

TILT Faculty Research Fellowship Proposal

ChatGPT-assisted Team-based Learning assessment of 4th year DVM students during Small Animal Medicine Clinical rotations.

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Abstract

This proposal is designed to fill a critical gap in DVM student education and assessment by applying Team-based learning (TBL) to the “rounds room” in real-time. The CVMBS is currently immersed in curriculum revision in an effort to better prepare DVM students for “first-day” readiness. One of the key components will be TBL exercises, where a classroom is divided into small groups and students are assessed for their retention and understanding of a pre-class assignment (individual Readiness Assurance Test or iRAT), and the ability to work together in applying clinical reasoning to case scenarios. Small animal medicine (SAM) presents an ideal pre-existing set-up for TBL exercises done in “real-time”. SAM rounds include 4-6 4th year DVM students (study group), 3-4 3rd year DVM students (naive group), and 3-4 house officers (gold standard group). The key to implementation will be the quick turnover from an identified case and reference to a well-constructed iRAT and case scenarios with ChatGPT assistance. DVM students will apply the reference to a case they will see as a SAM appointment within 24-hours of the TBL (immediate feedback). iRAT scores will be compared between groups, again for the study group at the end of their program (retention), and between the TBL study group and a control group (4th year DVM students also on rotation - SAM runs two services simultaneously - that were assigned the reference but did not undergo the TBL exercise). This quantifies the impact of TBL on DVM student training during a clinical rotation.

Project Narrative

Purpose statement

This project will test the hypothesis that ChatGPT-assisted Team Based Learning exercises can be efficiently and effectively applied to the small animal medicine rounds room in such a way as to enhance retention and application of published best practices to client-owned pets with varied presentations and manifestations of disease.

The incorporation of TBL into DVM student instruction is a stated priority of the CVMBS Curriculum Revision effort. The small animal medicine rotation is one of the foundational rotations in the preparation of 1st-day ready DVMs. The application of evidence-based pedagogical principles to the clinic floor in a DVM teaching hospital would be a novel attempt at filling a critical gap in DVM education – an intentional assessment of a teaching strategy within the context of a clinical service where DVM students are being asked to apply their knowledge base and clinical reasoning to actual patients with real problems.

Learning context

Although the application of TBL principles in a scheduled, organized, predictable setting of a classroom is standard practice, the application of these principles to the clinic floor will be a novel effort. The small animal rotation is a required rotation for all 4th year DVM students, lasting 2-3 weeks (depending on “tracking” status of the student). At CSU this rotation is run as two simultaneous services, each with 4-6 4th year DVM students, 3-4 3rd year DVM students, and 3-4 house officers (residents and interns), with each service overseen by a faculty member. During the course of a week each service will see multiple cases – these include new appointments and rechecks varying between 10-20 cases per day. Each case represents a client-owned cat or dog with a presenting complaint (the owner’s perception of their pet’s problem, e.g. diarrhea, vomiting, losing weight, etc.) and a case history that can range from nothing more than the presenting complaint to dozens of pages of previous medical records. There is some level of predictability (e.g. a previously scheduled appointment for a young coughing dog) as well as unknown parts of the presentation (e.g. travel history), key features (e.g. was the dog recently boarded), and multiple diagnostic options and potential etiologies. That is a unique feature of this proposal in that these cases are not hypothetical, with pre-designed parameters – these are the “real thing”, exactly what 4th year DVM students will be faced with on Day One of their employment as veterinarians. Another unique feature is that members of the study group will be directly exposed to the featured case shortly after having participated in the TBL. An important logistical component is that the ‘teams’ are created randomly (4th year DVM student clinical rotation schedule) as opposed to self-selected.¹

Project objectives and expected outcomes

The first objective of this project is to design and confirm the ability of ChatGPT to produce the necessary output in a timely and accurate manner. This effort would otherwise be impractical for a SAM faculty running an active clinical service. As a “pilot” effort, the PI (CBW) has already worked on having ChatGPT generate iRat questions and case scenarios using made-up cases with classic presentations of common presenting problems. ChatGPT is given a recent and relevant reference on the problem of interest; this is the same reference that the students and house officers are given as required reading (pre-class preparation). ChatGPT is then asked to produce a series of questions (iRAT, the readiness assurance) and case scenarios (the application) suitable for DVM student assessment (both are evaluated and edited by

faculty). The expected outcome is the rapid and reliable production of MCQs and case scenarios appropriate for 4th year DVM student evaluation; had they actually done the assigned reading? had they retained some key features of that assigned reading? and could they apply that knowledge to a realistic scenario as a group? ChatGPT will be directed to use best practices in the writing of MCQs.² The pilot project clearly showed that the tRAT portion of a traditional TBL exercise (reaching agreement on best iRAT answers) was not necessary or helpful, especially when compared to the interaction and involvement during discussion of case scenarios, so the tRAT portion has been dropped from the standard TBL format.

