McGill University

Pedagogical Merit Reviewer's Role

The Pedagogical Merit Review of protocols involving live animals in teaching and training aims to be a structured and objective exercise that evaluates if a proposed live animal model is essential to achieving expected learning outcomes, in other words, if a live animal model is "the best learning model for the student to achieve the set objectives". It evaluates the necessity of using live animals for the proposed outcomes, as well as constructive curriculum alignment between the methods used for teaching/training, those for the evaluation of learning outcomes, and the timing of the given course. This process is in line with the Canadian Council on Animal Care (CCAC) Policy. Please visit the CCAC FAQ for more details on the Policy. Examples from the CCAC of protocols showing evidence of strong constructive curriculum alignment are provided below.

For each assessment of animal-based teaching/training protocol, please consider these key aspects:

• Whether the learning objectives are clear and specify the involvement of animals;

• Whether the learning objectives specify the proportion of the objective that must be achieved and/ or how well the behaviour must be performed (accuracy, speed, quality);

• Whether criteria proposed for assessing the completed animal-based teaching/training is suitable and will contribute to optimization of this use of animals for the benefit of future students;

• Whether the composition, learning level and needs of the student group(s) are compatible with the goals and objectives of the animal-based teaching/training;

• Whether the timing of the inclusion of animals in the teaching/training is suitable for the projected timing of the expected outcome(s);

• Whether the review of the obstacles and opportunities for implementing Three Rs by the animal based teaching/training instructors is sufficiently thorough;

--The 3Rs tenet (Replacement, Reduction and Refinement) guides scientists on the ethical use of animals in science.
- **Replacement** refers to methods which avoid or replace the use of animals in situations where animals would otherwise have been used;
- **Reduction** refers to any strategy that will result in fewer animals being used;
- **Refinement** refers to the modification of husbandry or experimental procedures to minimize pain and distress.

*For each assessment, please also state if the proposed program meets the Pedagogical Merit requirements.

Examples of the Constructive Curriculum Alignment Approach

Example 1: Evidence of Weak Constructive Curriculum Alignment

A protocol is submitted for a course on anesthesia, where students have to learn how to intubate a cat. This course is part of an animal health technology program. The following learning outcome, assessment method, and learning activities are proposed by an instructor.

• **Learning outcome:** The student will be able to competently intubate a cat.
• **Assessment method:** A checklist is used to score the students performing the technique on a cat.
• **Learning activities:** Students will practice orotracheal intubation using a live, anesthetized cat.

In this scenario, where the learning outcome, learning assessment method, and learning activities seem to align, there is potentially pedagogical merit for using live cats. However, the intended learning outcome is rather vague in that it does not include specific conditions or expectations which could only be evaluated in a live animal model, such as absence of trauma or bleeding in relation to the expected amount of time to perform the procedure. In the absence of these conditions, one could ask if learning outcomes could be achieved just as well using a different model such as a mannequin. The answer often lies in the specificity of the intended learning outcomes.

Reviewers should inform instructors in cases of weak curriculum alignment so the instructors can reevaluate their proposal.

Example 2: Evidence of Strong Constructive Curriculum Alignment

Using the example above, more specific learning outcomes that could only be evaluated in a live animal model and that align with revised assessment methods make a stronger case for using live animals, based on constructive curriculum alignment.
 • **Revised learning outcome:** The student will be able to perform an orotracheal intubation on a cat within 60 seconds with no associated bleeding.
 • **Revised assessment method:** A checklist is used to score the performance of the procedure. Among other measures, the presence or absence of blood will be assessed, as will the time taken to perform the procedure.
• **Learning activities**: Students will practice orotracheal intubation using a live, anesthetized cat.

In this scenario, there is strong constructive curriculum alignment, and a live cat could be the best learning model.

If a live animal is identified as potentially the best learning model, the reviewers should confirm that specific live animal-based learning outcomes are, in fact, essential for the students enrolled, given the composition of student groups, their learning level, needs, and career paths, and the timing of animal use in the proposed teaching/training activity in relation to the projected timing of the expected outcome(s). In other words, is it necessary for these students at this time in their academic program to be able to intubate an anesthetized cat?

