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Using constructivism for revision of teaching material for cases

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In this manuscript, I will distinguish between two different theoretical teaching approaches. The first is, objectivism, stating that knowledge exists independently of the student, and understanding is coming to know what already exists (Biggs, 1996). Knowledge is seen as decontextualized and can be learned, tested, applied more or less independently of particular contexts (Brown et al., 1989). Hence teaching is a matter of transmitting existing knowledge and learning is to receive it accurately, storing it, and using it appropriately (Biggs, 1996).

The second teaching approach, constructivism, states that meaning is created by the student learning, not imposed by reality or transmitted by direct instructions (Duffy & Jonassen, 1991). Hence, this theory put the students centrally in the creation of meaning, not the teacher, as the transmitter of knowledge. It is important for the teacher to understand that the student brings an accumulation of assumptions, motives, intentions, and previous knowledge that affect every teaching situation and affect the course and quality of the learning that may take place. The teacher may ignore or use this student-structured framework, but the centrality of the student is given and the student creates the meaning by actively selecting and constructing his/her own knowledge.

I will apply the approaches in the discussion of revision of teaching material for a 4 hours exercise for 30 veterinary students 6 times a year. The material consists of a 45 minutes lecture, a quiz and 6 cases. The exercise is on Vaginal cytology in the bitch (female dog) and is part of the course "small animal medicine, surgery and reproduction" (MKR) which is a mandatory master course for veterinary students. The course is nominated to 15 ECTS,

and is a big course with many teachers that, in the end, will contribute to examine the students by suggesting questions for the final exam consisting of a 4 hours long multiple-choice test.

The teaching material that I revised has been changed a couple of times, as different lectures have taught the course. Latest the course was taught by an Associate Professor in Veterinary Reproduction and Obstetrics, Dipl. ECAR, European Boarded Specialist in Reproduction, German Specialized Veterinarian in Breeding Hygiene doing research within small animal reproduction. Therefore, she had a lot of specialist knowledge within the subject, which were reflected in the teaching material. The material covered very detailed and complicated areas of the canine oestrus cycle and was quite comprehensive, for an example see figure 7.1 in appendix A. It was therefore necessary to assume that the students were well prepared for the exercise, and to keep a fast pace throughout the entire exercise to get through all the material.

I tried to teach the students using this teaching format, but the students seemed confused after the introduction lecture, they were not able to work independently with the quiz and cases, a great proportion of them did not finish the cases in time and finally they evaluated the exercises negatively.

"The pace at the lecture was too fast"
"The slides were a bit confusing"
"There is some contradiction between slides and quiz"
"I would prefer to do these exercises as E-learning"
"The pictures in the quiz are of a poor quality and lack explanations"
"The content of the slides is sometimes confusing and the lecturer sometimes contradicts the slides".

I felt stressed when I did the lecture and could feel the students were frustrated. I therefore decided to revise the lecture and quiz. I asked for input for the revision from following persons: The students, the associate professor who originally designed the cases, the associate professor that taught the course before me, the course responsible for MKR, colleagues working on clinical pathology and my pedagogical supervisors.

Revision of lecture

In accordance with the advice of (Rienecker et al., 2015) I prioritized structuring the content of the lecture according to the assumed logic of the

students over the disciplinary logic. The two approached seems closely related, but the revised lecture has more focus on why it is relevant for the students to determine the breeding status of the bitch and clinical cases. I therefore changed the name of the exercises to "determine the breeding status of the bitch". I used time to explain technical terms and minimized the use of abbreviations. I also aimed for a clear red line through the lecture. Dividing the lecture into: Why is it important to determine the breeding status of the bitch; The canine estrus cycle; Gynaecological examination; Vaginal cytology; Clinical signs and cytology when the bitch is in proestrus, estrus, diestrus and anestrus.

After advice from my department supervisors, I made it possible to teach students that were not prepared. This meant, lowering the amount and complexity of the content in the lecture material and focusing on a basic overview, see figure 7.1. I tried to achieve this by removing material from slides. This resulted in more time for student activation and brakes in my monologue. The student activation mostly consisted of me posing question about content I just had explained, to ensure repetition and re-decontextualization. This also gave me an indication of whether the students were able to follow the logic in the lecture. I also spent more time introducing and preparing the students for the cases.

Revision of the quiz

I revised the original quiz making sure that there was enough explanations written for the students to work with the quiz independently. I made sure that there were nothing that could be interpreted as contradicting to statements in the lecture or to other answers for the quiz.

The purpose of the quiz was to let the students recognize some of the pictures of different cell types from the lecture, repeat the most important cell types seen in vaginal cytology, and re-decontextualize their learning from the lecture. I tried to facilitate the re-decontextualization by asking questions, formulated opposite to what was done in the lecture. Forcing the students to describe the cells instead of just identifying them and then relate them to stages in the canine oestrus cycle.

I decided to replace all the pictures the students had complained about because they found them contradicting, or of a poor quality, with new pictures in a better resolution.

I made the quiz voluntary and decided to give the students feedback by sending them the correctly answered quiz the weeks just before their exam. I did this to let the student have more time for the cases at the day of the exercises, and be able to use quiz for repetition when they prepared for their exam in MKR.

As an additional help to the students I will try align the quiz to the quizzes for MKR made by clinical pathology in the small animal hospital. This mean focusing more strictly on the intended learning outcomes defined for the course in reproduction in small animals, MKR when I formulated the questions. It is also my intention to put the quiz on Absalon this autumn and use the same feedback system as clinical pathology.

