

Involving teaching assistants in the design of large courses

Morten Arendt Rasmussen

Department of Food Science
University of Copenhagen

Introduction

The use of teaching assistants in the execution of large courses is common practice across universities worldwide. However, this task is mostly conducted disjoint, where the course responsible sketch out the teaching assistants specific tasks, such as to assist during practical or theoretical exercises and correction of homework, reports etc. which then is being conducted in a *no questions asked fashion* by the teaching assistants often in an environment where the course responsible is not present. It boils down to that one person (the course responsible) constructs the material, which then is *thrown over the wall* to the other person (the teaching assistant) who is going to try to turn this material into learning. The result of this is often, that the good learning intentions behind the material is lost in this line of communication, where the teaching assistant lack the exact idea of the exercise, or sufficient background knowledge for framing the context, and further, that the course responsible is out of sync with the students hurdles in achieving learning. On the other hand the teaching assistants belong to per see the brightest part of the student spectrum and as such posses a capacity beyond what is utilized in such a traditional setup.

This project explores how to utilize teaching assistants in the process of designing a new course, and discusses the consequences of this involvement.

Background

On the second year of the bachelor in Food science, a mandatory course in data analysis is a part of the education. This course is nine weeks with one and half day per week at disposition. The course was normally taught to a broad spectrum of wet biological bachelor educations, but was in 2015 separated out to only the 80+ students following the bachelor in Food science. Following this, the course was to be designed from scratch and conducted for the first time in autumn 2015.

Course description

This course in data analysis for Food science and Nutrition is made up of the following ingredients

- Lectures
- Theoretical exercises
- Case studies
- Homework
- Multiple choice questions

Lectures

The lectures are traditional auditory lectures with dissemination of the theoretical mathematical background, pen and paper examples as well as examples involving computer coding. Across a week there are three lectures, each of 60 minutes.

Theoretical exercises

Each week there are four to seven theoretical exercises covering the curriculum. These are optional.

Case studies

Theoretical exercises often resemble an artificial task, and as such do not cover the entire process involved in conducting research including data analysis. In order to mitigate this, semi-open case studies are conducted throughout the course. Such a case study has duration of two weeks (from

Monday week one to Thursday week two) and is conducted in groups of three to four students. A case study consists of a dataset, some background information, and some rather open objectives. The goal is to get the students to think critically and define interesting questions, which they pursue with relevant data analytical tools. In contrast to the theoretical exercises, there are no exact answers.

In total there are four case studies, where the last count 25% of the final grade. The first three are optional. The dissemination format of the case studies is a voice-over recorded slide show of no more than 10 minutes.

Homework

Each week a single theoretical exercise is labeled as homework. In order to attend exam, seven (out of eight) homework needs to be accepted.

Multiple choice questions *Quick Quiz*

Each week a quick quiz of approximately ten multiple-choice questions is made available via Absalon. These questions are in line with the learning objectives of the week, and are top-of-the-head questions. The students are encouraged to use no more than 30 minutes on answering these before the last lecture of the week, where questions with low number of correct answers are given special attention.

Teaching assistant involvement

Each week has two times two hours, where the students can get help on theoretical exercises, case studies and homework from the teaching assistants. The teaching assistants correct the homework and the first three case studies.

Considerations on teaching assistant involvement

In large courses teaching assistants are used to surpass the students needs for one-on-one time with their lecture, and further to distribute the task of correcting homework. Here, the teaching assistants serve as the lectures extended arm.

Peerish supervision

Teaching assistants are normally students on a later semester and/or Ph.D. students. The fact that they are closer in study age to the students, compared to the lecture, gives the immediate advantages of being more in sync with the students learning hurdles and hence benefit from the upsides of peer (to peer) supervision Benschhoff, 1992. University professors can often have the problem of understanding the problems proposed by students, leading to answering the wrong questions and hence causing even further frustration from the students. Here, the more study age synchronized teaching assistants can contribute with different angles of perception and help unravel such problems.