If there is strong curricular alignment, and the specific learning outcomes are essential for the students, the last step is to determine if there are any equivalent replacement models, either absolute or relative (an example of an absolute replacement model is a mannequin that displays varying degrees of tracheal trauma).

If there are no equivalent relative or absolute replacement alternatives, the instructor will be informed that the proposed live animal model has pedagogical merit and the animal care committee will also be informed through a completed Pedagogical Merit Review Form.

If there are equivalent **absolute replacement alternatives**, the instructor will be informed that the proposed live animal model does not have pedagogical merit because the proposed live animal is not essential in achieving successful learning outcomes. The instructor can then substitute the live animal with the alternative, and no animal protocol is required since there is no longer live animal involvement.

If there are equivalent **relative replacement alternatives,** the instructor will be informed that the proposed live animal model does not have pedagogical merit because the proposed live animal is not essential in achieving successful learning outcomes.

In general, if the reviewers identify equivalent relative replacement models that fall under CCAC Category of Invasiveness A (CI A), such as invertebrates, eggs, or tissues, the instructor can then substitute the proposed live animal with the alternative. There is no CCAC requirement for the animal care committee to review or approve CI A work within a protocol (although some institutions do so) and hence, no requirement for further review of pedagogical merit.

If the reviewers identify equivalent relative replacement models that involve live vertebrates or cephalopods (e.g., zebrafish or Xenopus for egg production), the instructor can then substitute the proposed live animal with the alternative live animal in the protocol and request an expedited pedagogical merit review.

Example 3: Evidence of Strong Constructive Curriculum Alignment

A protocol is submitted for an institutional hands-on training course. This training is required before research team members can handle live animals. The following learning outcomes, assessment methods, and learning activities are proposed by the instructor.

• **Learning outcomes:** The student will be able to safely and humanely handle live mice and will be able to successfully give a subcutaneous injection to a conscious mouse.
• **Assessment method:** The student will demonstrate an appropriate handling and injection technique in a conscious mouse.
• **Learning activities:** Students will handle conscious mice and practice subcutaneous injections.

In this scenario, there is strong constructive curriculum alignment, and a live mouse could be the best learning model.

If a live animal is identified as potentially the best learning model, the reviewers should confirm that specific live animal-based learning outcomes are, in fact, essential for the students enrolled, given the composition of student groups, their learning level, needs, and career paths, and the timing of animal use in the proposed teaching/training activity in relation to the projected timing of the expected outcome(s). In

other words, is it necessary for these students, at this time in their academic program or work situation, to be able to safely and humanely handle and inject mice?

If there is strong curricular alignment and the specific learning outcomes are essential for the students, the last step is to determine if there are any equivalent replacement models, either absolute or relative (an example of an absolute replacement model is a stuffed toy with a covering that mimics mouse skin).

If there are no equivalent relative or absolute replacement alternatives, the instructor will be informed that the proposed live animal model has pedagogical merit and the animal care committee will also be informed through a completed Pedagogical Merit Review Form.

If there are equivalent **absolute replacement alternatives**, the instructor will be informed that the proposed live animal model does not have pedagogical merit because the proposed live animal is not essential in achieving successful learning outcomes. The instructor can then substitute the live animal with the alternative, and no animal protocol is required since there is no longer live animal involvement.

If there are equivalent **relative replacement alternatives**, the instructor will be informed that the proposed live animal model does not have pedagogical merit because the proposed live animal is not essential in achieving successful learning outcomes.

In general, if the reviewers identify equivalent relative replacement models that fall under CI A, such as invertebrates, eggs, or tissues, the instructor can then substitute the proposed live animal with the alternative. There is no CCAC requirement for the animal care committee to review or approve CI A work within a protocol (although some institutions do so) and hence, no requirement for further review of pedagogical merit.

