16

Improving veterinary students' deeper learning and motivation by stronger alignment in a course of Clinical Anaesthesiology

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Introduction and definition of problem

Veterinary students of the University of Copenhagen will during their university education transfer from mainly auditorium and class room teaching to individual clinical training in a hospital setting with real live patients. This transformation is not only in the setting but also in the way of teaching and learning. Many students experience difficulties in transferring from earlier courses where learning is mostly by perceiving presented knowledge to using knowledge in a clinical setting where the situation is less controlled.

In the course "Emergency, Obstetrics, Critical Care and Clinical Anaesthesiology" this dilemma is evident in the case of the subject Clinical Anaesthesiology: the students have had all their theoretical teaching in anaesthesia before emerging this course but still have difficulties in being well enough prepared for the clinical rotation to get the best learning experience and most gain – ie. deepest learning.

Previous teaching in the subject of anaesthesia:

3rd year (last year on the bachelor level): 3 hour lecture "Principles of anaesthesia and analgesia", part of the course "Small Animal Basic Clinical Theory". The exam is a combined essay and multiple choice exam.

4th year (1st year on the candidate level): 3 hours lecture "Overview of anaesthesia and analgesia", part of the course "Small Animal Medicine, Surgery and Reproduction". The exam is an electronic multiple choice

exam.

4th year (1st year on the candidate level): Some practical anaesthesia of pigs as part of the course "Surgical Techniques".

The course "Emergency, Obstetrics, Critical Care and Clinical Anaesthesiology" is an obligatory course on the candidate level of the degree in veterinary medicine, year 1 or 2. The course is of one-block duration and commences 4 times a year for up to 45 students at the time. The sub-course Clinical Anaesthesiology consist of 3½ hours of introduction teaching for all the 45 students followed by one week of clinical anaesthesia training in the anaesthesia department of the University Hospital of Companion Animals. During their clinical training the students will be in 8 groups of 3-6 students and each day of clinical work with patients will be rounded off by "rounds" where the teacher and the students discuss the patients of the day and relevant theoretical subjects.

For the course investigated 29 students was listed and completed the course. The 29 students were divided into 8 groups of 3-4 students.

Pedagogic angle and purpose of the study

When supervising the students during their short clinical rotation, I often experience the students being very overwhelmed by the amount of decisions they have to make during their clinical work and how difficult it is for them to make independent decisions. To help them make decisions they need solid guidance to reflect their way based on their existing knowledge rather than trying to know everything by heart and asking for protocols. This tells me that many students are unfamiliar with using their knowledge and reflect on it and its use. This can partly be explained by the massive curriculum in veterinary medicine, and to a large extent by the way we teach, as fast overview lectures promote surface learning rather than deep learning. If we as teachers fail by focusing on only the content of the teaching rather than all three dimensions: content, drive and interaction, the students will find it difficult to learn and develop new competences. Illeris' teaching triangle describes the relationship between content, drive and interaction as two processes: the external interaction process between the individual and the environment and the internal psychological learning process (Illeris 2003). The three dimensions can also be described in terms of know-

ledge, understanding and competences (content), motivation, feelings and will (drive) and action, communication and cooperation (interaction).

To enhance the outcome even further in terms of deeper learning we could benefit from Biggs' constructive alignment model that describes the relationship between curriculum aims, teaching-learning activities and evaluation and how these three elements condition the student's learning. According to Biggs and Tang all learning is a result of student activity and constructive alignment will promote deeper learning of the students.

These theoretical thoughts result in the following purpose of this project in university pedagogy in relation to the teaching of Clinical Anaesthesiology in the above mentioned course:

How can stronger alignment between the course's curriculum goals and teaching-learning activities contribute to deeper learning of the students and thereby prepare them better for their clinical training?

The stronger alignment in this investigation does not include the final evaluation form of the course, as it is given as a multiple-choice exam based on clinical cases preferably.

