6

Evaluation of synopsis-based teaching and exam in the course Applied Tree Biology and Arboriculture

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Introduction: The course Applied Tree Biology and Arboriculture

"Applied Tree Biology and Arboriculture" started out as two courses for different groups of students (landscape architects and forestry students) but was eventually merged into one course. Approximately half of the students come from abroad. The course thus attracts a range of students with different backgrounds but with a common interest in tree biology and management, as the course includes both theoretical and practical aspects. The course is 7.5 ECTS and runs for one block (approximately two months).

The course has five learning outcomes that can be translated into one overall objective: To educate students to become good and knowledgeable managers of trees (see figure 6.1).

My co-teacher and I have been teaching the course for three years. The first year, we followed the previous teacher's plan closely, but the second year we changed some aspects, primarily by including more theoretical and plant physiological knowledge. Unfortunately this was not appreciated by all students and the evaluations were rather mixed (see below).

Therefore we decided to restructure the course and were inspired for this by Biggs & Tang (2007) as well as the lecture by Niels Grønbæk during adjunktpædagogikum (see also Grønbæk et al. (2009)). Box 2 presents a summary of the teaching and learning activities of the course. The main idea was to create alignment between course objectives, activities and evaluation through elaboration of a series of four synopses. The topics of the

Box 1: Learning outcomes of the Applied Tree Biology and Arboriculture, as stated in the course description.

1. Describe central features of trees' biology
2. Apply techniques and theory from the course to efficiently manage trees
3. Collect and summarize relevant knowledge to solve stated problems related to management of trees
4. Predict how trees will perform in different environments
5. Critically review other students' work and (self)reflect on good learning

Fig. 6.1. Box 1 – Learning outcomes.

synopses mirrored the learning objectives as outlined in the course description, and the students were examined in one of the synopses, drawn at random at the oral exam. A synopsis would be a brief report or summary of the answers to questions that would have an increasing level of complexity.

The aim is to motivate students to deep learning, mediated by concentrated work with the synopsis and showing how the activity may improve performance at the examination. However, it may seem that there is a compromise between deep learning and the general overview of the subject matter, coverage of the curriculum. Even though the synopsis questions (see Appendix A) were formulated very broadly, it was impossible to cover all aspects of what used to be the curriculum.

As part of the activities, students were asked to give feedback to synopses developed by other groups or students. This session would take place approximately five days after handing in the synopses. The instruction was that feedback should be given following the Harvard model of feedback (Lotte Sjøstedt, pers. com.), where the person or group giving feedback

Box 2: Major activities in the 2012 edition of the Applied Tree Biology and Arboriculture course. The activities were carried out in each of the four modules:

- Encouraging students to read ahead
- Introduction of learning objectives, including synopsis questions
- Introductory lecture
- Practical exercises, relevant to the synopsis
- (short) field visits
- Independent work with synopses

The plans included a lecture based on questions from the students, but this was less successful as only few questions were posted by the students.

Fig. 6.2. Box 2 – Major activities in the course.

should mention three good points about the synopsis, and three things that could be improved. The person receiving feedback should not comment on the feedback. Teachers were not involved in the feedback. Giving and taking feedback can be a potent form of teaching, because students have to reflect and self-reflect on the subject matter, and leads to understanding of the students' own strong and weak points. In this way the student self-direct his or her learning (Gibbs & Simpson 2002).

The first objective to be dealt with in this paper is finding out whether the synopsis approach used in the 2012 edition of the course lead to fulfillment of the course objectives. This question can only be answered with respect to the synopsis, as there was no evaluation of the knowhow of the students outside of the synopsis topics. The coverage aspect cannot be treated in a meaningful way. Part of this question is also to compare student satisfaction in the new and old editions of the course.

The second objective is to investigate how students see the exam situation and how this influenced their learning. Specifically I wanted to know if the synopses lead to a more comfortable examination and assessment situation.

Methods

The analysis is based on the standard course evaluations by students carried out via the course homepage, Absalon. Course evaluations from 2011 (before substantial changes of the course) and 2012 (with synopsis-based teaching) were compared. For 2011, fifteen students responded to the questionnaire, whereas in 2012 only five (out of the seven students participating) answered the questionnaire.

Additionally, four students from the 2012 course were interviewed during January 2013 on their perceptions and attitudes to the course. The interview included questions on the general perception of the course, the synopsis, the reading material and the exam.

