

Designing a Course in Agribusiness Economics that Encourages Active Student Participation

Arne Henningsen

Institute of Food and Resource Economics, LIFE, University of Copenhagen

“Learning takes place through the active behavior of the student”

Ralph W. Tyler (1949)

Introduction

This report describes how I designed and taught the MSc course Agribusiness Economics II”¹ and evaluates the various teaching methods and measures that I used.

The course Agribusiness Economics II gives 7.5 ECTS points and should have a total workload of 206 hours. Eight weeks are designated for teaching and one week is for the exam. Classes can take up to 12 hours per week, and the lecturer is free to allocate different teaching methods (e.g. lectures, exercises, group work). I was the only teacher of this course, although I received some assistance from a PhD student, for example, in the practical exercises.

As the title of the course is rather vague and my research interests differ considerably from those of the previous teacher, I changed the content of

¹ The course is taught at the Faculty of Life Sciences of the University of Copenhagen and has the course number 290050. It coincides with the second part of the Thematic Course: Agribusiness Economics (course number 290062), which is compulsory for students who follow the MSc programme in Agricultural Economics and choose the specialization “Agribusiness and Food Economics”. Usually, a few students from other specializations or other MSc programmes take this course as an elective course.

the course so that it fitted better with my research interests. When I selected the content of the course, I considered four criteria: (i) the content should be comprised of topics which are generally considered to be important aspects of a curriculum in applied (agricultural and agribusiness) economics; (ii) the content should be covered by the intended learning outcomes (ILOs) of the study programme; (iii) the content should not be covered by any other course at our faculty, and, (iv) the content should be related to my research areas in order to facilitate stimulating research-based teaching. Based on these criteria, I chose two topics: (i) reducing price risk by using futures markets (two weeks) and (ii) applied econometric production analysis (six weeks). In both parts of the course, I focused on agribusiness firms and concentrated on practical applications, as I was sure that most students would benefit (e.g. in their future jobs) from practical skills and competences more than from theoretical knowledge.

This year, fifteen students participated in the course: five were Danish, three came from other European countries, five came from Sub-Saharan Africa, and two from Asia. As these students came from different universities and had degrees in different subject areas, I expected that their prior knowledge in the subject areas relevant for this course (e.g. microeconomic production economics, econometrics, statistics, mathematics) would be very heterogeneous.

As students learn best when they are active (see e.g. Tyler; 1949; Biggs & Tang; 2007, p. 21), I designed the course in a way that would “activate” the students. The general approach to teaching was “problem-based learning” and I tried out various teaching methods that are supposed to activate students. Furthermore, the intended learning outcomes (ILOs), teaching methods, and the exam should be constructively aligned.

In the following section, I will describe the most important teaching methods that I used during the course, present my reasons for choosing them, and evaluate their success. In the third section, I will present an overall assessment of the course. The fourth and last section concludes.

Teaching methods

Problem-based learning and the use of textbooks

The general teaching method that I used on the course was “problem-based learning”. Hence, I did not go through a textbook page by page, rather the

problem that had to be solved determined which part of the theory and hence, which pages of the textbook were relevant. As the students will probably have to find the relevant information and theories on their own at a later date (e.g. in their job or when writing their thesis), I told them that they should practise these skills by finding the relevant information themselves. I suggested a few textbooks and left it to them to select the one they liked the most. This also meant that the students had to reflect on the kind of information they needed from the literature, which should further increase their learning. To facilitate this, I provided a lecture schedule on the e-learning platform for the course² where I listed the topics for each class so that the students could easily find these keywords in the index of their textbook. However, some students felt uncomfortable with this and a few of them complained and said that they would rather have traditional lectures, where the teacher goes through a textbook page by page. As a compromise, I added the numbers of the relevant pages in the primary textbook (Chambers; 1988) to each topic in the lecture schedule on the e-learning platform so that the students could find the theories which were taught during class even more easily (e.g. if they did not attend the class). Furthermore, the library only provides a very limited number of copies of the suggested textbooks so that most of the students had to buy their own. As they did not want to buy more than one textbook, or take the risk of spending money on the “wrong” textbook, all the students obtained the primary textbook. Of course, this somewhat contradicts the intended learning outcome, but I could understand that the students did not want to gamble with their money and I thought that it did not make sense to overstrain the students, who had not experienced problem-based teaching before, with a change in the teaching method that was too substantial and abrupt.