Changes made in the project design based on input from colleague

Based on the description of the project a colleague asked the following questions: What is it that you want to investigate: Motivation, deeper learning or the students' responsibility for their own learning by improving constructive alignment? As this was not clear from the project description, a more strict purpose was developed according to the above mentioned purpose.

Also a part regarding the practical exercises rounding off the introduction teaching day was included in the project proposal but his part was removed in the final project as it spread out focus.

Description of the course and interventions

The main changes made in the course of Clinical Anaesthesiology to investigate the purpose of this project are made in the 3½ hours introduction teaching and to a lesser degree during the clinical rotation.

Original course

In earlier forms of the course most of the theoretical teaching of the introduction day was repetition of subjects related to clinical anaesthesia according to this plan:

08.30 - 09.10: Short introduction to most used anaesthesia protocols

09.10 - 09.40: Theoretical exercises in groups: ASA-classification and choice of anaesthesia protocol

09.50 - 10.10: Introduction to anaesthesia monitoring

10.10 - 10.50: Theoretical exercises in gruops: Identification of anaesthesia complications and possible treatments

11.00 - 11.20: Presentation of The Anaesthesia Department (introduction to the students' clinical rotation)

11.20 - 12.05: Practical exercises in groups: Intubation and intravenous catheter

In teaching former courses I have often had the feeling that most of the introduction day was spend reviewing formerly taught curriculum. The students seemed happy and found the review good and informative and I could observe an improvement in their knowledge compared to earlier courses without introduction teaching. However they were still overwhelmed by the transfer to clinical work, and my wish was to make them more prepared for clinical work and me giving less reviewing lectures. These are the main reasons for the changes made in the investigated course.

Investigated course including changes to achieve more alignment

In the present version of the course the following changes were made in order to enhance alignment:

Curriculum aims (listed in question number 1 in the questionnaire, appendix 1) from the course description were presented in more detail for the students and operational teaching aims were made from these to make the purpose of the course even clearer for the students. (Operational teaching

aims are listed in question number 3 in the questionnaire, appendix 1). The presentation of these aims also made it possible for the students to match their expectations with the teacher's and set the frames for the teaching.

The introduction teaching was planned to prepare the students to their clinical rotation rather that reviewing formerly presented curriculum. A reviewing Power Point presentation was available for the students to assist in their preparation for the introduction teaching instead and the teaching toke the starting point in how I as an anaesthesiologist plan an anaesthesia for a patient. The interactive dialogue-based presentation of a real case was followed by group assignments where the students in small groups were asked to go through other cases as just demonstrated answering various issues relevant for the cases. Some of the cases (time did not allow for all cases to be presented and the students were told that initially) were then presented by the students for the whole class and discussed.

By letting the students solve their own cases after a demonstration let to the use of their knowledge and reflection and prepared them theoretically for what they would be doing during their clinical training in practice, and hopefully motivating them for deeper learning.

By giving the cases to solve as group assignments the students were forced to work as a team which is also of great importance in a hospital setting, where the members of a team make their competences available for the team as a whole. The case-angle also illustrated the problem-oriented way of preparation rather than the page-by-page reading.

An individual assignment was given to the students to sum up the theoretical introduction teaching: They were asked to make a mind map taking focus in "Anaesthesia". This was done to let them reflect on the many aspects of the subject and to relate it to other parts of veterinary medicine. They were also encouraged to use their individual mind map as an inspiration for further studying before their clinical rotation as the mind map might have illustrated less well understood issues.

These changes resulted in the following plan for the introduction teaching:

08.30 - 09.10: Presentation of The Anaesthesia Department (introduction to the students' clinical rotation)

09.10 - 09.40: Demonstration of a case: "How to plan an anaesthesia" – taking starting point in the operational teaching aims.

09.50 - 10.30: Theoretical exercise in groups: Patient cases – how to ASA-classification, what anaesthesia protocol, how to monitor and how to manage analgesia?

