**IDT 611: ID Final Project Phase I**

**Annotated Bibliography**

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By

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To

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## The Use of Scenario-Based Learning in Veterinary Medical Education

### Topic Overview

In veterinary medical education, scenario-based and problem-based learning are used extensively to teach critical thinking skills. Rockett and Christensen (2010) designed a scenario-based critical thinking approach to veterinary nursing education to teach students how to solve problems rather than regurgitate facts. Problem-solving skills develop critical thinking as the student begins to connect new skills and learning to real-world scenarios. Using authentic experiences provide relevance to their educational process. Many veterinary medical educators use case presentations and Subjective Objective Assessment Plans (SOAP) reviews to build these problem-solving skills. Case presentations and SOAPs can also be considered scenario-based learning. The articles used in this annotation will come from both human and veterinary medicine. Many instructional techniques started in human medicine and were later implemented in veterinary medical education.

### Article 1

Hirumi, A., Johnson, K., Kleinsmith, A., Reyes, R.J., Rivera-Gutierrez, Kubovec, S., Bogert, K., Lok, B., Cendan, J. (2017). Advancing virtual patient simulations and experiential learning with InterPLAY: Examining how theory informs design and design informs theory. *Journal of Applied Instructional Design, 6*(1), 49-65. doi:10.28990/jaid2017.061005

### Summary

This article is the third in a series that studied the development of the NERVE Learning Center. The NERVE Learning Center developed virtual simulations to assist medical students as they worked through patients with cranial nerve disorders. Since patients with cranial nerve disorders

are rarely seen, trained doctors are at a loss as to how to diagnose and treat these patients efficiently due to their lack of experience. The computer simulations give medical students opportunities to interact and examine patients to experience various cranial nerve disorders. This article reviews the integration of experiential learning and the instructional strategy, InterPLAY. Through the experiential learning theories developed by Dewey, Schank, Berman, & MacPhearson, and Lindsey & Berger, the study looked at three experiential learning principles to enhance learner engagement and design memorable and meaningful experiences. The three principles examined were 1) framing the experience, 2) activating experience, and reflecting on experience. Framing the experience is the design of measurable learning objectives. Activating experience requires that the learner have authentic experiences and challenges to engage and cause the knowledge to transfer. The learner should see the relevance of the activities to their learning needs. Reflecting on the experience allows the learner to analyze their experience and learn from it.

**Relevance to Topic**

In veterinary medical training, the use of problem-based or scenario-based learning is coming into the forefront to engage the learner because the scenario or problem is based on cases they could potentially see as veterinarians or technicians. This article provides background on the benefits of experiential learning to make the content relevant to the cases they will see after graduation. The virtual simulation patients in the article each have a built-in history and symptoms, which creates the patient story and engages the learner. The research and development methods combined with the three principles of experiential learning (framing, activating, reflecting) and InterPLAY (story, game, play) provides the foundation in this article of how to design case scenarios, so they offer a memorable and meaningful learning experience.

## Article 2

Andrea, G., Laszlo, V.F., Abdelfattah, N. (2019). A review of some innovative teaching concepts and methods used in the field of veterinary medical education. *Journal of Dairy & Veterinary Sciences, 8*(5). doi:10.19080/JDVS.2019.08.555749

**Summary**

Veterinary medical education has been challenged to prepare clinic-ready veterinarians. This article notes that students are now categorized as "digital native" known as the Y2 generation. Students are expected to graduate with specific competencies to meet social, economic, and professional requirements. This development pushed for a revised definition of knowledge. Knowledge is no longer rote memorization but should lead to meaningful learning. Facilitation of learning will take the place of providing knowledge. The article reviews current innovative teaching concepts and methods used in the field of veterinary medical education and provides specific recommendations for the utilization of each one. The review covers the following concepts and methods.

- Concept mapping.
- Distance learning and web-based education.
- Computer-aided learning and computer-based learning.
- Cooperative learning, group learning, collaborative learning.
- Research-led teaching and learning.
- Inter-professional education.
- Evidence-based veterinary medicine.
- Case-based learning method.

- Peer-assisted learning.
- Blended learning and interactive classroom.
- Active learning.
- Classroom performance systems

**Relevance to Topic**

For this bibliography, this article provides a list of the current teaching concepts, and methods being introduced into current veterinary medical education, which will provide a reference point of where scenario-based or case-based learning can be integrated. An effective learning environment needs to include interactions between students and faculty and students with their peers.

Case-based learning integrates basic medical sciences to apply that information to solve clinical cases. The revised approach to veterinary medical education uses information, engagement, and stimulation to push the student to use their innovations while still building the critical competencies needed for working in practice. The article does stress that while case-based learning does have its advantages in connecting the learner's medical studies to their interaction with patients both in school and after graduation, it is beneficial to use a combination of methods. For this bibliography, it is essential to note where scenario-based learning is applied in the learner's educational experience.

**Article 3**

McFee, R., Cupp, A.S., Wood, J.R.. (2018). Use of case-based or hands-on laboratory exercises with physiology lectures improves knowledge retention, but veterinary medicine students

prefer case-based activities. *Advances in Physiology Education, 42*, 182-191. doi:10.1152/advan.00084.2017

**Summary**

This study examines the performance and attitudes of veterinary students to identify the most appropriate learning method to augment an anatomy and physiology course. Hands-on laboratory and case-based learning activities were provided with the lecture portion. Half of the students performed the laboratory activities, and half of the class performed the case-based activities. Student attitudes and performance were collected through surveys and tests. The study hypothesized that case-based learning would be well received and an effective supplemental method for the learning of physiological concepts compared to traditional laboratory exercises.