The second objective will be to assess the impact of utilizing a ChatGPT-assisted TBL format on DVM student retention, understanding, and application of materials relevant to patients seen real-time on the clinic floor, as opposed to fabricated problems ; both within the timespan that includes the actual appointment, and then long-term retention (end of semester), understanding, and ability to apply that skillset to a subsequent case presenting for a similar problem. The expected outcome will be demonstration of a significant difference in DVM student performance between those that participated in the TBL exercise compared to those that were simply given the required reading.

Brief literature review

A PubMed search using the terms “team based learning” and “veterinary medical education” produced nine manuscripts, of which two were relevant.^{3,4} TBL was shown to significantly increase medical students’ examination scores compared to lecture-based instruction, and student’s attitude towards learning was better.³ Hazel et al. found that for veterinary undergraduates the team scores exceeded individual scores in the Readiness Assurance task, and qualitative measures of the student experience were predominantly positive.⁴ From these two entries and the PubMed descriptions of similar articles, another dozen references were quickly identified (a number of which were reviews or meta-analyses) and reviewed. TBL has been used in the training of medical school residents, with outcomes ranging from positive to neutral.⁵ Inclusion of TBL in an anatomy laboratory setting improves students’ attitudes toward teamwork and resulted in significantly improved test scores.⁶ A similar improvement in the attitude towards teamwork was found in medical students exposed to TBL exercises, by Zhang, et al.⁷ The pre-reading assignment was a motivating component of TBL for 1st year medical students.⁸ These all were recurring themes in the reviewed literature, and importantly, Burgess et al. found that TBL encouraged individual learning, consolidation of knowledge and enhance retrieval, all skills critical to the development of 1st-Day Ready veterinarians.⁹

Methodology

Objective #1. A “script” or standard operating procedure (SOP) will be developed in ChatGPT (2.0) such that a brief case summary of an actual patient presenting for a specific problem can be entered, and ChatGPT will be asked to produce a number of multiple choice questions, written in the USMLE format, suitable for an iRAT at the level of 4th year DVM students, referring to a recent publication (the pre-class assigned reading) relevant to the patient’s primary problem (i.e. diarrhea, cough, anorexia, etc.). These questions will be assessed and edited by CBW prior to distribution at the start of SAM rounds. The featured patient will have been chosen directly from a scheduled appointment that the DVM students will be seeing within 24 hours of the TBL exercise, and the summary provided to ChatGPT will be the required reading assignment given to students and house officers 24 hours prior to the ChatGPT iRat exercise. The desired outcome of this effort is to produce an SOP that results in the rapid acquisition and incorporation of a case scenario

taken directly from a new appointment by ChatGPT and the subsequent generation of appropriate and relevant MCQ's requiring minimal editing after-the-fact.

Objective #2. All students & house officers on both SAM services will complete the iRAT discussed in Objective #1. ChatGPT will also be asked to produce a number of case scenarios and MCQs relevant to the identified problem and again based on the specific patient and reference provided (e.g. next best diagnostic testing, justification of treatment trial, etc.). These will also be assessed and edited by CBW before distribution. This part of the TBL exercise will only take place in the SAM service identified for the TBL exercise (i.e. with CBW as faculty) and questions will be answered as a "team" effort. The entire TBL exercise (including a brief discussion of the iRAT and case scenario answers) will take between 20-30 minutes, all answer sheets will be anonymous but logged according to date, case, SAM service, and group: 3rd year DVM students on TBL service (naïve group), 4th year DVM students on TBL service (study group), and house officers on the TBL service (gold standard group). This exercise will also generate anonymous iRAT answers from 4th year DVM students on the simultaneously run second SAM service; these students will have been assigned the reading but will not have participated in the TBL case scenario exercise and discussion (control group).

