

Including practical experience in teaching results in deeper understanding

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“Tell me and I’ll forget; show me and I may remember; involve me and I’ll understand.” – Chinese Proverb

The topic of this paper is the value of animal research and practical experience in particularly in the animal science and veterinary degrees. Focus will be on the master level course "Animal Production Science" and the value of gaining practical experience by visiting a farm.

Introduction

Continuous cut-backs have resulted in more and more restrictions on what can be done in a given time-frame. For example, the latest money saving procedure is to make the students write their thesis two and two in order to save time on student consultancies. This in itself is not a problem; however, it is a problem that the direction seems to be for more cutbacks to be made but never any additions. In addition, we do not know the loss of valuable experience for the students when these cutbacks are made. One main question is; what does not only the animal science degree but any degree educating consultants lose out if experimental work is cut from the teaching? In animal science and veterinary science we train academics. The goals of the Animal Science programme is to achieve a basic knowledge about quantitative biology and its methods, but also have to critically evaluate research and results by learning how to analyse problems based on a holistic insight into the connection between the structure of the body, its functions, its ability to perform and welfare. Different teaching methods are used to achieve

this goal for example problem based learning (PBL) and project organized work that both are characterized by a high level of student involvement and work with both practice-based and more theoretical problems (Krogh and Wiberg, 2015). It is difficult to measure the direct outcome of one teaching method against another and most teaching on the animal science degree is a combination of different methods as the above.

For this study I was interested in investigating what the students perceive as being the most useful teaching tool and therefore the hypothesis tested in this study was: *students feel they gain a deeper understanding by including practical work in their learning process.*

The overall aim of this present report was to evaluate whether students found the practical work on the course as important as or more important than lectures and how they rated group work in the overall learning experience.

Methods

Students who had participated in the pig track of the master level Animal Production Science course were asked 6 questions related to the course, the different teaching methods and the learning outcomes. The questions asked were:

1. What have you gained from taking the course Animal Production Science?
2. What have you gained from the group work (your fellow students)?
3. What have you gained from the farm visit(s)?
4. What have you gained from the lectures?
5. What has been the main learning outcome?
6. How have you gained that learning outcome?

In addition, the students were asked to rank the following 3 keywords with what they found most important (1) to least important (3) of lectures, group work and practical work (farm visits).

Results

The following section will give an overview of some of the answers given to questions one to six and the keyword ranking. A total of 9 students that had followed the pig track were asked and 8 responded giving a response rate of 89%.

1) *What have you gained from taking the course Animal Production Science?*

Here all students answered that they had gained knowledge on general pig production in Denmark, with all its different aspects (housing, feeding, reproduction, management etc.). One also mentioned that group work had had a great impact on the overall gain from Animal Production Science and an increased knowledge and understanding on communication with farmers and their situation and preferences. Generally the aim of the course for a holistic understanding of a production system was accomplished. One student further mentioned that *“from a biology background with no livestock knowledge, I gained what I feel like is a very well rounded knowledge of the pig sector from all aspects, from 0 to 100 in 9 weeks”*. Another student said that *“overall, this was the course where you felt that you used all the knowledge you had gathered over the last 3,5 years of school on animal science education. All the knowledge was suddenly used in a practical and theoretical context”* and further added *“in addition; it gave an opportunity to see if consultant work was the way you would like to go”*. This view was also shared by another student who answered; *“The course is fundamental for the education. It combines the academic aspects with the practical world, and teaches problem identification and -solving. It allows us to see things from the farmer’s point of view, while still having to use scientific research for improving certain aspects of a production”*. Another student answered that *“the main outcome of the course was to understand the Danish pig production from a systematic (factors of the herd) and scientific point of view. Assessing the problems that the pig farmers face based on a diagnosis of the current state of the farm. And more importantly, to provide the solutions considering the attributes and constraints of the farmer”*. Generally they all felt that they now had an understanding of a full production system and what methods to use to optimize the production.