**Relevance to Topic**

Case-based learning (CBL) is commonly used for higher level courses in both veterinary and human medical education. This study compares the effectiveness of CBL in traditional laboratory exercises. In the study, students preferred the CBL method as it provided clinical relevance. Providing relevance has been shown to improve knowledge retention. Through additional testing, retention was documented at one month and six months compared to retention from lectures only. Real-life scenarios such as those used with CBL can help conceptual knowledge development along with promoting clinical thinking and knowledge retention by facilitating meaningful schema development.

## Article 4

Thistlethwaite, J., Davies, D., Ekeocha, S., Kidd, J. M., MacDougall, C., Matthews, P., Purkis, J., Clay, D. (2012). The effectiveness of case-based learning in health professional education. A BEME systemic review: BEME guide no. 23. *Medical Teacher, 34*, e421-e444. doi:10.3109/0142159X.2012.680939

### Summary

The goal of this literature review was to examine the definitions and history of case-based learning and come up with a complete definition that is evidence-based. James Lorrain Smith introduced the case method of teaching at the University of Edinburgh in 1912, and Harvard Business School is one of the first institutions to adopt the CBL learning method (p. e422). The review found that CBL has been compared to the four levels of inquiry-based learning: 1) confirmation, 2) structured, 3) guided, and 4) open (p. e423). CBL falls between structured and guided by fostering a deep approach to learning as they move from acquiring knowledge to reproducing knowledge, which increases meaning and relevance.

### Relevance to Topic

This article suggests that while many of the articles available on CBL show an increase in student learning and preference, there is little evidence relating to its effectiveness on achieving learning outcomes in medical education. According to the article, what evidence there is, is patchy and inconclusive. This conclusion calls for expanded reading on inquiry-based learning and constructivist learning theory. Reviewing research articles published after the 2012 publication of this article could provide the evidence needed to substantiate effectiveness.

## Article 5

Banchi, H., Bell, R. (2008). The many levels of inquiry. *Science and Children, 46*(2), 26-29. Retrieved from https://eric.ed.gov/?id=EJ815766

**Summary**

This article was chosen to examine the relevance of inquiry-based learning when compared to CBL. Banchi and Bell (2008) describe the four levels of inquiry-based learning and apply this method to the teaching of science in elementary school students. The four levels of inquiry-based learning are: 1) confirmation inquiry, 2) structured inquiry, 3) guided inquiry, and 4) open inquiry. Confirmation inquiry is achieved when the instructor provides the student with a question and a procedure or method. The results are known in advance by both the instructor and the student. The goal is to reinforce a previously introduced concept and provides the student with the experience of conducting an investigation. Structured inquiry moves to the next level as the student who has been presesented with a question and procedure now has to provide an evidence-based explanation. Guided inquiry moves to the next level as the students are provided with a research question, and they design a procedure or method to test their research question and resulting explanations. Instructors provide guidance to ensure that the student's investigation plan makes sense. Open inquiry is the highest level. Students now have to come up with a research topic, design questions, design the investigation, carry it out, and present their results. Having experience in the previous three inquiry methods provides the best potential for student success using open inquiry. As students experience multiple levels of inquiry they will develop an understanding of the scientific method.

**Relevance to Topic**

After reviewing the Banchi and Bell article, a correlation can be made between CBL and inquiry-based learning. Students must make the connection between a medical concept that was learned and a patient case. Does the medical concept make more sense when paired with a patient case? What questions must be asked to ensure the concept and the case compliment each other with evidence-based support? According to the Centre for Innovation and Excellence in Learning (2016), CBL is categorized as an inquiry-intensive practice as learners analyze specific cases or scenarios in an interactive learner-centered atmosphere to analyze and address problems and resolve questions. Inquiry-based learning does merit further research as a foundation of CBL.

## Article 6

Li, S., Ye, X., Chen, W. (2019). Practice and effectiveness on "nursing case-based learning" course on nursing student's critical thinking ability: A comparative study. *Nursing Education in Practice, 36*, 91-96. doi:10.1016/j.nepr.2019.03.007

**Summary**

This article examines the influence of CBL on critical thinking ability. Li, Ye, and Chen (2019) found patient care improved if a nurse has critical thinking abilities. Having critical thinking abilities helps nurses be more confident in identifying priorities working up patient cases. This confidence provides expeditious patient care. Hence, critical thinking, according to Li, Ye, and Chen is an essential learning objective for any clinical nursing course. CBL is interpreted as a tool that involves matching clinical cases with required medical knowledge in that field. CBL is seen as a participatory teaching and learning method that reflects active and reflective interaction with the material.

**Relevance to Topic**

The interest in the topic of developing critical thinking through the use of case-based learning began through the writings of Rockett and Christenson. Rockett and Christenson (2010) designed a scenario-based critical thinking approach to veterinary nursing education to teach students how to solve problems rather than regurgitate facts. Problem-solving skills develop critical thinking as the student begins to connect new skills and learning to real-world scenarios. Using authentic experiences provide relevance to their educational process. Another search was performed for more recent articles that focused on the impact of critical thinking in veterinary medical education. An article by Cake et al., (2016), reviewed articles and collected stakeholder surveys to find that critical thinking is seen as one of the soft skills competencies needed by veterinary professionals. Interestingly another finding in this article was the lack of evidence-based, high quality, outcomes-driven research. This finding confirms that results of the Thistlethwaite article. The fact there is a lack of high-quality research is concerning, as this research moves forward.

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