However, in general, I think that the problem-based learning approach was very successful: the students were usually very motivated and active and were rarely idle during classes, whilst most of them generally took a “deep” approach to learning. Furthermore, most of them liked this way of teaching very much. When I teach my next course, I will first check the availability of textbooks in the library and explore how familiar the students are with the problem-based learning method and then decide whether I should refer to several textbooks or just focus on a single textbook. Finally, as problem-based learning requires the students to think independently and

² The University of Copenhagen uses the e-learning system “its learning” (<http://www.itslearning.eu/>) and calls it “Absalon”.

to apply their theoretical knowledge, it is more demanding for students than traditional lectures. Hence, one should not expect that *all* the students will be happy with this teaching method.

Pre-assessment and catch-up sessions

As I expected that the prior knowledge of the students would be very heterogeneous, I conducted a pre-assessment of the students. This pre-assessment showed that their prior knowledge was less heterogeneous than I had expected, but it was generally rather low. Almost all the students had significant gaps in their knowledge about the basic concepts of production economics (e.g. production function, marginal product) and basic calculus (e.g. simple operations with fractions). These findings were confirmed in the problem-based exercises when the students had difficulty solving the exercises because of their lack of knowledge in basic production economics and basic calculus. Therefore, I offered a few short catch-up sessions in basic production economics and basic calculus during the first two weeks. These sessions were either at the beginning or at the end of a class so that students could easily skip the sessions. I think that these catch-up sessions brought the students' knowledge up to standard so that they could solve the exercises, although a few students complained that basic topics should not be taught on an MSc course. Hence, in the future I will communicate more clearly to the students that these catch-up sessions are voluntary. Alternatively, I might even skip the catch-up sessions and suggest books to the students that they can use to fill the gaps in their knowledge, i.e., also allow the students to use problem-based learning to fill their knowledge gaps.

Long classes

A maximum of twelve hours per week can be used to teach this type of MSc course, although most teachers use nine or less hours. However, I decided to use nearly all twelve hours per week for teaching, which gave me sufficient time for extensive practical exercises, thorough repetition, and some extra sessions such as catch-ups, quizzes, and interactive preparation of lists of definitions (see below). I consider this to be an important advantage, as usually only a few students do voluntary homework exercises and repeat at home. As weaker students often do not benefit from individual homework (Wiere & Gängler; 2008), these classroom repetitions should be particularly supportive of these students.

I think that using the maximum available time was a good decision, as the practical exercises and the repetition sessions definitely supported the students' learning, particularly the learning outcomes of the weaker students. Furthermore, the students liked the extra sessions (e.g. quizzes) very much and only a very few mentioned that the classes were too long.

Hands-on learning

My primary aim for this course was that the students should learn practical applications in the areas of futures markets and econometric production analysis, as most students will benefit much more from these skills and competences than from pure theoretical knowledge. As practical skills can be only learned by practical applications, a large proportion of the classes was devoted to practical exercises. For instance, the students had to protect a (virtual) firm from losses due to price changes by trading (realistic) futures contracts on a virtual futures trading platform³, or they had to find out the optimal firm size by using microeconomic production theory, data of individual firms, and econometric software.

Given that I used the problem-based learning approach and that we focused on practical applications, the students only learned those parts of the theory that were relevant for answering the addressed questions (problems). Of course, I selected and formulated the questions (problems) so that the most important parts of the theory were covered. When conducting the practical applications, most students really "internalized" the theoretical background. Hence, I did not consider it problematic that the course did not cover a wider range of theories as I consider the "deep learning" of a limited amount of theory to be much more desirable than the "surface learning" of a much larger amount of theory that the students cannot apply and quickly forget after the exam.