2) *What have you gained from taking the course Animal Production Science?*

Most students mentioned how knowledge sharing and using the other peers' strengths and competencies had improved the final product. For example one student answered; *"you can discover different advantages from different group members and learn from them"* and another that *"I have gained a better understanding of group work and learnt how to find and utilize the different group members competencies so that we together could achieve the best possible result"*. One added that; *"also every time you work in a group you learn something about yourself, e.g. your weakness and strengths"*. In addition, improving their own writing skills through the process was mentioned and that it was *"super helpful to work with people from different backgrounds, there was always one of us that knew about an otherwise unknown so it was great to share knowledge in that sense"*. In addition one student answered that *"I have gained future peers on my work. I felt like some in the group complemented each other perfectly, which made the group project more exiting and eliminating"*. Another answered; *"It has been very educational to explain and discuss different matters with the group"* and you get *"new aspects and viewpoints on problems in the production"*. Another student added how the international group dynamic had been beneficial as to how they look at the Danish form of pig production and to work with students with other experiences and educational backgrounds than themselves. This was further elaborated by one of the international students who answered; *"I learned how to work in teams and how to properly plan in order to achieve our goals. Additionally, I built a very nice friendship with my group mates. In fact, they were very friendly and helpful, as I was the only one that did not speak Danish"*.

3) What have you gained from the farm visit(s)?

Generally the students all thought the farm visits had been very beneficial for example one student said; *"personally I'm a hands on learner, if I see it happening it sticks way better, so farm visits were an invaluable tool for me to learn much faster what I needed to learn about pig production"*. Some of the students also mentioned communication with the farmers as being one of the very beneficial outcomes for example one answered; *"I learned how to interact with the farmers because you have to be very careful with your question while assessing the state of the production"* and another that she had gained; *"a lot of insight into the farming industry in Denmark and also knowledge on how to talk and address the farmer and employees"*. This view on how to address the farmer was shared by most of the students and quite a few answered along the lines of; *"Increased*

knowledge on the farmer's situation and preferences and also a better understanding of communication with farmers". Also "how farmers have to compromise when trying to fulfill their utility objectives and seeing how academic solutions can be implemented in real life" was mentioned and a general overview and introduction to the Danish system of production.

4) *What have you gained from the lectures?*

Generally the students answered that the lectures had provided background knowledge, had increased their understanding of pig production in general and had been a useful supplementary tool. For example one student answered; *"lectures were a great way to discuss problems with other groups and pose questions to the expert in each factor; great to get the basics before going and seeing it in reality in a production setting"*. This was also answered by another student who said he; *"gained a lot of knowledge in animal nutrition, pig production, and animal welfare. I really like the high-level of discussion in all lectures. All professors are specialists in their area and they used very updated information"*. Another student answered that she felt that they had given her; a general overview of the different elements within animal production (feeding, housing, vet, etc.), and the possibility of putting the knowledge in relation to the farm visits. Another student also used them as a guideline for what they had to look at on the farm for example *"what a farmer has to consider eg. when they choose a specific diet or what temperature to use in the farrowing unit"*. This was further elaborated by another student who answered; *"The fact that most of the lectures were directed to our specific topic, was very beneficial"* and another student answered *"it gave insight and a direction as to which things to look for on the farm. So a context to refer problems back to"*.

5) *What has been the main learning outcome?*

The answers to this question were divided. Some mentioned the overall aim for example *"combining the practical and academic aspects of pig production"* were mentioned as well as *"increased ability to see and understand the technical things in a larger context"*. Others were more specific; *"a good general and overall understanding of a Danish pig production, with all its different aspects. Both the difficulties in producing pigs, but also the possibilities and gains"*. One answered a more personal outcome; *"Writing skill and self-study skills"*, whereas one student answered that; *"There is not a simple answer for this, I consider that the course was very*

hands-on and project based, which helps a lot to understand the dynamics of the animal production. Also, it made me realize that I need to develop my knowledge even more. Especially, in nutrition, because this was the area in which I most interested in. The pig production is a complex system that requires the conjunction of different areas of knowledge. Additionally, it is required to be specialist (nutritionist, welfare specialist, farm designer, veterinarian or geneticist) in order to provide the best outcome possible. Additionally, as we work in the project we understood that there are still a lot to do in the pig industry". Another student answered more specifically; "How to analyse an entire pig herd - using e-controls, feed formulas i.e."

