

## **Challenges associated with teaching interdisciplinary courses - Getting the level right and increasing student's active participation in classes**

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### **Introduction**

During the last four years, I have been teaching on two interdisciplinary Master's level courses ('Tropical Crop Production' and 'Thematic Course in Interdisciplinary Land Use and Natural Resource Management') that are both hosted at Department of Plant and Environmental Sciences. Both courses are followed by students with very diverse disciplinary backgrounds. My experiences from teaching these two courses have made me reflect on the challenges associated with interdisciplinary teaching in an international context and encouraged me to experiment with methods to overcome these challenges.

This project takes point of departure in the challenges that I have faced while teaching the course in Tropical Crop Production and describes and discusses the measures that I have applied in attempt to overcome these challenges.

### **Challenges associated with teaching on the course in Tropical Crop Production**

The course in Tropical Crop Production is a 7.5 ECTS points course, offered as a part of the master's programme in Agricultural Development. The course is followed by students with BSc degrees in a wide range of

disciplines - e.g. Geography, Crop physiology, Agronomy, Biology, Natural Resources and Human nutrition and is mandatory for students under the AgrisMundus program. The students are a culturally diverse group which in 2013 represented 15 different nationalities (out of 25 students). 10 of these students were from developing countries. The course is taught in block one; hence it is often one of the first courses that international students are following at a Danish university. The teaching at the course is a mixture of lectures, theoretical exercises and practical exercises. Four lectures contribute equally to teaching the course.

One of the main challenges associated with teaching the course in Tropical Crop Production is related to the interdisciplinary nature of this course. Not only do the students have many different disciplinary qualifications, but the qualifications change from year to year, hence it is difficult to know the level of background knowledge the students in a certain year have on a certain subject and to adjust the level and nature of the teaching accordingly. Of course the teaching has to fulfil a certain minimum level, but as the course curriculum is very broad, there is also a great deal of flexibility in terms of which issues to focus on, the level of detail and on how much to deviate from the course literature during lectures. Dealing with the challenge of getting the level right is one of the main focuses of this project.

A second challenge is related to the fact that the course for many international students is the first encounter with the Danish university system and the Danish teaching style. As many of the students are from developing countries where university teaching is dominated by a well maintained hierarchy and one way communication, it can be particularly difficult to make these students participate actively in the classes. Improving the student's active participation in the lectures and exercises is another focus point of this project.

## **Problem statement**

The objective of this project is to explore and evaluate methods to improve the lectures and exercises on the course in Tropical Crop Production.

In particular, the project investigates how an initial screening of the student's background knowledge and interests within selected topics can be used to ensure an **appropriate level** of the lectures and to increase the student's engagement in the teaching. Moreover, the project investigates if

selected tools can be used to **increase student's active participation in classes**.

The expected outcome of the project is to be able to make course adjustments that facilitate deep learning by student activating teaching at an appropriate level.

Due to the absence of systematically collected baseline data that the results of the applied methods can be compared with, and because of the central KU course evaluation system was not functioning, the evaluation of the applied methods will mainly be done in a qualitative basis and based on my own experience, students' feedback and answers from the written exam.

### **Initial screening of knowledge and areas of interests**

In order to get an impression of the student's background knowledge and areas of interests as fast as possible, I developed a short questionnaire that was distributed on the first day of the course. The questionnaire was developed using the freeware version of Survey Monkey.

The questionnaire contained four main kinds of questions:

1. Conceptual questions about specific topics.

The purpose of these questions was to screen the student's background knowledge about central concepts, in order to decide how much time I should allocate to explaining these – and which level to start from. Moreover, I expected that the wording and the vocabulary that the students would use when replying these questions, would add to my knowledge of their level of understanding.

2. Questions about which specific issues the students would like me to focus on during selected themes. The issues were divided into predefined categories, but with the option of suggesting issues that were not mentioned in a comment box.

The idea with this type of questions was to give the students a chance to influence the topics of my teaching whenever this was possible in order to make the teaching as relevant and interesting as possible.

3. Questions in which the students were prompted to ask a question about a specific topic.

The purpose of these types of questions was twofold: 1. to make the students start thinking about the topics and 2. to give me an idea about how to make the teaching as relevant and inspiring as possible by focussing on issues that the students found interesting.

4. Self-rating of knowledge of certain topics.

These questions were meant as a supplement to the type 1 questions and at the same time the answers would provide a quantitative measure of the level of knowledge.

The questionnaire was presented during the first day of the course and I made sure to explain the purpose of the questions in an honest way and made an effort out of explaining that even though they may not know the exact answers to the conceptual questions, they should still try to write an answer as it would be very useful for me to see the vocabulary they would use. I explained that there was a certain degree of flexibility in the curriculum of some of my lessons and that I would take their answers into consideration when deciding the content of these lessons. I also emphasized that the questionnaire was anonymous and that the results would be used to improve the teaching so there would be absolutely no point in wasting time on looking up the answers even though this could be easily done. The questionnaire was distributed by email on the same day with a deadline of one week to reply. 22 out of the 25 students answered the questionnaire within the deadline.

The results of the questionnaire confirmed that the scientific level varied a lot among the students and showed that the level was generally lower than I had expected. This was very useful in the planning of lectures and helped me to identify topics that I had to explain at a higher level of details than I had done the previous years. I also decided to eliminate some of the most difficult aspects of certain topics from my lectures when realizing that only a couple of students would be able to comprehend these. The student's answers to the conceptual questions were extremely useful as they revealed that many students were not familiar with very central terms and concepts that I, therefore decided to spend some time on defining. In previous years I had just taken for granted that all students were familiar with these terms.