Alignment

Distribution of the workload in correcting individual homework or case studies naturally poses a challenge concerning alignment. Answer sheets often minimize this problem, however, for tasks with less well-defined objectives, the response and grade to an assignment becomes more dependent on the correctors perception of the work, which is unwanted. In line with answer sheets, grading sheets sketching the different themes involved in an assignment, and examples of what a good, middle and bad response would cover, can help in breaking down the grading of such types of assignments, and making it more corrector independent. Calibration of correctors is the process where a set of correctors are aligned to use the same scale for grading, such that two independent correctors would assign the same grade and comments to the same assignment. Calibration can be pursued by selecting a subset of assignments, spanning the quality range, and let all correctors assign these, followed by a process leveraging the standards between correctors.

In this course we have used answer sheets for homework and grading sheets as well as calibration of correctors for the case studies.

Motivation and commitment

Ph.D. students often get the task of being teaching assistant assigned as a part of their job. However, there is no official merits gained from doing so, why teaching is often assumed as solely compromising the Ph.D. project.

Officially crediting the effort in running the course and a genuine interest in the material is thought to elevate the motivation by the teaching assistant.

Project outline

In designing the course **Fødevaredataanalyse 1** for 3rd semester bachelor students in food science, four teaching assistants were involved in the planning, construction and execution of theoretical exercises, homework and case studies. That is; each individual suggests curriculum components, being datasets, problem formulations, questions, etc. constructs relevant material including answer sheets and is involved in the teaching of this material.

The remainder of this paper lists how this process was facilitated, discusses pros and cons and proposes a cookbook for inspiration for others wanting to use teaching assistant involvement in course planning and execution.

Methods

We set out to design a new course from scratch. Instead of using an already existing book as basis, the core material was week notes. These notes lists:

- The topic in condensed form including key- equations and details
- Reading material
- Short video lectures
- Exercises
- Case study

In the construction of this material, the teaching assistants were involved in construction of exercises and case studies.

Practically, one month prior to course start, the course team (course responsible and teaching assistants) joined in a one-day workshop organized as follows:

1. Overview of course
2. Overview of relevant datasets available

3. Brainstorm on relevant questions for constructing exercises and cases based on the datasets in connection with the curriculum
4. Structuring of these ideas
5. Distribution of ideas among course team members
6. Two and two initial construction of material
7. Circulating material for additional inputs

After this workshop each individual finalized the material and constructed answer sheets, and shipped it to the course responsible for harmonization of layout.

Grading of case studies

After receiving the first case study, the assignments were distributed across the teaching assistants. Each corrector selected two assignments representing top and bottom respectively. All correctors, including the course responsible, reviewed these, in total eight assignments, and listed pros and cons for each. Based on this, a grading scheme partitioning the grading into three main categories was constructed, listing, within each category, what elements a good, middle and bad assignment encompasses.

For the remaining three case studies, the three main categories were unchanged, but with modification of what characterize a good and a bad assignment according to the specific case.

Results and Discussion

Of the total amount of exercises 40% were initialized and constructed by the teaching assistants. The rest were done by the course responsible. Generally, the range and character of the exercises were wider compared to if they were to be constructed by a single person. Especially the relevance in relation to food science, as well as the background details covered a broader range, reflecting the scientific diversity of the people authoring the material.

In the classroom, a lower number of questions concerning exercise ambiguities for the teaching assistant authored exercises compared to the course responsible authored exercises were observed.

Aligning the grading process of the cases via an initial corrector calibration and the use of grading schemes were considered effective and proved fair. However, the main factor here is the experience obtained from correction of tons of assignments. Here it is believed that the alignment effort depends on the teaching assistants being experienced in correcting from doing so.

Constructive alignment

A buzzword in course planning and execution is constructive alignment. Involvement of teaching assistants in the planning of a course naturally ensures alignment between the exercises and cases they author and how the teaching assistant supervises these. However, this obviously also poses the risk of the lecture being disjoint with exactly the same. Why there must be paid attention to alignment between these exercises and the remaining part of the curriculum. In this course it is a specific learning objective, that the students obtain proficiency on how to put data analysis in to context, in this case a food science and nutritional context. Selecting teaching assistants with a relevant food science or nutrition background helped in achieving this goal, as the face to face interaction is powerful in also communicating knowledge and perspective beyond what is needed for completing a specific task.