Results and discussion

General course satisfaction and academic level

On average, the student evaluations were more positive during 2012 than during 2011 (Fig. 6.3). While some 2011 students appeared to be happy about the course, there was also a group of students that were less satisfied. Discussions during the 2011 course showed that some students did not feel sufficiently challenged, and this was mirrored in the questionnaires where some students expressed that the academic level was too low, and that personal efforts were too low compared with the ECTS credits.

Compared to this, all 2012 students that filled in the questionnaire felt that the academic level was suitable. We intentionally designed the synopsis questions to have increasing difficulty (or complexity, according to the SOLO taxonomy), meaning that students who found the first questions easy would be challenged by the last questions. This may have introduced flexibility in the course, making it easier for students to adapt activities to their own level.

Despite the many shortcomings of a grading system, the exam results can also be used as a measure of the academic level. During 2011, two out of the seventeen students received the top grade (12), while two students did not pass. During 2012, all seven students passed, and four of them received top grades. The average grade was thus substantially higher during 2012 than during 2011.

	Too little		Suitable		Too much
1. What was your personal effort in the course compared with the ECTS-credits obtained?					
2011		3	12		
2012			4	1	
2. Compared to my own qualifications I found the academic level	Too little		Suitable		Too much
2011	2	5	7	1	
2012			5		
3. The components in the course supported the official competency goals	Disagree		Neither nor		Agree
2011	1	1	6	3	4
2012			1	1	3
4. The course provided room for active participation on my part	Disagree		Neither nor		Agree
2011	1	2	4	5	3
2012				2	3
5. I found the course rewarding proportionate to the efforts I put in	Disagree		Neither nor		Agree
2011	1	3	4	4	3
2012			1	2	2
6. All in all the course was good	Disagree		Neither nor		Agree
2011	3	1	2	5	4
2012			2		3

Fig. 6.3. Students' evaluations of the course "Applied Tree Biology and Arboriculture" from 2011 (n=15) and 2012 (n=5).

Level of engagement

It seems certain that the synopses have engaged people and made them more active than in the 2011 course (question 4, Fig. 6.3). Making a synopsis requires active participation, and practical and theoretical exercises were planned so they could be used directly or were of direct relevance to the synopses. All interviewed students appreciated the synopses as a way of learning. A student expressed about the synopses that they lead to absorption in the compendium, and another that "you'll get knowledge of what you have written". A third simply stated that a synopsis "is the best way to learn something".

Writing the synopsis can be seen as a formalized way for students to construct their own knowledge. Interestingly, this approach was already used by two of the interviewed students, who took notes while or after reading chapters of the compendium.

However, making a synopsis need not be a guarantee for deep learning. At first the synopses were made as group work, but this was not a success. Group members distributed the questions between them, and there was no integration or discussion of results in the group. This is a clear surface strategy – doing only what is required irrespective of the outcome – and after a

discussion in class we abandoned the group work to end up with individual synopses. This improved the quality of synopses, and all the interviewed students expressed that they preferred the individual synopses because they learned much more. If the group work is to be continued, one student suggested, the synopses could be made more problem oriented, which would lead to a better group process.

Another surface strategy used was to hand in only three of the four synopses, as this was what was required to attend the exam.

One student suggested the possibility of making a synopsis on a subject of their own choice, as there was a particular area that he or she would have liked to pursue. This would have the advantage of letting students replace a less relevant synopsis with one that really mattered to them. For example an interviewee expressed that one of the synopses covered material that had already been discussed in other courses. By letting students define themselves what they want to learn within the course, the course would approach a portfolio development and assessment.

Peer supervision

The peer supervision sessions tended to be very short, and I was therefore curious to know how it worked. Two of the interviewed students found that peer supervision had been helpful, whereas the other two would have preferred having feedback from the teacher. A problem that was mentioned is that there were large differences in the backgrounds and levels between students, meaning that the quality of feedback was variable. One student mentioned that teachers' opinions were more authoritative and that it was easier to respect their comments. On the other hand, all students expressed that they used some or part of the feedback, and one had learned a lot from reading the other students' synopses.

Alignment between objectives and activities

The online questionnaire contains a question (question 3, Fig. 6.3) on the relation between objectives and course activities. Again the answers from 2011 students were scattered, ranging from people who found that there were no agreement to people who found that there was complete agreement. In the 2012 course, two students neither agreed nor disagreed whereas three students found that there was complete agreement. The average degree of

alignment from the point of view of students thus seemed slightly better in 2012.