While most students appreciated this hands-on approach very much, a few of them attached little value to the practical skills and competences. These students complained that they learned too little (theory) on the course. For instance, a part of the theory that they used for their

³ This futures trading game is organized once a year by the Commodity Futures Trading Group of the University of Kiel (http://www.bvwtm.uni-kiel.de/en_index.html). Many different futures contracts can be traded in the game. The contracts have exactly the same specification as real futures contracts and prices are also taken from the real futures contracts.

practical applications had already been taught on the BSc course “Produktionsøkonomi” (production economics). However, the students had not learned how to apply this theory for econometric production analysis. As some students did not assign value to the learning of these skills, they complained that they did not learn *anything* during the lectures⁴. However, while at the beginning of the course none of the students could conduct the empirical analyses, let alone the interpretation of the results, most of them had become very skilled at this by the end. Furthermore, most students considered the academic level of the course to be suitable (see section “Overall evaluation of the Course” and figure 5.1(b)). Therefore, I will continue to focus on the application of economic theory rather than teach pure theoretical knowledge in my future courses.

Dialogue teaching

During the actual teaching, I used the method “dialogue teaching”. I asked questions to guide the students so that they found the answers and solved the problems themselves rather than telling them the solutions straight-away. This should encourage students to really think about the topic and hence, support the deep approach to learning (see e.g. Biggs & Tang; 2007, p. 22ff). Furthermore, students should become aware that they can find answers and solutions on their own, which should increase their confidence in their abilities. Finally, I think that this way of teaching reduces the likelihood that students will be idle or drift away with their thoughts during sessions, as I engage them in the “dialogue”.

To facilitate communication with the students, I learned the students’ names very quickly (which was actually not very difficult with just 15 students). If no student volunteered to answer, or only those who had already contributed a lot, I encouraged individual students to share their thoughts with the others. However, two students told me that they did not like to be asked questions unless they raised their hand; I respected their wish.

If no student knew the answer to my question right away, I asked the students to discuss the question with their neighbours for two minutes and I repeated the question to be sure that all the students knew exactly what

⁴ Although these students claimed that they had already learned this theory, they were usually unable to recall, let alone apply it. In fact, the students who had taken the course “Produktionsøkonomi” were on average no better at solving the theoretical exercises in the written exam than the students who obtained their previous degree from another university.

they were supposed to discuss. This really “activated” the students and they often found the answer after discussion, or they at least got much closer to the solution. This was a nice psychological break for the students, and some were even able to discuss in their native languages (Danish and Swahili), whilst it also gave the teacher a welcome short break.

During these lectures, I visualized all important statements on the blackboard and I did not project slides onto the wall, as dialogue teaching is driven by the students and I could more easily follow the students’ way of thinking on the blackboard. In contrast, slides cannot be adjusted in real-time which means that I would either have to force the students to go “my way” or a situation might arise whereby the sequence of concepts presented on the slides might deviate from the development of discussion during the lecture – both procedures are very undesirable.

I am very satisfied with this way of teaching, as the students in general were actively thinking and searching for a solution and they were not afraid of giving the wrong answer. Furthermore, most students liked this way of teaching very much. For example, one student (No. 4) wrote in the course evaluation “I like his way of teaching, because somehow everybody gets to understand” and a further student (No. 8) wrote “it was never boring”.

However, as this teaching method – likewise problem-based learning – is more demanding for students than traditional lectures, one should not expect that *all* students will like it. For instance, one student (No. 9) made the following criticism in the course evaluation: “It seems like he wants us to discover everything on our own” (which is indeed the aim of dialogue teaching). Furthermore, some students preferred to be given the lecture slides. As I understand this request, but I would like to continue using the blackboard in future courses, I plan to take a photo of the blackboard before I clear it and make these images available to the students on the e-learning platform.

Homework assignments and peer assessment

The ILOs of this course stress practical skills and competences in particular. As performing practical applications is the best way to achieve such ILOs, it is important that the students not only practise this during class, but also at home. Therefore, I planned homework assignments for the students, which I wanted to implement in such a way as to achieve the following objectives:

- the students should not do the homework assignments individually, but in groups so that they can learn from each other and learn to discuss and communicate the theories, methods, and results,
- the students should have a strong incentive to prepare their homework assignments thoroughly, because in my experience, many students – and particularly the weaker students – are not very motivated to do voluntary homework assignments and they often do not do them at all,
- students should only receive formative feedback on their homework assignments, because – in contrast to summative feedback – this supports students’ learning (Butler; 1988; Black & Wiliam; 1998),
- students should give and receive feedback on each other’s homework assignments, as this allows them to learn from each other and to reflect on their own assignments, and
- finally, the grading of the students should not be based on the assessment of group work, as this is prohibited by Danish law.

