Research Report

# Use of abstract reflection to enhance student learning from theriogenology practical classes

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## Abstract

Veterinary training is a resource-consuming process. Practical sessions throughout the curriculum are considered vital aspects of professional training and consume large amounts of time, space, and human resources and are not without risks to human and animal health. It is, therefore, important that the educational experience is optimized during practical sessions. Mentee dialogue with mentors, as part of institutional peer teaching support, aimed to optimize the practical sessions to develop professional expertise (knowledge and skills) of veterinary theriogenology students. We used the theory of experiential learning and reflective observation as a means of enhancing learning during the practical sessions. We attempted to do this by discussing abstract concepts associated with authentic learning tasks covered in each practical session. Anonymous end-of-course student feed-back revealed that the process encouraged in-depth and alternative critical thinking and discussion in the groups, which was a fun way for them to embed the knowledge and develop the skills being taught. The use of 'abstract reflection' appears to be a useful and efficient way of enhancing the value of laboratory practical teaching and learning resources within the veterinary theriogenology curriculum. The vibrancy associated with collegiate interactions between academic staff members and educational designers results in a more enthusiastic and beneficial teaching culture and learning environment, and the development of students to become better, agentic, and more deliberate professionals.

**Keywords:** Abstract reflection, pedagogy, practicals, experiential learning, andragogy

## Introduction

Veterinary training is a resource-consuming process. Practical, or laboratory, sessions throughout the curriculum are considered vital aspects of professional training and are required for accreditation of veterinary degrees by registration authorities. They consume large amounts of time, space, and human resources, and are not without risks to human and animal health.[1] This requirement is particularly true for theriogenology where student knowledge and skills are required in several domestic species with similar but sufficiently different attributes to require multiple species exposure. As a result, the number of practical sessions scaffolded within the didactic lectures for reproduction subjects is relatively high to expose students to the basic and more advanced skills pertinent to each species. The practical classes are inherently resource, animal, personnel, and materials intensive.

Assessments designed to appraise theoretical knowledge that had been reinforced by the authentic practical sessions were not being answered as if the students had attended the aligned lecture and practical sessions. Disappointingly, students did not appear to be able to immerse themselves in the holistic teaching experience when responding to the assessment tasks. To overcome this pedagogical gap, it was decided to make the practical sessions a more effective part of the intrinsic learning experience by encouraging transactive cognitivism and constructivism by the students. At a mentorship of teaching program, ideas were brainstormed that could, or might, be useful to enhance the pedagogical experience using appropriate epistemology.

A process was added to the practical sessions that were already structured and relevant to the didactically delivered material, to try and induce student-relevant reflection at practical

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sessions. Abstract questioning of ideas and principles pertinent to that laboratory session became part of the concluding process of each practical session.

## Development and implementation of concepts and activities

On reflection of teaching, and student learning, it became clear that just because something is taught, it does not mean it will be learned. In a voluntary university mentorship program, we took up the challenge to develop student metacognitive skills by encouraging internal dialogue in their learning as an important part of their, and a teacher's, role in developing the link between knowledge and use of that knowledge,[2] thereby bringing 'order to chaos' while learning and understanding new concepts. We brainstormed ideas and used scholarship for our learning and teaching development, with the intention to transform pedagogy to andragogy.

The aim was to use Kolb's experiential learning model[3–5] where students undertake iterative processes using previous knowledge, new knowledge, that of their peers, and potentially that of teachers. The intention was to induce some mental dissonance in a safe academic environment, as well as the sharing of ideas and thoughts, to increase awareness of what they were doing in the practical session. It was planned that, by creating a mental picture, and linking it to pertinent factual information, the memory of the procedures and processes would be authentic, resulting in more durable and pertinent understanding by the students, thereby using hermeneutics, the theory and study of interpretation, to develop a heuristic, or learning by discovery, culture in the students' activities. This was to increase student agency,[6] creating deliberate, professional-enabling, productive learning in complex environments resulting in thoughtful, courageous, and morally responsible learners.[7]

Reflective practice occurred only with assertive students, and it was our aim to encourage reflection in all students and to use the opportunity for students to develop autonomy[8] and self-authorship.[9] As a result we had to foster an environment of 'relaxed professional conduct' where enquiry and research were fostered within the laboratory setting.

After deliberation, literature searching, the benefit of experience, and many iterations and alterations of plans, it was decided that a series of 5 'abstract questions' pertinent to the practical/laboratory session would be handed out to groups of students at the beginning of the practical session. The practical session would continue as it would normally occur with active student participation. Once the practical session was concluded, the whole class would informally gather to address the questions set to each group. This gave the opportunity for the group to reflect on their question and make their suggestions as to possible reasons why they had concluded as they did. The rest of the class were encouraged to challenge those conclusions and to offer alternative suggestions. At the beginning of this process, we considered it important not to be too confrontational, as this was a challenge of ideas, and not personal affronts for those thoughts or ideas. It was important that we developed and behaved as experiential educators. We had to be more than just facilitators to balance attention to the learner with the subject matter in a complex relational process where the students could reflect on the meaning of the ideas and develop the skill of applying those ideas.[5]

## Examples of questions

Male anatomy practical session (near the beginning of the subject):

Explain why or how the blood pressure in the corpus cavernosum of ruminants has been reported to be as high as 15,000 mm Hg when the systolic blood pressure of most animals is 120 mm Hg.

Reproductive examination of the live cow laboratory session (near the end of the subject):

Explain how and why a cow stands to be mounted by another cow when in estrus.

Note that it was not always obvious if there was a clear answer, but the point was to highlight to the students that sometimes things just are, with our current knowledge base.