Similarly, interviewees were asked whether they found that the course activities were meaningful in relation to the objectives, which they all confirmed, emphasizing especially the usefulness of the synopses. One student mentioned that there was a nice correspondence between theory and practical exercises, and another underlined field visits and lab exercises as good activities. However, it should be said that the question was difficult to pose and answer because the students did not have the objectives at hand.

Exam

A weakness of the compulsory online questionnaires is that they are to be filled out before the course ends, and there is thus no evaluation of the exam situation. I was therefore especially interested in this topic in the interviews. Even if only four students were interviewed, this still gave an impression of how the exam was perceived.

All the students stated that the exam was a motivating factor for the learning. One student expressed it in this way: "I want to say what I know and satisfy myself and the professors." Another said that if it had not been for the exam, she would not have read as much.

For all students, preparations for the exam included reading the synopses. One interviewee expressed that by reading the others' synopses (which had been uploaded to Absalon), it was possible to learn a lot on what other people emphasized in their replies. Other preparations included reading the compendium or parts of it, but one student read only his own synopses before the exam. The interviewed students had read the compendium one or two times during the entire course.

The atmosphere during the exam was described as relaxed or relatively relaxed, even though at least three of the students were nervous. One student expressed that he enjoyed the exam. The fact that the questions were known beforehand (being the synopses questions) contributed to calm down the nerves, and one student said that "If you prepare something *(i.e. the synopses)* during the block you have absolutely no problem to pass the exam". Another said "The exam is just a matter of understanding the questions even better". Three of the students said that they liked the exam, whereas one would have preferred a written exam. An advantage of the oral exam expressed by one student is that the feedback in forms of a grade is given immediately after the examination, and there is no waiting time. From a

teacher's point of view, I have no doubt that this type of exam represent an improvement over the exam where a random and unknown question is drawn, making the situation more predictable and easier to prepare for.

In previous editions of the course we have experienced that some students were so nervous that they did not express what they knew, forgetting important parts of the subject matter or simply being unable to tell it in a logical matter. This is despite us as teachers have always tried to help students. Therefore a central question was whether the students felt that they had shown their full potential, and whether the assessment of their knowledge was fair. While three of the students agreed to this, one student said that "I could have presented it a lot better. I knew what I had to say but I could just not get it out of my mouth". The same student said that the assessment was fair but not in relation to the knowledge he possessed. It seems thus that the problem with minds going blank persist, despite attempts to make the situation more comfortable.

Taking the evaluation format closer to the real format and a less stressful environment would probably be possible by a kind of portfolio assessment. However, it is my impression that the students also learned a lot after handing in the synopses. This knowledge would tend to overlooked lost in a portfolio assessment but can still be presented at the exam.

Conclusion

Evaluations of the two course editions and statements of the interviews indicate that working with the synopses was more rewarding in terms of learning. My own impression both during the course and at the exam was that the average student in the 2012 course was mastering the subject matter better than participants in the 2011 course. The question is whether the 2012 students will have acquired the same knowledge outside the synopsis topics as the 2011 students. There is no way we can tell, but maybe that is no so important: We know that they have learned what we asked them in the synopses, which we from the start defined as the essentials of the course. The oral exam situation seems to be inherently problematic for some students, and we need to consider if there are other ways of reasonably evaluating student performance.

Acknowledments

A Synopsis questions

Synopsis 1, week 36-37

1. Tree structure and function, with special focus on water balance.

  1. Describe water conductive tissues from root to leaf on your chosen specimen tree
  2. Give an overview of mechanism of water transport from soil to air through a tree
  3. Which features in trees and surroundings influence water balance?
  4. Suggest ways to affect these features through management

Synopsis 2, week 38-39

  1. Annual variation in trees and environmental impacts (focus on temperatures and frost).
  2. Describe major seasonal changes in physiology of trees
  3. Compare the strategy of deciduous and evergreen life styles
  4. Suggest ways in which low temperature damage in sensitive trees can be prevented
  5. How will higher temperatures affect tree phenology?

Synopsis 3, Week 40-41

  1. Plant production and establishment.
  2. Describe different nursery plant types and their advantages and drawbacks in relation to uses
  3. Root system establishment – why is that a problem and how can management affect it?
  4. Planting of a concrete area with a selected species: develop a plan and justify your choices (area to pointed out by teachers)

Synopsis 4, Week 43-44

  1. Management, stability and old age.
  2. Describe degradation mechanisms in trees
  3. Which stability mechanisms can be found in trees, and how are they affected by tree management?
  4. Make a management plan for the old tree(s) that has(have) been given in your care. Justify your choices.