Finally, an SOP will be created that directs ChatGPT, using all of the previously provided references for specific patients and identified problems during the course of the year, to generate a number of MCQs that assess each level of Bloom's taxonomy up to but not including the final level, "Create". These questions will be edited by CBW and collated into a "Final Exam", to be given to all 4th year DVM students who had previously been involved in the iRAT portion of the clinical rounds room exercise. This will include both the "study group" and the "control" group. Students will only answer those questions from the reference that they were assigned during the course of their clinical rotations (i.e., having been on service week X, and taken the iRAT for case Y). It is the performance on this Final Exam that will be used to make a statistical comparison between 4th year DVM students that went through a TBL case scenario exercise targeting specific patients and problems, to those that were only assigned the "pre-class reading" and iRAT questions. The null hypothesis is that the performance will be the same between groups. The expected outcome is that those students exposed to ChatGPT assisted TBL exercises will perform at a higher level of clinical reasoning on Bloom's taxonomy pyramid.

IRB approval

The proposal will be submitted for IRB approval as this involves human subjects. All participation is anonymous (i.e. no names or personal identification on iRAT, Scenario, or Final Exam submissions).

Timeline

Complete data collection by June 30, 2025. CBW works 20 weeks of clinics per year and can recruit participation from additional SAM faculty to increase data points within that timeframe. Manuscript submission within 3 months of project completion. Presentation(s) (CSU VTH, Research Day, National Meeting) dependent on meeting schedule and availability.

Dissemination plan

Poster/Abstract presentation of results at CSU "Research Day" and special Clinical Sciences seminar. Manuscript submission to the Journal of Veterinary Medical Education. In-Person presentations at ACVIM Forum.

Budget

ChatGPT 2.0 subscription (12 months@ \$20/month x 2) \$480.00

Maddie Funk Supplemental Pay, 10 hours @ \$40/hr \$400.00

Maddie Funk is the Clinical Sciences Department Instructional Designer & Multitmedia Specialist
Her assistance with ChatGPT logistics and data collection/organization is outside the scope of her
CS responsibilities.

ACVIM Forum 2025 Presentation of Results

Registration \$775.00

Transportation (roundtrip flight, DIA parking) \$500.00

Hotel accommodations (\$125/night, 3 nights) \$375.00

Qdoba Lunch Catering

Clinical Sciences Department presentation \$150.00

Pizza, Soda, & Cookies for 30, x 3 days

DVM student incentive for “Final Exam” \$450.00
Exam participation cannot be required

Total Budget Request \$3,130.00

Letter of Support (Dr. Chad Johannes, VTH Director)

Included following References below.

References

1. Burgess AW, et al. Applying established guidelines to team-based learning programs in medical schools: A systematic review. *Acad Med* 2014;89:678-688.
2. Case SM, Swanson DB. Constructing written test questions for the basic and clinical sciences. Philadelphia, PA: National Board of Medical Examiners, 2002.
3. Chen M, et al. Meta-analysis on the effectiveness of team-based learning on medical education in China. *BMC Med Educ.* 2018;18:77 doi: 10.1186/s12909-018-1179-1.3
4. Hazel SJ, et al. Team-based learning increases active engagement and enhances development of teamwork and communication skills in a first-year course for veterinary and animal science undergraduates. *J Vet Med Educ.* 2013;40:333-41. doi: 10.3138/jvme.0213-034R1
5. Poeppelman RS, et al. A narrative review and novel framework for application of team-based learning in graduate medical education. *J Grad Med Educ* 2016; DOI: <http://dx.doi.org/10.4300/JGME-D-15-00516.1>
6. Huitt TW, et al. Team-based learning in the gross anatomy laboratory improves academic performance and students' attitudes toward teamwork. 2014; DOI 10.1002/ase.1460
7. Zhang W, et al. Comparing the effects of team-based and problem-based learning strategies in medical education: a systematic review. *BMC Medical Education* 2024;24:171-181.
8. Burgess A, et al. Implementation of team-based learning in year 1 of a PBL based medical program: a pilot study. *BMC Medical Education* 2016;16:49.
9. Burgess A, et al. Team-based learning replaces problem-based learning at a large medical school. *BMC Medical Education* 2020;20:492.

March 28, 2024

To the TILT Faculty Research Fellowship Proposal committee,

This note is in support of Dr. Craig Webb's proposal, "ChatGPT-assisted Team-based Learning assessment of 4th year DVM students during Small Animal Medicine Clinical rotations". The Veterinary Teaching Hospital has a long history of innovative efforts to best prepare DVM students for their careers, and this study would be another realm. Dr. Webb has been a fixture with small animal medicine for over two decades and has always had a keen interest and genuine effort towards improving pedagogical practices on the clinic floor.

Thank you for your consideration of his study proposal.

Sincerely,



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