If the reviewers identify equivalent relative replacement models that involve live vertebrates or cephalopods (e.g., zebrafish or Xenopus for egg production), the instructor can then substitute the proposed live animal with the alternative live animal in the protocol and request an expedited pedagogical merit review

Example 4: No Evidence of Constructive Curriculum Alignment

A protocol is submitted for an animal physiology course. This course is part of a Bachelor's degree in Biology. The following learning outcomes, assessment methods, and learning activities are proposed by the instructor.

• **Learning outcomes:** The student will be able to understand certain mechanical and physiological properties of skeletal muscle. Students will be able to: 1) name and describe the phases of a muscle twitch; and 2) define and explain the physiological basis of the following: (a) subminimal, minimal, maximal, supramaximal stimuli; (b) latent period; (c) wave summation; (d) tetanus; and (e) muscle fatigue.
• **Assessment method:** A multiple-choice test will be used to assess the knowledge gained in the laboratory.
• **Learning activities:** Students will observe procedures on a fresh muscle preparation in a frog.

In this scenario, animals are not specifically mentioned in the learning outcomes, the assessment method does not involve animals, but recently euthanized animals are proposed as the learning model. There is no strong case to use frogs in support of the intended learning outcomes based on the absence of constructive curriculum alignment.

Reviewers should inform instructors in cases of no curriculum alignment so the instructors can reevaluate their proposal.

Example 5: Evidence of Strong Constructive Curriculum Alignment

The previous scenario could be revised to achieve constructive alignment and potentially make a case for frogs as the best learning model.

• **Revised learning outcome:** The student will be able to demonstrate certain mechanical and physiological properties of skeletal muscle in frogs. Students will be able to: 1) name, describe, and induce the phases of a muscle twitch; and 2) define and explain the physiological basis of the following: (a) subminimal, minimal, maximal, supramaximal stimuli; (b) latent period; (c) wave summation; (d) tetanus; and (e) muscle fatigue.
• **Revised assessment method:** A laboratory report and quiz based on the procedures performed by students on a frog muscle.
• **Revised learning activities:** Students will use a muscle preparation from a pithed frog, placing it in an apparatus and taking a series of measurements. The frog muscle is used in place of mammalian muscle because of its tolerance to temperature change and handling.

In this scenario, there is constructive curriculum alignment and it would seem a recently euthanized frog could be the best model.

If a live animal is identified as potentially the best learning model, the reviewers should confirm that specific live animal-based learning outcomes are, in fact, essential for the students enrolled, given the composition of student groups, their learning level, needs, and career paths, and the timing of animal use in the proposed teaching/training activity in relation to the projected timing of the expected outcome(s). In other words, is it necessary for these students at this time in their academic program to be able to manipulate fresh frog muscle?

If there is strong curricular alignment and the specific learning outcomes are essential for the students, the last step is to determine if there are any equivalent replacement models, either absolute or relative (an example of an absolute replacement model is a non-animal model that could be manipulated by the student to obtain data).

If there are no equivalent relative or absolute replacement alternatives, the instructor will be informed that the proposed live animal model has pedagogical merit and the animal care committee will also be informed through a completed Pedagogical Merit Review Form.

If there are equivalent **absolute replacement alternatives**, the instructor will be informed that the proposed live animal model does not have pedagogical merit because the proposed live animal is not essential in achieving successful learning outcomes. The instructor can then substitute the live animal with the alternative, and no animal protocol is required since there is no longer live animal involvement.

If there are equivalent **relative replacement alternatives,** the instructor will be informed that the proposed live animal model does not have pedagogical merit because the proposed live animal is not essential in achieving successful learning outcomes.

In general, if the reviewers identify equivalent relative replacement models that fall under CI A, such as

invertebrates, eggs, or tissues, the instructor can then substitute the proposed live animal with the alternative. There is no CCAC requirement for the animal care committee to review or approve CI A work within a protocol and hence, no requirement for further review of pedagogical merit.

If the reviewers identify equivalent relative replacement models that involve live vertebrates or cephalopods (e.g., zebrafish or Xenopus for egg production), the instructor can then substitute the proposed live animal with the alternative live animal in the protocol and request an expedited pedagogical merit review.

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