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IDT603 (Instructional Design and Technology I):

Design Document

Submitted in partial fulfillment of the requirements for the degree of
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By

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To

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Remember to [update the Table of Contents](#) before each submission of the template for grading.

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Content Coverage

The goal of the instruction is to train veterinary medical and surgical staff to take digital dental radiographs of the dog and cat.

The content of the course should first allow the participant to quickly navigate through each of the steps in the goal sequence. Secondly, the content should provide active learning to build the confidence of the participant. Building participant confidence will assure better retention of the skill and assure the passing of the skill to the participant's clinic environment (Handshaw, Designing for the classroom -virtual and live, 2014). The content will also have assessments at pre-determined points throughout the training. Assessments will be given at the end of each unit to ensure the material is completed. Assessments will be set up to be repeated to allow the participant to improve results as needed.

The course is divided into three sections: pre-training, active training, and post-training. Pre-training materials will be reviewed and completed by the participant before the active training session. Active training materials will be reviewed and completed during the face-to-face portion between the participant and the trainer. Post-training materials will be reviewed and completed immediately after the active training with an available. The post-training session may have a continuing education component added to allow participants to ask questions and test skills.

Pre-training session.

The pre-training is online. A course will be designed to prepare the participants for the future active learning session. The pre-training session will cover prerequisite skills and knowledge listed in the next session.

Subordinate and Prerequisite Skills and Knowledge

The subordinate and prerequisite skills show the knowledge that is required by the participant before and after the training. Based on the survey and needs analysis, the required skills are listed below.

1. Recognize and locate the four types of teeth in the oral cavity of the dog and cat.
2. Charting the oral cavity utilizing the Modified Triadan Numbering system
3. Radiation safety and regulations as it applies to your state.

Pre-Training Script

1.0 Learning Environment: Asynchronous E-Learning

1.1 Preparation

- 1.1.1 Participant list with names and confirmed emails collected thirty days before the start of the pre-training session
- 1.1.2 Course link with completion deadline to be sent to participants 14 business days before the start date of the active training session. Participants will not be allowed to join the active training session unless they have completed the pre-training session.

1.2 Potential Learning Software – Adobe Captiva, Storyline or Moodleroom

1.3 Course Components

1.3.1 Syllabus and Course Overview

1.3.1.1 Purpose: To navigate the participant through the course goals and objectives.

1.3.1.2 Include disability statement.

1.3.1.3 Provide unit titles and learning objectives with hyperlinks to the course location

1.3.1.4 List each assignment with a hyperlink to each assignment.

1.3.1.5 Add button to ensure the participant has read and understood the syllabus.

1.4 Unit 1: Oral Anatomy of the Dog and Cat

1.4.1 Rationale: Recognizing the oral anatomy of the dog and cat ensures correct placement of the digital x-ray sensor plate.

1.4.1.1 Unit 1: Section 1: Oral Anatomy of the Dog

1.4.1.1.1 Objective: Identify the oral anatomy structures of the dog.

1.4.1.1.2 Sources of Content

1.4.1.1.2.1 7-10-minute video clip with a dog model

pointing out the required oral anatomy. Each video will be closed-captioned with transcripts available for accessibility.

1.4.1.1.2.2 Easy to read downloadable diagram(s) showing the oral anatomy points of the dog. The

diagrams will correspond with the information shown in the video clips. Another option would be to provide a slide from the video clip, so the information matches.

1.4.1.1.3 Assessment 1: Each video clip will have three -five interactive multiple-choice questions to test comprehension of the video content.

1.4.1.1.3.1 The participant will need to achieve 100% in these quizzes to move forward in the course.

1.4.1.2 Unit 1: Section 2: Oral Anatomy of the Cat

1.4.1.2.1 Objective: Identify the oral anatomy structures of the cat

1.4.1.2.2 Sources of Content

1.4.1.2.2.1 7-10-minute video clip with a cat model pointing out the required oral anatomy. Each video will be closed-captioned with transcripts available for accessibility.

1.4.1.2.2.2 Easy to read downloadable diagram(s) showing the oral anatomy points of the cat. The diagrams will correspond with the information shown in the video clips. Another option would

be to provide a slide from the video clip, so the information matches.

1.4.1.2.3 Assessment 2: Each video clip will have three -five interactive multiple-choice questions to test comprehension of the video content.

1.4.1.2.3.1 The participant will need to achieve 100% in these quizzes to move forward in the course.

1.5 Unit 2: Charting the Oral Cavity Using the Modified Triadan Numbering System

1.5.1 Rationale: The Modified Triadan Numbering System is used for identification of images on the full mouth x-ray template used in the software.

1.5.1.1 Unit 2: Section 1: The Modified Triadan Numbering System in the Dog

1.5.1.1.1 Objective: Label the dog dentition using the Modified Triadan Numbering System.

1.5.1.1.2 Sources of Content

1.5.1.1.2.1 7-10-minute video clip using a dog dental chart to demonstrate how the Modified Triadan Numbering System works. Each video will be closed-captioned with transcripts available for accessibility.