All these objectives were achieved by the following procedure:

The students were given six homework assignments during the course (one per week, from the second week to the seventh). They were supposed to solve the assignments in groups and upload them to the e-learning platform within one week. Every group was given another group’s assignment and was asked to provide formative (peer) feedback to the group that had prepared the assignment (again within one week). After receiving feedback from their peers, the groups were allowed to revise their assignments and to update the version on the e-learning platform. At the end of the course, there was an oral examination, during which the students were supposed to explain (“defend”) one of their group’s homework assignments. About 30 minutes before the oral exam, the students randomly drew one of the assignments. They received a print-out of the selected assignment, which their group had uploaded to the e-learning platform, so that they could prepare themselves for the exam.

Some students claimed several times that they felt uncomfortable with receiving feedback “only” from fellow students. They urged me to give them the solutions to the homework assignments. However, as providing solutions to exam questions *before* the exam encourages rote learning rather than “deep” learning, I did not provide the solutions and I explained why to the students. However, as a compromise, I went through all the revised versions of the students’ homework assignments and gave them brief formative feedback. This procedure still provides a large incentive for the students to carefully prepare and read the peer assessment reports, because they can

improve their homework assignments after receiving the peer-feedback, but not after receiving feedback from the teacher. At the same time, the students could feel more relaxed and confident during the oral examination, as they had been told if their assignments had major flaws and they had been given time to figure out the correct solution if necessary. Of course, they also had the opportunity to discuss their solution not only with their fellow students, but also with their teacher.

All the groups submitted all the assignments and the quality of the homework was generally very high. Also, the peer assessment, in general, went very well. Most students found the peer assessment really helpful and most groups significantly improved their assignments after the peer assessment. However, a few students claimed that the peer assessment was a waste of time and one group refused to provide any (useful) feedback to the other groups. The oral examination showed that most students seemed to have actively participated in the preparation of the homework assignments, as they were able to explain exactly what their group had done in the homework assignment. However, a very small minority of students seemed to have been “free-riders” during the preparation of the homework assignments and they were therefore, unable to explain what their group had written. Hence, this seems to justify the prohibition of grading according to group work.

Overall, I think that the procedure for the homework assignments was a successful strategy for supporting the students’ learning. Furthermore, the students evaluated the homework assignments very positively in the course evaluation. For instance, one student (No. 1) wrote, “The assignments – good opportunity to reflect on classwork”, whilst another student (No. 10) wrote, “The weekly assignment made me reflect on [...] what was being taught in the course”, and a further student (No. 13) wrote that “the homework [...] gives room for the students to work together and practise what they learn in class”.

Interactive list of definitions

The students urged me several times to give them a list of all the definitions used in the course. As I thought that giving them such a list just would support rote learning, I chose an interactive way of preparing the list. First, I created a “process-oriented document” on the e-learning platform, where the students could add the definition of any relevant term. Then, I wrote the most relevant terms on small pieces of paper. During one class, I distributed these pieces of paper among the students and asked them to add the defini-

tions of these terms to the above-mentioned “process-oriented document”. While the students added these definitions, I went through all finished definitions and either wrote that they were correct or pointed out the things that were either unclear or incorrect. In any case, the student who had added the definition, or any other student, could improve the definition. This went very well and after about 45 minutes, the students already had a sizeable, albeit incomplete, list of definitions. I told the students that they should continue to improve the existing definitions and add new ones at home until the end of the course. I also suggested that they use the document to discuss and comment on each others’ definitions. Furthermore, I promised to look at their definitions every few days and to give feedback on each single definition. However, while the introductory session within the class went very well, only a very few students later revised and added a small number of definitions at home – even though I reminded them to continue the list several times. Hence, it seems that the students found the list of definitions less useful than they initially thought. Therefore, I am unsure whether I will use this teaching method in my future courses.