10.30 - 11.00: In plenary: Presentation of some of the cases and discussion

11.00 - 11.15: Round up and final assignment (mind map)

11.20 - 12.05: Practical exercises in groups: Intubation and intravenous catheter

Evaluation form and investigation methods

To evaluate the effect of the changes made in the introduction teaching a Danish questionnaire with 21 questions was made based on the usual evaluation form for the course and supplementing questions regarding:

1. Effect of curriculum aims and operational teaching aims
2. Evaluation of group assignments
3. Alignment of curriculum aims, teaching-learning activities and clinical rotation
4. How well prepared the student felt him/herself for the clinical rotations
5. How motivated the student felt for further studying and deep learning

All questions were rated 1-7 (e.g. not at all - very much or unacceptable - optimal) or not relevant. The students were given the questionnaire within 2 weeks after completion of their clinical rotation and the quantitative data were supplemented with qualitative data as the students could write comments to relevant questions. A total of 29 questionnaires were handed out and 24 completed and returned, representing all 8 groups of students in the block. The completed questionnaires were anonymous except group number.

Some of the questions in the questionnaire will be compared to the results from the final evaluation form from the students in the block before the subject of this study.

All results will be given as mean. Relevant comments from the students will be included in an illustrative way.

Presentation of results and experiences from the study/intervention

Overall the subcourse Clinical Anaesthesiology is rated as a very relevant course for the students (mean 6.64) and the students find the course material close to optimal (mean 6.09). The students find the teachers near optimal as clinical supervisors (mean 6.91), the assistance/guidance during the clinical work very good (mean 6.41) and the university hospital/department a near optimal place for teaching (mean 6.55).

Effect of curriculum aims and operational teaching aims

The students found that the course highly took its starting point in the curriculum aims (mean 5.81) and these were made clear from the start (mean 5.77). These results are better than the in the former block (before interventions) as these questions only scored 4.86 and 4.14 respectively. The add-on of the operational teaching aims improved the students' understanding of the curriculum aims (mean 6.18), thereby indicating the need for more tangible aims to enhance understanding.

Evaluation of group assignments

The students found the learning of the theoretical case assignments more than acceptable (mean 4.52) but the spread among the students was high (minimum 1, maximum 7) and the learning was less than amongst the students of the former block (mean 5, minimum 4 and maximum 6). The feedback of the theoretical assignments was well accepted (mean 5.28) and on level with the former course, however the spread was again higher than before (minimum 1, maximum 7). An explanation to the high spread of the students' learning from the cases can be the fact that not all cases were reviewed and discussed in plenary – despite this being mentioned from the start; so students who's cases did not get reviewed and discussed may be the students who respond with low scores and comments like "There was not enough time for the assignments", "I think the learning would have been better if there had been more time", "More time to review ALL cases" and "More time to review the cases to actually get feedback!". In contrary other students responded with comments like "The concept is really educational", "A good educational assignment. Good choice to work in groups so that you can discuss and hear different arguments. Nice with an introduction to the assignment.", "...it was a good way to be introduced to the

way of thinking in the department.", "...having been through a theoretical assignment made it easier to transfer it to practice".

Alignment of curriculum aims, teaching-learning activities and clinical rotation and its effects

The mean for the question regarding the students' experience of alignment between curriculum aims, teaching-learning activities and clinical rotation was 6.00 and thereby scores near optimal of the students.

The students themselves felt more than acceptable prepared (mean 5.27) for their clinical rotation based on the introduction teaching and their own preparation and they felt a near optimal (mean 6.14) motivation for self-studying and deeper understanding.

The students found the teaching outcome of the clinical rotation very high (mean 6.50) and were very highly in agreement of this point (minimum 5, maximum 7). They had many positive comments related to the clinical rotation, and these are some of them: "It is great to be responsible for your own patients, and to get as much hands-on as possible.", "Small groups make it possible for all to get answers to questions.", "It worked really well when you followed a patient from start to end and was able to see parameters change during anaesthesia." and "Really good when we have had to explain or answer questions, as you learn more compared to just listening."