1.5.1.1.2.2 Easy to read downloadable dog dental chart

labeled using the Modified Triadan Numbering System. The diagrams will correspond with the information shown in the video clips.

1.5.1.1.3 Assessment 1: Each video clip will have three -five interactive multiple-choice questions to test comprehension of the video content.

1.5.1.1.3.1 The participant will need to achieve 100% in these quizzes to move forward in the course.

1.5.1.2 Unit 2 Section 2: The Modified Triadan Numbering System in the Cat.

1.5.1.2.1 Objective: Label the cat dentition using the Modified Triadan Numbering System.

1.5.1.2.2 Sources of Content

1.5.1.2.2.1 7-10-minute video clip using a cat dental chart to demonstrate how the Modified Triadan Numbering System works. Each video will be closed-captioned with transcripts available for accessibility.

1.5.1.2.2.2 Easy to read downloadable cat dental chart labeled using the Modified Triadan Numbering

System. The diagrams will correspond with the information shown in the video clips.

1.5.1.2.3 Assessment 2: Each video clip will have three -five interactive multiple-choice questions to test comprehension of the video content.

1.5.1.2.3.1 The participant will need to achieve 100% in these quizzes to move forward in the course.

1.6 Unit 3: Radiation Safety

1.6.1 Rationale: Radiation is a hazardous substance in veterinary clinics. Dental x-ray units emit radiation when the image is exposed. Radiation safety needs to be practiced keeping staff members safe.

1.6.1.1 Unit 3: Section 1: Components of the Dental X-ray Generator

1.6.1.1.1 Objective 1: Identify the parts of the dental x-ray generator.

1.6.1.1.2 Sources of Content

1.6.1.1.2.1 7-10-minute video clip identifying the parts of the dental x-ray generator. Each video will be closed-captioned with transcripts available for accessibility.

1.6.1.1.2.2 Easy to read downloadable series of photographs of the dental x-ray generator with the parts labeled. The photographs will

correspond with the information shown in the video clips.

1.6.1.1.3 Assessment 1: Each video clip will have three -five interactive multiple-choice questions to test comprehension of the video content.

1.6.1.1.3.1 The participant will need to achieve 100% in these quizzes to move forward in the course.

1.6.1.1.4 Objective 2: Describe the function of each part of the dental x-ray generator.

1.6.1.1.5 Sources of Content

1.6.1.1.5.1 7-10-minute video clip describing the function of each part of the dental x-ray generator. Each video will be closed-captioned with transcripts available for accessibility.

1.6.1.1.5.2 Easy to read downloadable series of photographs. The photographs will show the part of the generator labeled with a written description of the function of the part. The photographs will correspond with the information shown in the video clips.

1.6.1.1.6 Assessment 1: Each video clip will have three -five interactive multiple-choice questions to test comprehension of the video content.

1.6.1.1.6.1 The participant will need to achieve 100% in these quizzes to move forward in the course.

1.6.1.2 Unit 3: Section 2: Dental X-Ray Safety.

1.6.1.2.1 Objective: Describe the steps necessary to practice dental x-ray safety.

1.6.1.2.2 Sources of Content

1.6.1.2.2.1 A 7-10-minute video clip demonstrating the steps necessary for dental x-ray safety. Each video will be closed-captioned with transcripts available for accessibility.

1.6.1.2.2.2 Easy to read downloadable graphic with the steps necessary to practice dental x-ray safety. The graphic will correspond with the information shown in the video clips.

1.6.1.2.3 Assessment 2: Each video clip will have three -five interactive multiple-choice questions to test comprehension of the video content.

1.6.1.2.3.1 The participant will need to achieve 100% in these quizzes to move forward in the course.

1.7 Participant Feedback

- 1.7.1 Three to five questions will be asked to gain participant feedback about their experience of the course. The questions will be asked using a range scale format.
- 1.7.2 There will be two additional mandatory short answer questions.
 - 1.7.2.1 What was the most beneficial part of the course and why?
 - 1.7.2.2 What was the least beneficial part of the course and why?
- 1.7.3 Completion certificate; The certificate will be issued to the participant once the feedback survey is completed.
- 1.7.4 Instructions requiring participants to bring their certificates to the active training session.

Active Training Session

The Active Training Session will provide skill building through interaction with course materials and the trainer. An agenda is distributed to the participants which divide the training into units with activities attached to each unit.

Script for Active Training Session

1.0 Learning Environment: Face-to-face classroom

- 1.1 Rationale: The face-to-face classroom is the best choice because the learning will require the participant to interact with the material physically.

1.2 Preparation

- 1.2.1 Send an email to participants with e-learning course link and instructions.
Enclose date, time and address for the active training session.
- 1.2.2 Confirm that the clinic has ordered cadaver specimens.
- 1.2.3 Confirm that the clinic has tested the x-ray equipment and software to ensure that it is working properly.
- 1.2.4 Confirm the trainer has adequate dental models.

1.3 Activity Agenda

- 1.3.1 List learning objectives for each unit
- 1.3.2 List the activity and performance outcomes for each listed objective.
- 1.3.3 Print a copy for each participant

2.0 Unit 1: E-Learning Review

2.1 Rationale: To confirm the participants have prepared for the Active Training Session.

To make sure there were no further questions.