Quizzes

About once a week, I used a “quiz” for assessing, completing, and reinforcing the students’ learning outcomes regarding the topics taught in the previous lectures. I prepared slides with one multiple-choice question on each. For each question, four possible answers (named “A”, “B”, “C”, and “D”) were given, with only one out of the four answers being correct. Each student got four answer cards with “A”, “B”, “C”, and “D”, respectively, written on them. The answer cards had four different colours, with each colour corresponding to one of the four letters. The colours make it easier and quicker to grasp (for the teacher as well as for the students) which answers have been chosen by the students. For each of the questions, I showed the corresponding slide and read the question and the four possible answers aloud. The students could think about the correct answer for around one minute (depending on the complexity of the question), and then I asked the students to show the answer card, which they thought was correct. I subsequently encouraged the students to discuss the possible answer with one or two fellow students who had shown a different answer card. When I noticed that the discussion among the students had declined considerably, I again asked the students to show the answer card, which they thought was correct to see whether the discussion had increased the number of correct

answers. Finally, I revealed the correct answer and – if several students had still got the wrong answer – explained why it was correct and why the other answers were incorrect.

I am generally very satisfied with these quizzes. They provide very helpful feedback on the students' learning progress for the students as well as for the teacher. While usually more than half of the students showed the wrong answer card in the first round, most students showed the correct card after discussing the questions with their fellow students. Hence, it seems that the students who showed the correct answer card in the first round were able to apply their knowledge and convince the others. On the other hand, the students who showed the wrong answer card in the first round, but the correct answer card in the second round, had obviously increased their knowledge. This assumption was also affirmed by the students. For instance, after one of the quizzes, one student told me that he had learned several things during the quiz, although he always showed the correct answer already in the first round. Furthermore, many students mentioned in the course evaluation that they found the quizzes extremely useful and fun.

Overall evaluation of the course

The course evaluation shows considerable disagreement among students about the overall quality of the course. Two students (No. 2 and 9) strongly disliked the course and gave very negative comments. For instance, one of the two students wrote “This part of the course has not worked at all for me and i think that it is a shame”, whilst the other wrote, “the course has been crap”. A few students urged me several times during the course to teach in a more traditional way. However, as many scientific studies have shown that traditional lectures are a rather inefficient teaching method coupled with the fact that most of the students liked the course as it was, I only granted some of the students' requests (e.g. providing the page numbers in the textbook, additional assessment of the homework assignments by the teacher) whilst I also tried to convince them that problem-based learning has many advantages over traditional lectures.

However, the majority of the students really liked the course as it was taught (Fig. 5.1(a)). These students wrote, e.g. “The course met my objectives” (student No. 1), “all in all I found the course very interesting” (student No. 5), “The topic was relevant to me” (student No. 7), and “I did learn a lot” (student No. 8).

Furthermore, most students considered the academic level of the course to be suitable; only three students considered it to be too low whilst three students thought it was too high (Fig. 5.1(b)).

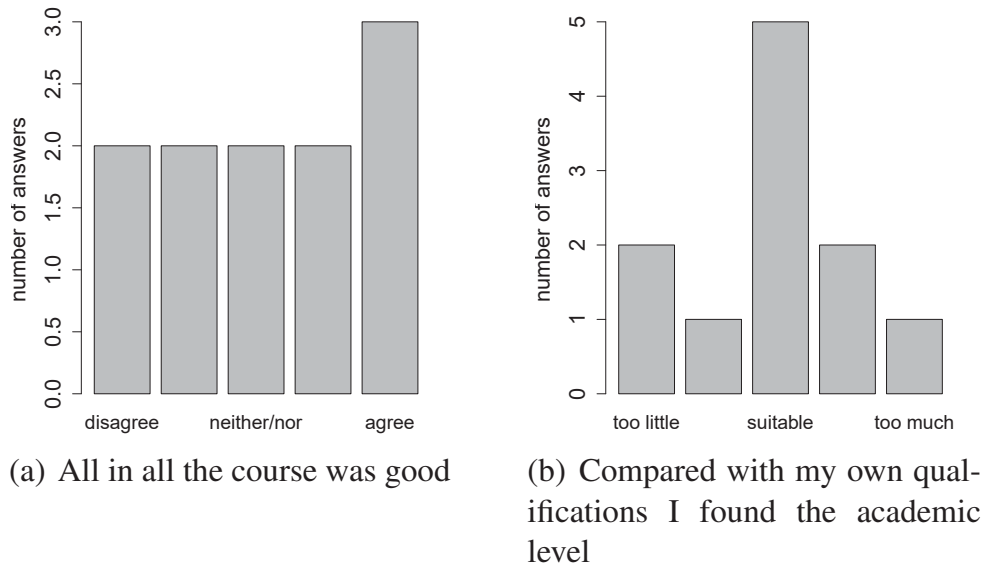


Fig. 5.1. Students' overall evaluation of the course and the academic level. Note: "(dis)agree" is an abbreviation for "I very much (dis)agree" and "neither/nor" is an abbreviation for "I neither agree nor disagree". The same is true also for all following figures.