On the question "How was the relationship between theoretical teaching ("Rounds") and clinical teaching?" the students answered near optimal (mean 6.41). Their comments included "The combination of the practical hands-on in the operating theaters and the possibility of theoretical talk has been good.", "It was super nice with rounds where we could discuss the questions you had come across during the day." and "Really good with rounds in the afternoon." These comments make it clear to me that it is important for the students to have a place to go with their questions and that giving them this possibility by having rounds enhance their reflection and thereby deeper learning.

Discussion and conclusion made upon the results from the study

The high degree of the curriculum aims being the starting point for the teaching and the increased understanding of the curriculum aims by writing up operational teaching aims correspond well with the triangle of learning

by Illeris which illustrates the relationship between content and interaction, here illustrated by enhanced understanding by improving the relationship between the desired competences and the clinical relevance. To list specific wanted competences (e.g. "the student should be able to plan and perform the most optimal anaesthesia/sedation procedure for the individual patient and procedure" or "plan postoperative analgesia") as operational teaching aims as an alternative to the more "fluffy" curriculum aims (e.g. "Be able to evaluate and choose the correct form of sedativae, analgesia and anaesthesia..."), the students will easier understand what they will have to learn as it becomes more clear.

On focusing on the theoretical assignments, the cases, the acceptable level of learning is good but the large spread of result amongst the students with regard to the feedback make to opposites. These two opposites make it clear to me as a teacher that to enhance the outcome and deep learning of all students they need feedback on all their assignments. This fits well with Biggs' constructive alignment model where testing is one of the three components (aim, teaching-learning activities and test) that allows deeper learning (Mørcke & Rump 2013). The test in this context is seen merely as an evaluation of the students' abilities to solve the assignments correctly and will thereby also tend to boost the students' motivation if successful. One student commented "More teaching instead – it is the teachers who have the answers." This to me is a clear example of a "surface"-learner who has yet not gasped the concept of leaning in a more advanced state. To get this kind of student to understand the learning concept used in this course, there is a need for more explanation of why the teaching is done the way it is.

A near optimal alignment of the curriculum aims, the teaching-learning activities and the clinical rotations is a very positive indication of successful alignment not only to me as teacher but also recognized by the students. However the main purpose of enhancing alignment of this course was to improve the students' deeper learning and prepare them better for the clinical rotation.

Both the level of preparation for the clinical rotation and the motivation for deeper learning and further self-studying were high and correspond well with the good achieved alignment level in this investigated course.

These results indicate to me that enhanced alignment of a course will lead to deeper learning of the students and maybe do so by enhanced motivation. In the current investigated course of Clinical Anaesthesiology a stronger alignment between the course's curriculum goals and teaching-

learning activities contributed to deeper learning of the students and thereby prepared them better for their clinical training. Hence, the project was successful.

Perspectivation and potential limitations of the project

In this current project of stronger alignment, the stronger alignment is successful in preparing the students better for their clinical rotation and enhancing their motivation for deeper learning.

Stronger alignment could be a way of improving deeper learning of the students in other courses and surely makes a red line throughout the teaching experience. The strong focus on curriculum aims and more practical operational teaching aims makes it easier to keep focus during teaching – both during planning and execution.

However the stronger alignment only refers to the alignment of the curriculum aims and the teaching-learning activities, hence it does not relate to the testing of the students' competences. If the exam fails to align with the rest of the course there is a risk of the students not being tested correctly in the curriculum and they will maybe not be as motivated to follow the alignment way during teaching as the goal is somewhat different. – if the motivation for passing the exam is greater than that of learning we have obtained too little.

Therefore it is a limitation of this project that the exam is not included in the alignment changes and to fully benefit from the great advantages of constructive alignment in a course the alignment of the exam or test should be included.

All contributions to this volume can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/2015-8/

The bibliography can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/

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