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## 2008 TECHNOLOGY-ENHANCED LEARNING (TEL) GRANT PROGRAM

# APPLICATION FORM

If you have questions about the program or require assistance in completing this form, please contact the Digital Media Center's TEL Grant Program manager, **Kurtis Scaletta**, [kurtis@umn.edu](mailto:kurtis@umn.edu), (612) 624-1323.

<b>Project Title:</b>	Mastery of Veterinary MRI Interpretation Through Animated Query Learning
<b>Abstract (50 words):</b>	Veterinary students will learn to interpret Magnetic Resonance Images (MRI) of the head through a series of independent study modules. To encourage active learning and more intent image focus, students will perform physical actions to answer queries about image features while screen events will signal correct response or not.

**Note:** You will also need to enter the Project Title and Abstract into the TEL Grant tracking tool.

### I. PRINCIPAL INVESTIGATOR/PRIMARY CONTACT

Please designate a single investigator to whom we can address official correspondence, and enter this investigator's name in the space provided.

<b>Name:</b>	Travis Saveraid, DVM, DACVR		
<b>Department:</b>	Veterinary Clinical Sciences		
<b>College or Unit:</b>	Veterinary Medicine		
<b>Campus Address:</b>	C 339 VMC 1352 Boyd Ave, St Paul MN 55108		
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## II. ADDITIONAL INVESTIGATORS

<b>Name:</b>	<b>Thomas F. Fletcher, DVM, PhD</b>
<b>Department:</b>	<b>Veterinary and Biomedical Sciences</b>

<b>Name:</b>	<b>Laura Crews, DVM</b>
<b>Department:</b>	<b>Veterinary Clinical Sciences</b>

## III. PROJECT DESCRIPTION

### 1. LEARNING ACTIVITY OR PROCESS

The project will focus on Magnetic Resonance Imaging (MRI) of the head. Veterinary students will learn to interpret MRI images on a computer screen by answering questions, e.g., what's your diagnosis?; where is \_\_\_\_?; how many \_\_\_\_ can you find?; name the encircled feature; etc. To make learning more active, engaging, and appealing, students will answer queries by performing a physical action, e.g., dragging a shape or name or clicking a target. Upon mouse-up, a screen event will signal immediate feedback regarding correct/incorrect outcome. Clicking RESET will randomize elements/questions to maintain student interest and encourage continued participation. We believe students will focus more intently on image features when they are physically involved in interacting with them.

Note: We have already developed animated queries in connection with cranial nerves, see:

<http://vanat.cvm.umn.edu/CrNAnimQuiz/>

### 2. COURSES AFFECTED

The project will impact students studying anatomy (CVM 6100) and students studying radiology (CVM 6101, 6102, 6104, 6105, and 4<sup>th</sup> year Radiology Clinical Rotations). The series of independent-study query modules will be distributed via our Veterinary Anatomy web site (<http://vanat.cvm.umn.edu>) to a world-wide audience of veterinary students (further enhancing the reputation of the U of MN in veterinary education).

### 3. LEARNING OUTCOMES

Students will gain insights based on unique perspectives of head anatomy that are not evident by non-MRI imaging techniques. Student progress will be documented by having them take an MRI image interpretation exam before and after each particular study block.

### 4. TEAM ROLES

Drs. Saveraid and Crews will be responsible for MR images and clinical interpretation. Dr. Fletcher will be responsible for computer programming and head anatomy.

#### IV. PERSONAL STATEMENT

**T. C. Saveraid:** I have been a clinical radiologist for the last 6 years with a special emphasis on magnetic resonance imaging of dogs, cats, and horses. My teaching instruction involves didactic lectures and laboratory sessions across all four years of the veterinary student curriculum including 4<sup>th</sup> year clinical rotations. I am the lead radiologist on the installation and implementation of the new clinical, 3T MRI program at the College of Veterinary Medicine.

**T.F. Fletcher:** Veterinary anatomy instruction and related courseware development have been my major career vocation for the last twenty years. Over those years I have accumulated web site development skills (HTML, CSS, and JavaScript). Recently, I have redirected an interest in Java object-oriented programming toward the completely revised Flash ActionScript 3 API, which is now object-oriented. My courseware is accessible world-wide through the web site that I developed (<http://vanat.cvm.umn.edu/>).