- 2.1.1 Unit 1: Section 1: Dental Anatomy
 - 2.1.1.1 Objective: Identify the oral anatomy structures in the dog and cat.
 - 2.1.1.2 Performance Outcome: Participants perform identifying the oral anatomy structures using the dog and cat model.
 - 2.1.1.3 Assessment 1: Participant performance is measured using a checklist.
- 2.1.2 Unit 1: Section 2: The Modified Triadan Numbering System
 - 2.1.2.1 Objective: Demonstrate the Modified Triadan Numbering System in the dog and cat.

2.1.2.2 Performance Outcome: Participants count the teeth on a dog and cat model using the Modified Triadan Numbering System.

2.1.2.3 Assessment 1: Participant performance is measured using a checklist.

2.1.3 Unit 1: Section 3: The Dental X-ray Generator

2.1.3.1 Objective: Identify the parts of the dental x-ray generator

2.1.3.2 Performance Outcome: Participants point out and identify the parts of the dental x-ray unit.

2.1.3.3 Assessment 2: Participant performance is measured using a checklist.

2.1.4 Unit 1: Section 3a: The Function of the Components of the Dental X-ray Generator

2.1.4.1 Objective: Describe the function of each part of the dental x-ray generator.

2.1.4.2 Performance Outcome: Participants verbally describe the function of each component of the x-ray generator.

2.1.5 Unit 1: Section 4: Dental X-ray Safety

2.1.5.1 Objective: Identify the steps required to practice x-ray safety.

2.1.5.2 Performance Outcome: Participants verbally present the steps required to practice x-ray safety

2.1.5.3 Assessment 3: Participant performance is measured using a checklist.

3.0 Unit 2: Sensor placement

3.1 Objective: Identifying the appropriate teeth, set up the correct location of the sensor.

3.1.1 Performance Outcome 1: Given a specific oral location to radiograph, the participant will point to the requested location on the dental model.

Proficiency will show the participant is confident with oral anatomy.

3.1.2 Assessment 4: Direct observation

3.1.3 Performance Outcome 2: The participant will verbally justify the best position of the sensor plate to obtain the requested radiograph.

Proficiency will show the participant remembered the sensor positioning portion of the demonstration. The participant understands the interrelation between correct identification of the teeth and placement of the sensor.

3.1.4 Assessment 5: Direct observation

3.1.5 Performance Outcome 3: The participant will position the plate in the dental model. This step demonstrates active engagement for the participant.

3.1.6 Assessment 6: Direct observation

4.0 Unit 3: Tube Head Angulation

4.1 Objective 1: Confirming correct placement of the sensor, set up the correct angulation of the tube head.

4.1.1 Preparation: The trainer demonstrates the correct angle for each view.

4.2 Performance Outcome 1: The participant will select the correct angle using the protractor on the tube head.

4.3 Assessment 7: Direct observation.

4.4 Performance Outcome 2: The participant aligns the tube head over the sensor.

4.4.1 Preparation: The trainer demonstrates the correct angle for each view. The trainer demonstrates aligning the tube head over the tube head.

4.4.2 Assessment 8: Direct observation.

5.0 Unit 3: Troubleshooting the Dental Radiograph Image.

5.1 Objective: Identify solutions to technical errors found on the finished dental radiograph.

5.2 Preparation: The trainer will provide a lesson on the components of a dental radiograph using a dental image.

5.3 Performance Outcome 1: The participant will explain the components of a diagnostic radiograph.

5.4 Assessment 9: Direct observation.

5.5 Performance Outcome 2: Presented with the completed radiograph, the participant will analyze the result for positioning, completeness, and technical errors.

5.6 Assessment 10: Direct observation.

Post Training Session

The post-training session will gather feedback from the participants. The survey results will then be compared with the feedback from the pre-training session and observations of the active session to make modifications to the course design.

1.0 Learning Environment: Digital Survey

1.1 Preparation

- 1.1.1 Create a digital survey with the ability to record submissions.
- 1.1.2 Provide the participants with the survey link to get results quickly.
- 1.1.3 Question types:
 - 1.1.3.1 Rating scale
 - 1.1.3.1.1 Rationale: Answers are assessed a point value. Data shows how well the course achieved its goals.
 - 1.1.3.2 Short answer
 - 1.1.3.2.1 Rationale: allows the participants to be more honest with their answers.
 - 1.1.3.2.1.1 Two questions:
 - 1.1.3.2.1.1.1 What was the most beneficial part of the course and why?
 - 1.1.3.2.1.1.2 What was the least beneficial part of the course and why?

Organizational Impact

Effective skills and techniques for taking dental radiographs using proper positioning of the digital sensor improve assessment and diagnosis of pathology. Historically, many clinics did not have a dental x-ray unit. Due to changes in standard of care, many clinics are acquiring dental x-ray units and want to provide full -mouth radiographs to all of their dental patients as quickly as possible. Th reason is two-fold: 1) the equipment is expensive and the sooner they start

providing dental x-ray services, the sooner they can pay off the unit, 2) the radiographs improve the diagnosis of pathology.