## Results

The process was not originally intended to be a formal study; as a result, the outcomes are observational and subjective, based on personal interpretations and informal voluntary anonymous student responses to the process at the end of the subject.

Fifty-seven students submitted responses (out of a possible 59 in the year), of which, 3 did not answer the question, and responded to the practicals in general. Fifty-four of the respondents gave positive responses to the question as to whether the end of session questions were beneficial or not by the students, and most mentioned that this should continue in the future.

Some of the comments included:

- Assisted with catching up points of the practical that were either unclear or they had missed during the practical session.
- It assisted them in active engagement rather than passive participation (summarized- not written as such).
- They brought in practical aspects that were not necessarily directly associated with the practical session.
- It allowed us to use our brains more and to stimulate learning.
- They helped to answer questions that had arisen during the practical session.
- I loved the reflection questions…… Also done in a relaxed and inclusive way.
- Good, but maybe should be given beforehand so they could be researched.
- Sometimes the questions/answers seemed a bit beyond my knowledge……. (making them simpler might not have benefitted the advanced students).
- They made me think outside the box… and made us question why we do things the way we do.
- …… made me realize areas I needed to spend more time studying.
- They involved critical thinking and encouraged us to challenge previous understanding and perspectives.


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- It is good they are done in a group… so someone else might know the answer (and so they can be discussed).
- They made practicals more interactive.

Keywords from the student responses are represented as a word cloud (Figure).

## Discussion

Development of abstract questioning after practical sessions fits with the role of reflection to develop agency, self-authorship, confidence, maturity, and authority.[9] Encouraging all students to reflect on their practice, is part of the educators' responsibility to facilitate students to develop autonomy and learning responsibility, and not just in the assertive students.[10] The primary aim of this academic reflective intervention was to increase the efficiency in the use of resources in the practical sessions to enhance student learning. The rationale was ultimately to move from pedagogy to andragogy where the students take control of their learning.

The principles of the reflective process enhancing learning are based on experiential learning where deeper learning and understanding occurs collaboratively. However, students do not always openly engage in collaborative learning as it is a more complex and difficult task.[11] The aim of the abstract questioning was to stimulate the conversational framework, with the learners modulating between practice and concepts, and initiating the exchange of ideas, thereby inducing debate and dialogue. Then, developing a shared focus and an output after challenging each other with appropriate conflict, in the knowledge that it is not a personal affront but an opportunity to develop intellectually and professionally. As new experiential educators,[5] we had to work on developing the appropriate safe and nonjudgmental environment that could result in shared inputs and outputs and practice modelling the environment for collaborative learning to occur.[11] The learning and teaching environment allowed feedback loops to occur between facilitator, students, and other staff, for the growth and cementing of knowledge to occur in the students.

Interestingly, most students enjoyed the challenge of the abstract questioning. They appeared to take more away from the practical sessions than having a teacher orientated wrap-up of the contents, without encouraging thinking about processes by using abstract discussion topics. The point of encouraging understanding, rather than rote learning, is the key to higher order thinking and results in understanding of processes rather than reproducing information regardless of the context. Mostly, the students began to look forward to the questions, and became actively involved in the process of linking theory with praxis, fitting with our pedagogical aim of developing student agency in a safe and reflective learning environment.

Students were always encouraged, by both staff and peers, to engage in the learning process in a disciplined, fun and interesting way, so that end of subject assessment was part of a journey of learning to become, and to create, a deliberate and consummate professional.[8] However, there were some students that wanted the questions prior to the practical so they could research the topics, or became very frustrated with the dissonance and that there was not always an answer to the questions. Ultimately, the aim was to induce some uncertainty, thereby induce deep thinking to enhance learning and the value of the practical sessions.

The hope from this reflective experience was not only to increase the value of laboratory sessions to student learning, but to set the stage for professional lifelong learning. Understanding the uncertainties during professional training involving the complexities of learning clinical skills will enable the students to develop appropriate skills, study techniques, and resilience, to be proactive and manage feelings of uncertainty during clinical training and professional practice.[12]

From a teacher, facilitator or experiential educator perspective, the process was an interesting pedagogical and teaching collegiality exercise. It is difficult or impossible to demonstrate success as determined by better responses to examination questions and overall marks. Subjectively, there appeared to be greater engagement in the practical sessions by the students undertaking abstract reflections after practical classes, compared to previous years.


**Figure.** Word cloud representation of words used by the students in their unofficial anonymous feedback at the end of the subject, having undertaken the abstract reflection process

It is interesting that whereas we saw the questions as a way to foster reflection, 'reflection' was a minor word in the word cloud. It appears that the learners were very much outcome-focused: 'beneficial,' 'understanding,' 'consolidate' and 'knowledge'. The words relating to the process were mentioned less: 'reflection', 'critical thought', 'connection'. It is possible that the students have not actually reflected on the process of their learning, and it might be that the questioning process has a legacy of the students shaping their learning accordingly. Undertaking thematic assessment of the words used by the students might result in a different interpretation of the word cloud where there was use of words having a similar reflective meaning (e.g. reflection, cementing theory, critical thought, solidification, connection, think of information, and reinforce). Regardless, the development of comfort in questioning, will serve them well in their future learning and professional practice.

## Conclusion

Reflecting on teaching outcomes and using scholarship for learning and teaching in the presence of vibrant mentors can be an enlightening experience. Using appropriate affordances and encouraging the use of practical situations to induce self and peer discovery in a safe and vibrant reflective learning environment can be an efficient way of making students better, agentic, and more deliberate professionals.


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## Conflict of interest

None

## Authors' contribution

All authors conceived the ideas. Allan Gunn wrote most of the article, Jason Condon reviewed. John Harper was unable to be part of the article submission process but was integral in the design of the process and supported the aim to submit it for publication.

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