard to understand and hands on work explains it better.”

Another point in the findings is the decision to have regular classroom instruction first and then the activity, or vice versa. Eight of the student participants favored the scenario of regular classroom instruction and then the activity, 100% of the time. One student favored the opposite in every blog. Two other students answered half of their blogs to favor the first scenario and the other half to favor experiential learning and then regular classroom instruction. Because the majority of the participants favored regular classroom instruction and then the activity, instruction will typically always occur in this way.

Research conducted for the Literature Review suggests that females tend to learn better by hands-on experience, whereas males prefer a more logical or analytical method to learning (Kulturel-Konak, 2011). The results of this project suggest that one may disagree with this statement. The student participants consisted of a 10:1 female to male ratio. While the results may have been different if more males had been enrolled in the class, the only male in the class answered every blog that he learned best with experiential learning and by performing an activity that related to the curriculum. While he found regular classroom instruction helpful in learning during four out of the seven units, he stated that it was not helpful during the other three units. In addition, he stated that the activity was helpful in every unit.

The use of technology has increased drastically with the dawn of the digital age and recent increases in technological advances, interactive tools, multimedia, and software. Unfortunately, this has enabled students to manipulate an activity without having a true hands-on experience. To counteract this, one can incorporate technology within experiential learning activities or use technology to test students' comprehension of the content. This project allowed students to use technology to blog about their experiences. While many of the female participants didn't mind completing the blogs, a few females and the male participant did not enjoy blogging.

Recommendations

When selecting participants, an already existing or intact group was chosen. The Veterinary Science class was chosen which consisted of ten females and one male. This experiment was easily performed due to the small size of this class, however; if this project were completed again, varying the population to include a larger group would be considered. This would give the opportunity for more data to be evaluated and would likely also incorporate a more evenly dispersed male to female ratio.

Many school programs do not possess the finances to purchase teaching kits or other tools that could be used for experiential learning activities in the classroom. Within this project, all of the activities were found on the Pinterest website. In addition, all of the materials used for the activities were purchased at the Dollar General store. This could be beneficial for any teaching program, as students were able to better understand the content through experiential learning activities, while keeping a small program budget.

This project allowed students to use technology to blog about their hands-on experiences; however, before this project, none of the students in the Veterinary Science class had blogged before. If this project were to be performed again, I think it would be beneficial to allow extra time to teach students how to blog and become more acquainted with the blog site being used.

While many of the female participants didn't mind completing the blogs, a few females and the male participant did not enjoy blogging. To alleviate this issue, I believe that the blog assignment could be adapted to fit the students' strengths and talents, yet still challenge them academically. For example, students could be given the choice of answering questions, synthesizing their work in 25 words, or finding pictures or articles that relate to the activity being performed.

Many of the student participants found the questions that guided their blog writing repetitive. If this project were repeated, it is suggested that the questions that guide students' writing be condensed. For example both Questions 1 and 2 asked the students how they learn best. Question 1 asked in terms of choosing auditory, visual or kinesthetic learning; while Question 2 asked whether students liked to hear, see, or perform an activity related to the content. This could easily be condensed into one question. In addition, Question 9 asked if students' recommended experiential learning activities be completed by next year's Veterinary Science students, while Question 10 asked if students' recommended that experiential learning activities be completed by students in other Agriculture courses. These two questions could also be made into one.

In this project, I used blogging simply as a tool for collecting data; however, I believe that blogging could be used in the place of lab reports in which students could be graded on their work and how well they understand the content. Blogging also incorporates technology into the curriculum, allowing the students to become more familiar with technical advancements that will likely continue into their future.

Many of the students felt that the parasite lab was less interactive than the other activities. During the parasite lab, students looked through the microscope to find signs of parasites in equine fecal matter. In the other activities, students had to create models to better understand the current content. If teachers were to incorporate experiential learning activities into their curriculum, it is suggested that they select interactive kinesthetic learning activities that will actively engage all students in the class.

In conclusion, experiential learning is not only beneficial to agriculture classes, but could also be incorporated into other STEM-related courses. The kinesthetic learning process is not exclusive to agriculture programs, and could also be included in other disciplines and in lower and higher levels of education.

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