Revisions to secure a good teaching environment

To teach these exercises it is necessary to have access to quite a few bright field microscopes. These exercises have not been allocated to one microscope room but have moved around through the semester (6 exercises/semester). Interestingly the location seems to influence the students: When I was teaching in the Anatomi Histology room the students asked why the course wasn't part of basic anatomy. When the course was taught at the large animal hospital the students asked if the vaginal cytology in the horse was the same as in the dog. I felt that the students were most focused when they were taught at the small animal hospital. Therefore we are trying to move all exercises to the small animal hospital.

Enforcing rules for good behaviour and tone (Rienecker et al., 2015), was another of my focus points to secure a good teaching environment. This was easiest done by, me telling the students where to sit in a friendly but firm manner and also defining rules for good behaviour and how to share the case material. When I start out by doing this, the exercises continue in a friendly manner. I did not do this the first times I taught these exercises and experienced that small groups took all the case material and kept it until they were done, leaving other groups with no material.

The speed of the teaching also influence the teaching environment. I have lowered the speed of the lecture and assigned more time to discuss the cases at the end. Finally, I have made the quiz optional and do not give feedback on it at the exercises, but the students are allowed to ask questions. It seems like the decreased time pressure, is beneficial, for the teaching environment.

Feedback on the revised teaching material and format

To get feedback on the revisions I had made, I asked for feedback from my students and pedagogical supervisors:

Pedagogical supervisors:

"Clear red line in the lecture"

"Clear points and repetition of the points"

"Good contact with the students"

"Students work focused and interested are interested in the cases"

"Stress more why it is relevant to look at vaginal cytology"

"Nice teaching environment even though there are too many students for one teacher"

Student feedback:

"Good lecture"

"Good illustrations of the different cell types"

"Exciting cases"

"The workload for the exercises is appropriate"

"Friendly and safe atmosphere"

Discussion

Veterinary students need to accurately learn existing knowledge, store it and use it appropriately. If not the coming veterinarian could kill an animal or cause an outbreak of a contagious disease. Therefore, there is a tradition within the veterinary faculty to focus on the objectivist approach to teaching. However, there are areas where the teaching meaningfully to a higher degree could apply the constructivism approach. For example diagnosing a sick animal requires "actively selecting and constructing" in connection with using factual knowledge. Furthermore, constructivism can be a good approach to teach facts to students who need to know the facts from the top of their head (Rienecker et al., 2015)

At a faculty meeting, on the new reform of the veterinary education last year, an associate professor stated that we need to teach the students differently, to make them more confident and able to take action when they graduate. A professor replied to this statement by stating that we just need to make the students memorize more facts, to make them feel secure

when they graduate as vets. I think this situation reflect the conflict between teachers focusing more on coverage and objectivism on one side and teachers focusing more on constructivism on the other. I think the difference between the two types of teachers currently is getting increased by the limited time we have to teach the students and also the pressure to decrease the number of pages we suggest the students to read. The choice between coverage or trying to make the students to take responsibility for their learning and actively select and construct their own knowledge is sometimes needed and a middle way is not an option due to time restriction.

Time was also a limiting factor in the revision of the exercises in "determine the breeding status of the bitch". I decided to decrease the coverage and complexity in the material. I made the quiz voluntary and suggested that the students made it at home. In the future, I will put it on Absalon using the same format as small animal clinical pathology, this will enable the students to take the quiz several times and get instant feedback. The above mentioned changes made it possible for me to focus more on the students learning by interacting and talking to them. At the same time the students had time to reflect over and repeat, the important points in the exercises. This enabled them to work independently with the cases, and they managed to solve them.

When focusing less on coverage and complexity, there is a risk that a few students with a lot of knowledge will miss the more comprehensive and complex material. However, it is my impression that the students as a group have benefited from the revision, and for the extremely well prepared students it is possible to add complexity to the cases by talking to them individually.

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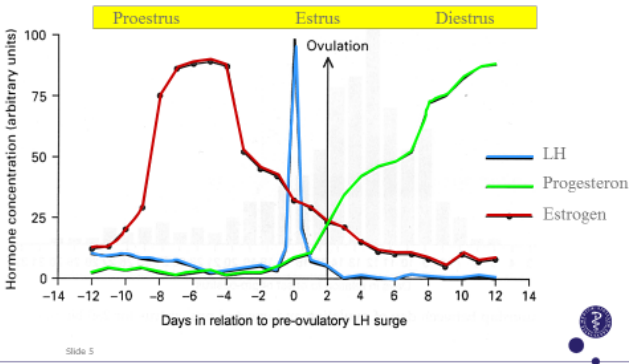
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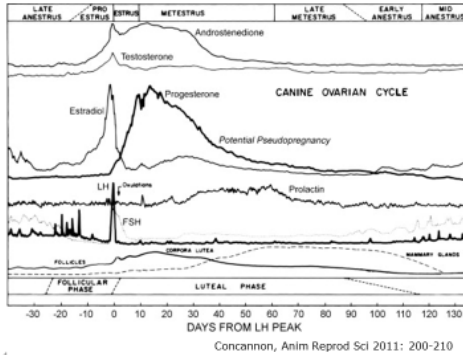
Fig. 7.1. Example of two slide used for explaining the hormones relevant for the exercise. The top is the more comprehensive and the bottom one is more simplified