6) *How have you gained that learning outcome?*

The students answered very differently to this question. For example one student combined all the teaching methods and answered; *"Through a combination of lectures, reading, farm visits, group work, report writing, meetings with supervisors and studying for the exam. Primarily the group work and the report writing as we therefore in the group have discussed things through"*. Another listed them in order and answered *"1) By scientific reading 2) constant feedback from the professors of the pig area 3) the direct contact with the farm"*. Several mentioned active participation, hard work, searching for information and discussing with group members. One of the international students also mentioned self-studying; *"I have been writing a lot through the course, and there were not many lectures, so a lot of things I need to find in the papers by myself"*. Some also answered that the farmer had played an active role; *"with the farmer's help plus discussions with teachers and the group"* and *"a combination of the farm visits, and actual work on the farm related problems"*.

Ranking of keywords

The students were asked to rank; lectures, group work and practical work from most important (1) to least important (3). Figure 5.1 shows the results of the ranking.

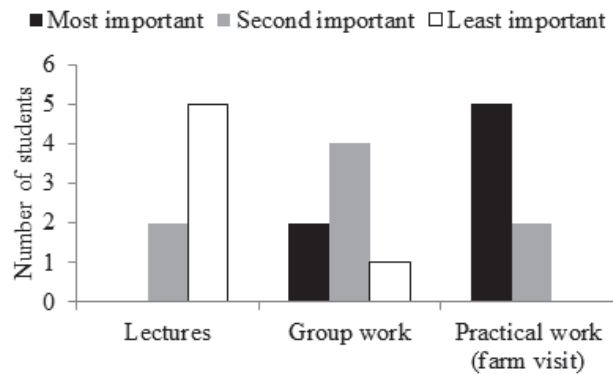


Fig. 5.1: Student answers to what they considered most important to least important.

Generally students ranked lectures last and farm visits/group work were ranked as more important.

Discussion

The hypothesis asked in this study was accepted as most of the students answered that they had gained a more in depth understanding of a pig production system through the practical work. It is expensive and time consuming to include farm visits in teaching however; the value can be directly measured. The results to the question; *How have you gained that learning outcome?* Really showed the different approaches the students learnt by and that how a combination of all actually benefits the greater amount of them. One student put the problem with these broader subjects in a nutshell as he answered; *"The pig production is a complex system that requires the conjunction of different areas of knowledge"*.

The first teaching tool of *"Practical work"* generally seemed to give the students motivation. In order to get the deep learning/understanding it is important to include practical work (R., 2004). One student answered; *"It was very educational to visit the farmer by our own, because we were kind of forced to be ready and do a good job communicating with him"*. This shows how the approach of letting the students try by themselves and visit the

farm by themselves was extremely beneficial. Students generally respond positively towards active learning and research-based teaching (Prince and Felder, 2006; Tomasik, Cottone, Heethuis, and Mueller, 2013).

The second teaching tool of *group work* was also rated as very important by many of the students. Interestingly, some of the students answered that they had now been given a deeper insight into group work and had through this course learnt how to take advantage of the different group members' strengths in order to make the best product. This is in agreement with the information processing theory in the PBL approach that suggests that for effective acquisition of knowledge, learners need to be stimulated to restructure information they already know within a realistic context, to gain new knowledge, and to then elaborate on the new information they have learned, for example by teaching it to peers or by discussing the material in a group setting (Kilroy, 2004). Group work works really well if the group works well as a whole. It can be detrimental though if the members do not work together (Krogh and Wiberg, 2015). In agreement, one student answered; *"It was also educational to be able to discuss the different topics with the group, however; at times it was also very frustrating as the group members had very different backgrounds and working methods"*.

The third teaching tool of using *lectures* as background knowledge was not ranked most important by any of the students. However, although most students rated lectures as being the least important of the three keywords to choose between they all had positive comments on the background knowledge they had gained through the lectures. A few mentioned that they found it hard to rank them as all were beneficial.

To summarise and return to the beginning and the Chinese proverb - *you need to be involved in order to fully understand*, the Animal Production Science course provides different tools and methods that allows deep learning by combining different methods.

Conclusion

Most students felt that the practical farm work and hands on experience gave them a deeper understanding of the subject area. They also learnt a lot through their peers and could through the process, progress to using each other in the way that would achieve the best product. Although lectures were seen as being the least important they still contributed with background knowledge and discussions that were useful for the overall aim.

Overall the pig track on the animal production course works really well with a good balance between theory, practise and group work.

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