The students did to a large extent express interest in the same topics - in the answers to what they would like me to focus on as well as in the open questions. As these were not topics that I have spent a lot of time on the previous years this came as a surprise to me and led me to completely rethink two of the course days.

### **Discussion based teaching with point of departure in student defined subjects**

One of the course days that I decided to rethink, was about 'Fertility of Tropical soils' - a day that is normally dedicated to lectures and calculation exercises. I planned to spend most of the day (three hours) on discussing one of the questions that many of the students had asked in the questionnaires, namely 'How to improve the fertility of degraded soils?'. Inspired by lectures and discussions at KNUD and IUP, I tried to design a discussion based course day during which the students did problem oriented group work about different issues related to improvement of soil fertility of degraded soils within small scale tropical farming systems. The group work was based on open questions relating to a loosely defined farming system, hence there were no 'right' and 'wrong' answers as such, but plenty of room to discuss different options and under which conditions (socio-economic, bio-physical and institutional) the different options would be appropriate and what the constraints to adoption would be. This led to a very lively discussion in which all the students participated with theoretical knowledge or with practical examples. My role was merely to be a facilitator of this discussion and to make a final wrapping up and institutionalization. Apart from obtaining knowledge about different soil fertility management options, an important learning outcome of the lesson in 'Fertility of Tropical soils' is to gain awareness of the complexity of the issue. This outcome was certainly fulfilled which is evident from the answers from the written exam, that reveal a much higher level of reflection on this issue than I have seen the previous years (at a general level). After the discussion, I made a feed-back note based evaluation of the day and it was clear that the majority of the students felt that the discussion had been interesting and enriching. It was also clear that the combination of the loose format (that made it possible for students to contribute with knowledge based on their scientific background) and the fact that many students felt that they had defined the topic of the discussion themselves, was appreciated.

## Student activating measures

In previous years, I have experienced that some students on the TCP course have been reluctant to ask questions during classes – especially in the beginning of the course and especially students from developing countries. Students have, however, not been reluctant to approach me to ask questions during the breaks. The reluctance to ask questions in plenum in the beginning of a course can be ascribed to several factors e.g. the fact that many students are in a completely new setting hence are not familiar with the Danish way of teaching and do not know any other students in the class. It may also have something to do with the interdisciplinary setting in which many students may be afraid of exposing their own lack of knowledge about a particular topic thinking that everyone else in the room knows the answer (which may to some extent be true in an interdisciplinary context).

In order to address the reluctance to ask questions in plenum and to increase student's participation in general, I experimented with different methods that we have been discussing during Adjunktpædagogikum and that are suggested in the literature (Biggs & Tang 2011, Liebman 1996). My aim was to make an extra effort to create a safe teaching environment and to use the fact that the students have very different scientific backgrounds in a positive way and try to create an interdisciplinary synergy.

During my second lecture, I presented some of the results of the questionnaire to show the students how much their levels of background knowledge within different topics differed and I also allocated more time than normally for the students to present themselves and their reasons for taking the course. This was done in attempt to make the students aware of the disciplinary heterogeneity of the class hypothesizing that this would make the individual student more confident and to make the students aware that it was perfectly ok to ask questions that other students were able to answer. I also used this opportunity to identify students with practical experience with tropical farming systems and asked them to prepare short presentations of the systems that they were familiar with whenever this was relevant. I see this as a way to exploit the interdisciplinary and international setup of the course while at the same time adding variation to the teaching and activating students that are normally not among the most active (students that have experience with tropical farming systems are normally from developing countries that are typically not among the most outspoken students). At the same time this was a way of signaling that comments based on practical experience is highly appreciated at the course – with reference to students



who may not be so theoretically strong, but may have a lot of experiential knowledge that others could benefit from.

During lectures with a conceptually difficult content, I experimented with small sessions in which the students were asked to ask their neighbor a question about something that I had just talked about and if the neighbor was not able to answer the question they were encouraged to ask it in plenum. Apart from learning aspect associated with thinking about how to explain a given question, the testing of a given question on the neighbor clearly made the students more confident to ask questions in plenum. Moreover, the contact with the neighbor encouraged the students to talk with each other, which – I think – contributed to a fast creation of a safer learning environment. I also experimented with another variant of this method in which the students were asked to explain the most important aspects of the part of the lecture that they had just heard to the neighbor. The purpose of this was to make students process and reflect on the received information and to give them a chance of asking questions if something turned out to be unclear.

The students did in general take the exercises that involved contact with the neighbor very seriously and in the lectures where I applied the described methods, I certainly got a lot more questions in plenum than normally and not a single question during the break. I had planned to include a formal evaluation of the 'talk to your neighbor' method in the KU evaluation form, but due to technical problems with the evaluation system, this never happened.

## Reflections

I will certainly apply the 'pre-screening of knowledge' questionnaire again next year. The answers have in many ways been very useful and inspiring in the planning of my teaching and it is my clear impression that the students appreciate to have a saying in the content of the classes and that this has a motivating effect (which was confirmed by student's feedback). I will also continue to work with different variations of the 'talk to your neighbor' method that I found very fruitful and very well suited for the course. It is difficult to say if the adjustments that I applied in the course this year made the students from developing countries participate more actively than they would otherwise have done. As mentioned, I got a lot more questions during the lessons than in previous years and the level of participation from

all students were certainly higher than in previous years. I also noted that there was a very pleasant and relaxed atmosphere among the students. But it is also my impression that the 2013 class was particularly active and motivated this year which has been confirmed by my colleagues who did not make any attempts to increase the participation this year.

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