#### V. TIMETABLE & BUDGET

##### 1. PROJECT TIMETABLE

###### A] PREPARATION PERIOD (5 MONTHS):

- design anatomical and clinical didactic objectives for our initial query modules
- construct several animation templates for querying students, using Flash ActionScript 3 object-oriented programming, as we have previously demonstrated that we are able to do: (<http://vanat.cvm.umn.edu/CrNAnimQuiz/>)
- prepare MRI image interpretation exams for assessing student performance before and after they make use of our independent study modules
- acquire MRI images of the head and brain from a total of at least 26 different dogs and cats representing the diversity of anatomical breed variation (i.e. canine breeds - Chihuahua, Cocker Spaniel, Greyhound, Labrador Retriever, and Great Dane) and general lesion classifications (i.e. solitary mass, multifocal masses, vascular obstruction, cranial nerve lesion(s), ventricular system malformation, inflammatory lesions, etc)
- all MR images will be acquired during clinically indicated patient exams; in addition, higher resolution image sequences of lesions or of adjacent anatomical regions will be taken as needed to fulfill the didactic goals of this project (the estimated additional cost is budgeted below).

###### B] Implementation Period (6 months):

- prepare initial didactic modules for web distribution to students
- improve initial modules based on student and faculty feedback
- generate additional modules to fulfill anatomical and clinical objectives

###### C] Continuation Period:

- generate more independent-study query modules focusing on the anatomy of the spine and specific musculoskeletal regions (shoulder, knee, elbow, carpus and tarsus) and the web site for distributing them.

##### 2. PROJECT BUDGET

ITEM	CVM	TEL
MacBookPro 17" + protection plan	\$900.	\$2,000.
Additional higher resolution MR exam costs: (26 @ \$600/exam)	\$8,400.	\$7,200.
Total:	\$9,300.	\$9,200.

## VI. ALIGNMENT WITH LEARNING OUTCOMES

Our College recently invested heavily to purchase, install, and staff Magnetic Resonance Imaging (MRI) technology because of image superiority, particularly for soft tissue. Now we want our students to develop competence in interpreting MRI images. This project will give them learning tools for MRI interpretation, to be used at their convenience and at their preferred pace via independent study.

## VII. CONFLICT OF INTEREST

We **do not**

have a conflict of interest as defined under the Board of Regents' Individual Business or Financial Conflict of Interest policy ([http://www.umn.edu/regents/policies/administrative/Individual\\_COI.htm](http://www.umn.edu/regents/policies/administrative/Individual_COI.htm)). If you selected "do," please describe the nature of the conflict of interest below.

## VIII. OUTCOMES FROM PREVIOUS TEL GRANTS

Tom Fletcher was a participant on the following TEL grants:

2006: C. Clarkson (PI), L. Wallace, and T.F. Fletcher

Title: Veterinary Clinical Anatomy. Integrated Learning Modules

Completed a web site (<http://vanat.cvm.umn.edu/cFemFrac/>) for presenting anatomy and surgical procedures related to mid-shaft femoral fractures. This presentation is intended to be the first in a series of surgical anatomy cases to be used to teach both anatomy and surgery to veterinary students. Future cases are in development under the leadership of Dr. Clarkson.

2004: R. Hardy (PI), A. McVey, and T.F. Fletcher

Title: Web-Distributed Video Learning Objects for Veterinary Clinical Neurology Instruction

Completed a web site (<http://xvanat.cvm.umn.edu/neurovideo/>) for delivery of video recordings of dogs/cats displaying the abnormal postures, movements, and reactions that students interpret to make neurological diagnoses. The video-clips are organized chronologically, by species, or by syndrome. Individual video-clips may be viewed via video streaming or they may be downloaded in either 320x240 or 640x480 pixel dimensions. This web site represents a model for distributing video clips of clinical patients in general.

2001: A. J. Beitz (PI), V.S. Cox, and T.F. Fletcher

Title: Neuroscience Multimedia Web Site

Completed a web site (<http://ni.cvm.umn.edu/>) intended to serve as a central repository for neuroscience multimedia content produced by U of MN faculty. To date, most of the content has been developed in the Veterinary College and is more appropriately served from our Veterinary Anatomy Web Site (<http://vanat.cvm.umn.edu/>).

1999: T.F. Fletcher (PI)

Title: Web-Based Delivery of Planar Anatomy Images

Resulted in a web site (<http://vanat.cvm.umn.edu/planar/>) that displays sagittal, transverse, and dorsal plane images of canine cadavers. The current web site which was developed in 2006 evolved from an earlier version developed with this 1999 TEL grant.