Showdown of the idea of the omniscient professor

In (especially) the Anglo-Saxon university tradition there is a strong knowledge hierarchy, where the idea of the all-knowing professor tends to prime how teaching conducted- and learning is achieved, this is also known as apprenticeship learning (Dolin, 2013, pp. 78-81). Realistically, this idea is only a good idea for certain types of courses, and even more, only for exceptional professors. The apprenticeship-learning model transfers only knowledge, which is a subset of the lectures knowledge, and the total learning achieved from such a course is bounded by the lectures knowledge. Contrary to apprenticeship learning, a constructivist learning approach assumes that the student learn from interacting with its surroundings being literature, learning resources, peers and the course environment as such (Dolin, 2013, pp. 70-78). Expanding the planning and execution of a course to include a whole team, and to actively utilize the knowledge, ideas and motivation from teaching assistants do not only expand the pool of knowledge

from which the students can drink, but also phrases the same knowledge in different ways, and from a constructivism viewpoint this leads to a more diverse and rich learning environment stimulating means of contemplation and learning.

Further, including teaching assistants as active partners, especially in planning of a new course, and especially for young lectures, serve as a resource for validation of ideas and concepts.

Drawbacks

Inclusion of the people who do the work in planning of the work seems as a win win situation. However, there might be some minor issues to be aware of when outsourcing the design of central parts of a course.

Each year new teaching assistants comes with new ideas and consequently the course becomes less static and more floating in terms of exercises and cases, and thereby also to some extent in terms of curriculum, where some modifications must be encountered in order to have alignment between the course elements. Further, a fair amount of hours has to be put in to facilitate construction and compilation of material prior to each course.

The lecture must strive to be updated on the details of the individual exercises and cases, which is not necessarily inherent, when he or she has not authored those.

The construction of exercises prior to the course consumes approximately 20 working hours for each teaching assistant. Some of these can be accounted for by the lower demand of weekly preparation time, however, this covers not all of them.

Cookbook for implementing teaching assistants in course planning

Based on the experience from involving teaching assistants in designing a large course I have sketched out a cookbook for how to implement this in

the course planing. These points are based on our initial course, supplemented with modifications and initiatives we anticipate to incorporate in the coming courses.

Start early

Set your team two month before the course (three if the course runs from September)

Workshop

Kick-off the course with a workshop, where the team is settled, and where you initialize construction of the material authored by the entire team. Focus on getting ideas on paper without paying too much attention to finer details. At the end of this workshop, the material should have a clear skeleton, such that it is straightforward to fill in the details and fix the layout. As course responsible you arrange lunch and coffee.

Finalizing the material

Distribute the material *as-is* after the workshop and let the individual teaching assistants finalize it, including pictures, data setup, answer sheet etc. Try to keep a fairly tight deadline on this one – one to two weeks after the workshop, in order not to loose details.

Harmonize

As the course responsible you harmonize the material to have fairly similar appearance. However, make sure to keep the individual fingerprint of the authors, and only correct spelling errors or ambiguous formulations. Keep an option for the teaching assistants to be quoted as authors on the exercises they have made.

Physical appearance

During the course, try to be present during theoretical exercises, case studies, etc. This is the best way to get immediate feed back on the student hurdles. Use some of these common hurdles to align the course via repetition during a lecture.

Merit the teaching assistants

Make a letter stating that the teaching assistants have been involved in designing a university course.

Conclusion

Teaching large courses comes with a number of obstacles related to work load and face-to-face supervision. As a way to compensate teaching assistants are commonly used for certain course tasks. However, these individuals possess skills beyond what is normally utilized in daily university practice. By utilizing teaching assistants as a resource in not only execution of the course but also in the design and planning, the course material gets more diverse and covers a broader range of perspective, while the teaching assistants are more comfortable and engaged in supervision of students.

References

- Benshoff, J. M. (1992). *Peer consultation for professional counselors*. ERIC Clearinghouse.
- Dolin, J. (2013). Undervisning for læring. In L. Rienecker, P. S. Jørgensen, J. Dolin, & G. H. Ingerslev (Eds.), *Universitetspædagogik* (1st ed., pp. 65–90). Samfundslitteratur.

All contributions to this volume can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/improving-university-science-teaching-and-learning---pedagogical-projects-2017---volume-9-no.-1-2/