The course evaluation also shows that I was very successful in reaching one of my main objectives for the course; namely the "activation" of the students. For instance, one student (No. 5) wrote that "It was a great experience during this class with this teacher because it was participatory with a lot of assignment and this had a positive effect on my studies. Maybe it will be a good idea if other teachers can do this too", whilst another student (No. 8) wrote "There was high interaction in the class". The students strongly agreed that the assignments provided room for independent problem-solving (Fig. 5.2(a)) and they almost completely agreed that the course provided room for their active participation (Fig. 5.2(b)).

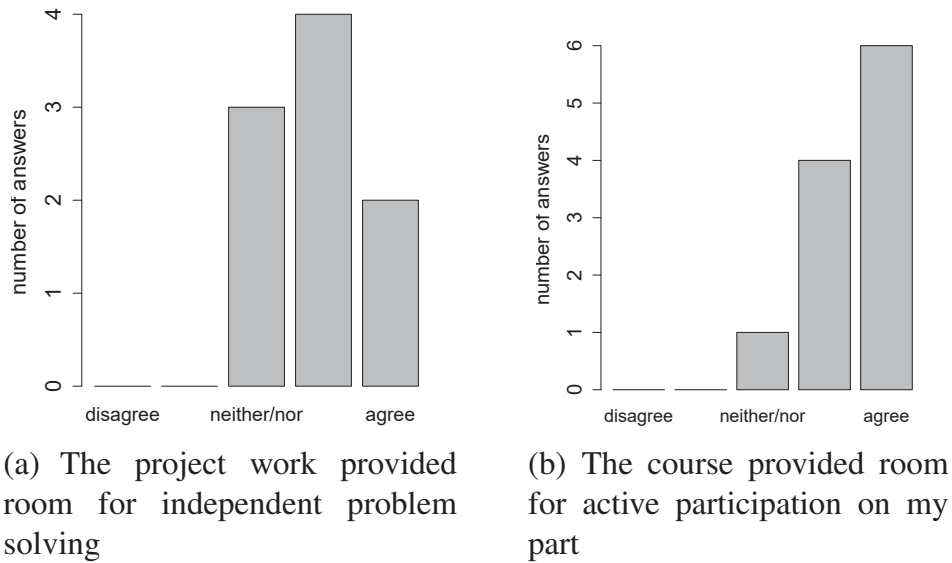


Fig. 5.2. Students' perception of independent problem solving and active participation

Conclusion

I designed and taught the MSc course Agribusiness Economics II based primarily on problem-based learning. I tried out various teaching methods; most of them were really successful (e.g. quizzes, homework assignments, dialogue teaching, hands-on learning), but a few of them were not optimal. I improved some of the sub-optimal methods during the course (e.g. lecture schedule with page numbers, additional assessment of homework assignments by the teacher) and I plan to further improve some of the methods in my future courses (e.g. referring to only one textbook, effectively utilizing the blackboard and making photos available for the students). Furthermore, I will explore the reasons why some students were dissatisfied with the teaching methods so that I can hopefully reduce the number of dissatisfied students without compromising the essential design of the course. Overall, I gained a lot of experience with modern teaching methods during this course and I hope that sharing my experiences in this report will stimulate readers to try out some of these teaching methods in their courses.

Acknowledgements

The author is grateful to Robert (Bob) Evans, Lars Otto, Géraldine Henningsen, Camilla Østerberg Rump, Lars Ulriksen, and Per Svejstrup Hansen for many helpful hints and valuable suggestions. Furthermore, the author is grateful to the Commodity Futures Trading Group at the University of Kiel (<http://www.bvwtm.uni-kiel.de/>) for organizing their very realistic commodity futures trading game.

All contributions to this volume can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/2010-3-1/

The bibliography can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/kapitler/2010_vol3_bibliography.pdf/