Unfortunately, taking dental x-rays in the dog and cat has a steeper learning curve than when learning to take them on people due to differences in oral anatomy. The goal of the training is to teach the participants enough positioning skills to be able to take dental radiographs. Clinic management wants to get the service up and running smoothly as quickly as possible.

Target Audience

Analyzing the characteristics of your target population involves investigation of general participant demographics by age, physical limitations, and gender, what motivates learning, their work, cultural and political environment. Secondly, getting information on what the learner already knows about the intended training topic. Analysis on both the target population and the current level of knowledge will affect the choice of content and how one will design how the content will be best used for the training (Handshaw, Getting real value from analysis, 2014). The analysis helps the designer to fit the learner's needs.

Participants come from a veterinary clinic. An ongoing survey of previous participants at previous trainings shows they vary in age, education, work experience, and duties. Participants are mostly women. All participants have a high school diploma. Of those, 40 % have continued their education towards becoming a certified veterinary assistant or a credentialed veterinary nurse (technician) (Perrone, 2018). The participants range in age from 18 to 60-year-old range. The highest number is in the 21-30-year-old range which makes them Millennials (Perrone,

2018). Millennials, sometimes called Generation-Y are avid consumers and sociable to foster their need to belong. Millennials are eager to learn but become frustrated if the knowledge does not come quickly (Generational differences chart). If the skill is not swiftly learned, they might not continue trying. This behavior portrayed by Millennials needs to be addressed in the learning environment through active learning activities (Therrell, 2015).

Another consideration is the variability of skill level in dentistry. Some participants either perform dental procedures or are learning to perform dental procedures. According to Lobprise, knowledge, skills and abilities of dental procedures and materials is required if one is to become an effective dental assistant (Lobprise, 2012). The dental procedures commonly performed by staff members are charting oral exam findings in a dental record, cleaning and polishing the teeth, taking full mouth radiographs, and assisting the doctor with oral surgical procedures. Performing an oral exam, cleaning the teeth and taking full-mouth radiographs requires training.

Learning Environment

A common link between the certified/credentialed staff and the clinic trained staff is hands-on training. In veterinary technician and veterinary assistant programs, medical and clinical skills are taught hands-on, and the student must perform the skill hands-on to complete the program (AVMA, 2018). Clinic trained staff are also trained hands-on either by a staff veterinarian, nurse, or veteran staff member. Medical and clinical skills are limited to those

procedures performed in that hospital. Hands-on training is the mainstay of learning skills in a veterinary practice.

In the traditional learning environment, the experience is passive when the instructor presents the content, and the student recalls it later. Vakhtina noted that when the experience is active, there is increased interaction between student and teacher (Vakhtina, 2015). In Butler's research the active training increases audiovisual associative recognition as the student physically interacts with the course content (Butler, 2013).

Environmental factors are taken into consideration when designing the learning environment. An analysis of the learning environment is required to ensure it provides the most benefit to the participant (Morrison G. R., 2012). The training program is a hybrid course combining a self-directed online classes as a preparation for the face-to-face, hands-on class where the experiential learning takes place.

The face-to-face course will take place in the treatment area of the veterinary clinic. The atmosphere in the treatment area can range from being chaotic if the clinic does not close while the training is taken place to quiet and focused if the clinic is closed for the training. When performing the training when the treatment area is active, it is imperative that the trainer keep the training group together to maintain participant focus. Training equipment needs to be set-up ahead of time and kept close-at-hand to keep the training moving smoothly and efficiently.

Table 1 looks at the considerations when choosing components of the learning environment for this project.

Table 1

Instructional Environment Analysis

Phase of Training	Environmental Factor	Considerations
Pre-Training Session	Online platform. Students will navigate through this course using self-instruction.	<ol style="list-style-type: none"> 1. M-Learning – the course needs to be accessible by the student on laptop/desktop, cell phone or tablet. 2. Navigation- links to the course components need to be implemented. 3. Prototype – once the online course is completed, find volunteers to test the prototype and give feedback. 4. Certificate of completion needs to be printable or downloadable as a pdf file.
Phase of Training	Environmental Factor	Consideration
Active Training	Lighting. The oral cavity requires illumination to help the participant visualize where to place the sensor and tube head.	<ol style="list-style-type: none"> 1. The surgical lighting on the dental table is used to illuminate the oral cavity. 2. The light can be a mounted ceiling unit or a mobile unit.
	Noise	<ol style="list-style-type: none"> 1. Training will take place in a treatment area to accommodate 1-10 staff members. 2. In some circumstances, the treatment area will be in use by staff members not participating in the

		training. Request that music is turned off and ancillary staff keeps the noise level down to a minimum.
	Temperature	1. The temperature is adjustable upon request of the clinic management.
	Room layout	<ol style="list-style-type: none"> 1. The training takes place in the clinic treatment area. Specifically, around the treatment table where the dental procedures are performed. 2. A second table or counter holds the laptop with the dental software connected to the sensor. This is within hands reach of the dental treatment table. 3. A seated waiting area will be provided that is six feet away from the treatment table to prevent radiation exposure. 4. A third table will be located in the seating area. The trainer's laptop sits on this table for presentation of materials.
Phase of Training	Environmental Factor	Consideration
Post-Training Session	Online survey	1. The survey is accessible through an online survey program.

		<p>2. The survey is accessed through the cell phone or tablet of the participant at the completion of training.</p>
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The participants will be from the same veterinary clinic. In the clinic setting, it is best not to have one person be in charge of learning a new skill. If that person becomes sick or leaves the clinic, they will have no one who can perform that skill. Training multiple participants will avoid a disruption to the dental service.

Existing Instruction and Resources

When identifying instructional resources, it is important to remember that the content must be effective and efficient with a focus on essential knowledge and skills that the participant will retain. The next step is to integrate technology that expands the content to the diversity of the participants. The way a participant grasps a concept can vary from individual to individual. The goal is to find a way to present a concept or fact that resonates and engages the participant. The more the content resonates, the more likely it will be retained (Morrison G. R., 2012, p. 138). The combination of good content and well-chosen technology is a course that supports evidence-based practice, critical thinking, and clinical judgment skills (Wiles, 2015).

Two types of materials are chosen for the training. The first type of materials should cover information and instructions. These materials will help the participant to navigate through the course easily. The second type of materials should provide active, engaged learning and feedback. Both types of materials should not be presented concurrently since this will

overwhelm the participant. Instead, the types of material will be chosen based on the tasks listed in the goal sequence section. In some cases, the task will require both the first and second type.

Table 2 reviews existing instructional resources and assess their current use for this project.

Table 2

Existing Instructional Resources

Existing Instruction Resource	Rationale	Validation or Modification
Veterinary textbooks by board-certified veterinary dentists or veterinary technician specialists in dentistry.	Most books have a section on the dental radiographic equipment, basic techniques, and dental anatomy.	Book information must be current and relevant to the training. Choose books from 2013 to present
Veterinary radiology textbooks by board-certified dentists or veterinary technician specialists in dentistry	These books cover dental radiographic technique, positioning, and equipment in greater detail.	Book information must be current and relevant to the training. Choose books from 2013 to present
Dental x-ray equipment and any software information are found through the manufacturer.	Manufacturer websites can also be an excellent source of information in multimedia formats such as graphics and product videos (Digital Dental X-Ray, 2018).	The product information requires permission for the use of any of their graphics. Materials must match the equipment found in the clinic.
American Veterinary Dental College www.avdc.org	Current dental terminology Current dental radiographic terminology	This site keeps an updated database of high-quality photographs which are for presentation and teaching with permission.
Journal of Veterinary Dentistry (JVD)	The JVD is the international journal for	This journal is an excellent resource for the

<p>http://journals.sagepub.com/home/jovb</p>	<p>veterinary dentistry. It focuses on high-quality research topics on the subject. It also has articles that educate the general practitioner.</p>	<p>latest in dental radiographic research.</p>
<p>Synthetic dental models</p>	<p>Used to point out anatomy. They are designed to look real.</p>	<p>Are not identical to real life and cannot be used to teach x-ray positioning. Fairly inexpensive.</p>
<p>Skull models</p>	<p>Used to point out anatomy. Used to teach positioning.</p>	<p>Are identical to real life. It is not a completely realistic experience as there is no soft tissue and manipulating the skulls can be frustrating. Fairly inexpensive.</p>
<p>Cadaver models</p>	<p>Used to teach positioning.</p>	<p>Are a real-life experience for the participant as all of the oral structures are present. They can be aesthetically displeasing to some participants. Bone skulls can be used in their place.</p>
<p>Dental X-ray Acquisition Software</p>	<p>Necessary when using a digital sensor for radiographs.</p>	<p>Software must link with the sensor. The clinic should test the sensor before training to ensure it is working properly. This avoids potential cancellation of the training.</p>

Existing and Emerging Technologies

The important rule when choosing technology is to prepare the training first and then fit the technology to the training (Piskurich, 2015). The technology should be kept as simple as

possible to avoid confusion on the part of the participant while they are in the course.

Technology will be chosen to support the three phases: the pre-training, active and post-training session.

Emerging technologies are tools and resources that can be used to improve the ability to teach, and the ability to learn (Consortium, 2017). The instructional content is the foundation of the course. Technologies are used to expand the reach of the content and make it more useful.

Table 3 reviews emerging technologies focusing on their benefits and limitations.

Table 3

Emerging Technology

Emerging Technology	Rationale	Benefit	Limitation
Synthetic cadaver head* http://syndaver.com/product-category/syndaver/vet/ *images on the website are graphic. I looked into this technology and requested the models have a hair coat.	The synthetic models would be a synthetic but a realistic model for hands-on training. Removes patient risk that comes from performing the training under anesthesia	<ul style="list-style-type: none"> • The trainer or vendor supply the model. • No need for the clinic to order cadavers which are frozen, supplies are limited • These models would be aesthetically pleasing to the participants. 	<ul style="list-style-type: none"> • Expense. The cost of building the prototype is \$20,000. To purchase a model would be \$2,000. • Getting it through TSA.
Shaderware http://www.shaderware.com/	Simulation training to allow the participants to practice the steps of the task.	<ul style="list-style-type: none"> • Participants practice on their own time before or after the hands-on training. 	<ul style="list-style-type: none"> • The cost would need to be supported by a corporate sponsor. • The trainer would need to

		<ul style="list-style-type: none"> Covers the basic radiographic tasks, theories, equipment, and safety allowing more time to practice complicated skills during the hands-on portion. 	<p>be available to handle technical problems and provide feedback and instruction support.</p>
<p>Simio https://www.simio.com/academics/student-resources.php</p>	<p>Simulation modeling framework to build a simulation from the ground up.</p>	<ul style="list-style-type: none"> New trainers try out their simulations as a test for peer feedback. A trainer builds a simulation organizing the task steps and instruction to their personal preferences. 	<ul style="list-style-type: none"> Learning the steps to making a simulation could take time. Troubleshooting errors in the function of the simulation. Finding objects that would mimic teeth and the radiographic equipment.

Project Sequence and Rational

Project Scope

Goal

The goal of this course is to provide dental radiograph training to veterinary staff.

Developing practical skills that last past the training event will efficiently integrate dental radiograph capabilities into the dental service of a veterinary clinic.

Target Audience

The target audience will be a combination of credentialed veterinary technicians, certified veterinary assistants, and on-the-job trained staff. The staff members will either be currently performing dental procedures or the in the process of being trained to perform dental procedures. In some cases, veterinarians will participate in the training.

Design Time/Milestones

Performance analysis and an analysis of the target audience for each training assignment will be completed in two weeks. The objectives will be written to address the needs found in the performance analysis and the target audience analysis. Material development will take two weeks. A beta test and pilot of the project will bring the development of the completed design in two months.

Delivery**Content**

The content of this project will cover dental radiography products, information, and positioning techniques researched through current veterinary dental literature. Materials and graphics will also be compiled using current veterinary literature. Content and materials for this project will be designed following the AECT Professional Code of Ethics to avoid copyright and privacy infringement and avoid any cultural or socioeconomic bias.

Method

The core delivery will be in two sessions – pre coursework and face-to-face sessions. The pre-course work will be delivered in an online classroom. The purpose of the pre-coursework is to prepare the participant for the face-to-face training session.

The online course will be monitored and assessed by the assigned trainer for technical issues with delivery and issues experienced by the user. Data will be collected and analyzed once a group has completed a session. Revisions to the software and delivery will be made before the next group begins the online course.

The face-to-face session will be taught in the requesting clinic by the assigned trainer. The face-to-face classroom is the best choice because the learning will require the participant to interact with the material physically. The purpose of the session is to provide skill building through interaction with course materials and the trainer.

The delivery of the face-to-face course will provide a condensed review of the pre-course work, and then the participants will be given activities to perform. Each activity will be demonstrated by the trainer. The participants will then repeat the activity. The participant's performance of each activity will be assessed and measured by the level of success required by the objectives.

Questions to Consider

Can we safely perform an audience analysis using a survey during the pre-coursework? The data would provide the trainer with much-needed information about the learning needs of the participant. The data is helpful in making content and material decisions.

Should there be a pre-test to assess whether a participant requires the pre-coursework? An option could be put into place to skip the course units and take the quizzes. An additional component is requiring the participant to submit one or a series of dental radiographs to prove competency. To add this additional component would require additional objectives and performance requirements to be developed which would require additional time.

What if a participant is not able to complete the pre-course work before the face-to-face session? There will be a review of the pre-coursework during the face-to-face. The participant could complete the quizzes that they would normally take online at the end of the review.

Objectives

Program

At the end of the program, the participant will be able to properly implement the procedures required to take dental radiographs on a dog and cat.

Supporting

At the end of the program, the participant will be able to: (1) identify oral anatomy structures in the dog and cat (2) identify and explain the parts and function of the dental x-ray generator (3) follow the procedures required when practicing dental x-ray safety (4) correctly place the digital sensor for each dental x-ray position (5) correctly angle the tube head to the sensor to produce an image of the tooth that is the correct length (6) identify technique errors on a dental radiograph (7) correct technical errors on a dental radiograph.

Training Materials

Training materials to be developed for the program include:

- Authoring system
- Test development software
- Media and graphics
- Dental models
- Dental x-ray generator
- Dental x-ray digital sensor and corresponding software
- Learning Management System (LMS) or Learning Content Management System
- Printed Materials
- Demonstration models
- Video clips
- 3D Simulation

Evaluation

Online Pre-Coursework

Assessment measurements will be taken after each lesson unit in the pre-coursework online session. Participants will be quizzed on their knowledge of multiple-question. The quiz is accessible until the participant has attained a score of 100%.

Face-to-Face Class Session

Assessments will be taken after the participant has attempted the scheduled activity. Measurements will be taken by the trainer using direct observation following the rubric criteria. Feedback will be verbally given to the participant after each activity.

Participant Feedback

Participants will be given the opportunity to share feedback on their experience with both the online coursework and the face-to-face session. Data from the participant feedback will be analyzed and used to make improvements to both course levels.

Design Principles

Interaction and Interactive Principles

When designing instruction, one needs to examine two tactics: 1) using instructional strategies that best suit the target audience, their KSAs, the learning environment, and 2) developing features in the content and instruction that interacts with the participant and engages the mind. Interaction can take place on a human to human level, on a human to social media level and on a human to technology level. According to Moore and Kearsley (2012), what is important regarding interaction is the closer the participant is to the content, the more engaged the participant and the deeper the learning experience.

Van Merriënboer and Merrill (2018) took this theory further and found that integrating the participant's knowledge skills and abilities with the skills they are learning during the training will allow the transfer of the new material to new problem situations. When you update knowledge, skills, and abilities, they do not fade away once the learner has completed the training. Updating knowledge, skills, and abilities cause a transfer of learning (Van Merriënboer, 2018). As technology becomes more complex, the related tasks to learn the technology become more complicated. The training increases from just learning the steps to

learning how to solve problems and think creatively to adjust to the challenges of the task. Van Marrienboer calls this “complex learning” (p. 2). The holistic design approach attempts to integrate the potential challenges of the task as each step is taught.

In the current training project, the needs analysis, previous trainees were unable to carry the skills they had learned past the training. These trainees were either unable to recall the steps of the task or could not troubleshoot a techniques error within an acceptable timeframe which caused delays in the dental procedure, which produces increased anesthesia time for the patient which can lead to increased risk to the patient. Stress ensues.

A more holistic design approach will facilitate the transfer of learning by integrating the basic steps as the task that form the knowledge base with problem-solving skills to solve the potential technical errors. Table 4 looks at the alignment of the teaching strategies found in InterPLAY and how they affect the interaction of the participant with the content.

Table 4

Teaching Strategies and Participant Interaction

Teaching Strategy - InterPLAY	Interaction	Intended Achievement
<p>Expose The trainer exposes the task to the participant using demonstration.</p>	<p>Trainer ↔ Participant</p>	<p>The participant recalls each of the steps which will establish the knowledge base which is the foundation for each skill. This sets up the desire to learn and stimulates curiosity.</p>
<p>Inquire This strategy validates the success of the demonstration.</p>	<p>Trainer ↔ Participant</p>	<p>The participant asks questions in there are challenges in understanding. The demonstration will stimulate the participant's curiosity by setting up an activity for them to do.</p>

<p>Discover Problem-solving techniques</p>	<p>Participant ↔ Skill ↔ Trainer</p>	<p>Potential challenges within the task are reviewed along with how to resolve the challenge. What constitutes a successful image? What do technique errors look like?</p>
<p>Create Interactive engagement with the subject matter</p>	<p>Participant →Dental X-ray Equipment</p>	<p>This interaction stimulates the participant with physical engagement with the dental x-ray equipment. The trainer provides feedback on participant performance.</p>
<p>Experiment How do we measure success? It is more than being right or wrong.</p>	<p>Participant ↔Skill ↔ Trainer</p>	<p>The participant assesses the results of their attempt at taking a dental x-ray. The participant must integrate the problem-solving skills and assess the image. If there are technique errors, how are they resolved? Mistakes can provide valuable feedback and cause the participant to think outside the box and choose alternative approaches.</p>

Motivational Design Principles

The connection between motivation and learning can only happen within the learner. Motivation is a factor that determines the direction of the learner’s aspiration (Gopalan, 2017). The motivation can come from within or from the outside. Whichever direction is chosen, motivation is necessary for a learner to succeed in learning. Learners are more motivated if the subject matter is relevant, meaningful and provides a challenge. Motivation can be stimulated positively by improving one's life situation or negatively as a means of survival. This section will deal with positive motivation.

There are two types of motivation – intrinsic and extrinsic. Intrinsic motivation comes from within the learner. The learner performs to satisfy their need to overcome a challenge,

satisfy a curiosity or realize a dream. The intrinsically motivated are deep learners who respond well to problem-solving and complexity.

Extrinsic motivation comes from outside the learner. This learner performs because there is a reward at the end of the line. This type of motivation does not last for long periods as the learner tires of trying to achieve the goal, or once the reward has been achieved, the learner will stop moving forward. There are two types of learners – strategic and surface. Strategic learners tend to be competitive with the goal to be better than the others. These learners do not engage deeply with the subject matter – only enough to get good grades. The best solution in this situation is to try to appeal to their intrinsic nature by looking for objects to stimulate them. These learners need to avoid activities that require straight memorization but instead should have activities that require them to assess or evaluate objects. Surface learners are similar to strategic learners in that they do not tend towards deep learning. Instead of these learners being motivated by competition, they are motivated by a fear of failure. Their learners perform the bare minimum to achieve the objective but are not interested in moving out of their comfort zone. Instructors must tailor lessons for these learners that exponentially increase in difficulty as they move from one lesson to the next. These learners must be given positive feedback as often as possible.

A motivational theory like the one found in Keller's ARCS model look at how motivation is linked to behavior and emotions. The goal ultimately is to develop a learner who is extrinsically motivated to be stimulated by the subject matter and become intrinsically

motivated. Intrinsically motivated learners are pleasurable to teach since they want to learn vs. have to learn.

The ARCS Theory is an acronym for the four factors of motivation – Attention, Relevance, Confidence, and Satisfaction. Each one of these has guiding strategies which enable the design of each of the four factors (Johnson, 2013). Table 5 discusses the purpose of each factor and how the participant will achieve each one of these motivational factors.

Table 5

ARCS Model Alignment to Project

Factor and Purpose	Guiding Strategies	Participant Achievement of Factor
<p>Attention</p> <p>Attention looks at ways to arouse the learner by stimulating curiosity and memories</p>	<p>Perception</p> <p>Inquiry</p> <p>Variability</p>	<p>Perception: Learning a new medical skill stimulates excitement.</p> <p>Inquiry: Dental radiographs complete the oral exam. The user can see what is going on under the gumline. The diagnostic picture is complete.</p> <p>Variability: Learning a new technical skill breaks the routine. Dental radiograph technique will vary by the variability of the skull anatomy by breed and species.</p>
<p>Relevance</p>	<p>Familiarity</p> <p>Goals</p>	<p>Familiarity: Veterinary clinics have full body radiograph units which all medical staff has been trained to use. Many of the</p>

<p>How does this information relevant to the current situation?</p>	<p>Motives</p>	<p>techniques are similar when compared to dental radiographs.</p> <p>Goals: The training provides objectives that break the task down into goals or steps. Each step must be achieved before moving on to the next one.</p> <p>Motives: For the staff members that have been involved in the decision making for the purchase of the unit, learning how to use the unit and integrate it into the clinic’s dental service is the prime motivator.</p>
<p>Confidence</p> <p>Confidence is the outcome when the learner has overcome a challenge. They have tried and achieved success</p>	<p>Requirements</p> <p>Successes</p> <p>Control</p>	<p>Requirements: Once they have successfully positioned and shot their dental x-ray, the participant must assess their finished radiograph for completeness. This requires training on recognizing errors and coming up with solutions for reporting the error. The act of assessing a finished image of a dental radiograph.</p> <p>Success: Lecturing and demonstration are the core of the instruction for this project. Participants must learn to correctly position the digital sensor and align the dental x-ray unit with the sensor. The finished image is evaluated for errors.</p> <p>Control: Participants are given feedback after every attempt of the activity. Mistakes are seen as learning opportunities, and</p>

		<p>the participant may ask questions for clarification and are allowed to retake the image.</p>
<p>Satisfaction Satisfaction is the feeling when the learner successfully overcomes the challenge and can overcome the challenge when it repeats.</p>	<p>Consequence Reinforcement Equity</p>	<p>Consequence: The participant must transfer the learning from working with models to working on live patients. The stress of being under a time constraint can be overwhelming.</p> <p>Reinforcement: The training is provided to a group of staff from the same clinic. The training teaches collaboration which provides support from peers. This support means you always have someone to work a challenge with you.</p> <p>Equity: The fundamental learning concept when learning how to take dental radiographs is practice. More importantly, the participants must practice the steps effectively. Proper practice makes for proper performance. An effective practice will lead to effective performance.</p>

Revision Summary

Proofreading for Organization

I had organizational errors under Target Audience and Learning Environment. When I get behind, I tend to get lax with my proofreading. Big mistake. I will be working on that.

Citing References

I need to integrate my sources into the sentences to show why a particular author is cited rather than dropping sources. Citing in this style separates writing at the graduate level when compared to the undergraduate level.

Project Sequence vs. Content Sequence

The concept of the project sequence put me behind in the assignment. I got stuck, and I found no answers through my research. What finally helped me understand the concept was stepping away from trying. I find I do need to read, research and step away from the assignment to write at my best. Piskurich's project design became my inspiration for Week 3.

Challenges Researching Topics

I have learned to make myself a list of search terms as I do the reading for the week. Having this list gives me many search options. Dr. Johnson and Cindy have helped me to learn the ins and out of research on Google and then to download the documents through the library.

Working Through Disruption

The loss of one professor and getting to know a new professor was very disruptive. I am thankful for my time working with Dr. Atkinson. He saw talent in me that I would have never noticed. I am still working through seeing that talent in myself. I am still here.

Collaboration Sessions with Dr. Johnson and Cindy

Having these collaboration sessions has meant the world to me as I work through the language of instructional design. It was helpful to have multiple eyes looking at my materials and references. I could not make it through these last few weeks without them.

Thankful for Due Date Flexibility

Thanks to Dr. Johnson for giving us extra time while we came through the transition to complete assignments. I am in a constant struggle with time management. Time management issues and emotional struggles were my Achilles Heel this class. Being behind in assignments ramps up my anxiety levels. Anxiety stops my motivation and avoidance comforts me. I am working on lowering my anxiety levels with daily gratitude lessons.

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