

Planning and conducting teaching of a complex subject as part of a larger course with different teachers

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Introduction

I have been given one week of teaching in a rather complex subject. My week of teaching is part of a 9 week course with different teachers every week. The course has been running for two years with an increasing number of students every year (this year 30+). The course responsible was not satisfied with the former lecturer of the week. The dissatisfaction was based on poor student evaluation of the week and complaints during the week. Moreover, students were unable to answer simple questions at the exam indicating that the poor performance of the former lecturer negatively affected student learning.

My overall objective of this project is to discuss the didactical theories which I have used in planning and conducting my teaching. I will assess my planning and conducting through the statements by the external pedagogic supervisor present during the lectures and my own evaluation.

Specifically, I will discuss the problems that are associated with teaching a small number of lectures as part of a multidisciplinary course with many independent teachers. I will also discuss the problems of teaching complex subjects to students who are still in the middle of their education and thus will not apply the complex subject in the near future. Subsequently, my choice of teaching methods by which I have sought to overcome these problems and achieve my overall aim of increased learning will be described and discussed.

Planning my Teaching

Problems reducing student learning

As narrated in Biggs and Tang (2007), there is no such thing as a student “*who does not want to do anything*”. Rather, any student who has been motivated by the teacher will want to learn. Since my starting point was a week of teaching where the learning outcome was poor, I therefore assumed that the motivation of the students was inadequate. As a consequence I set out to identify factors that may have contributed to this reduced motivation. Identifying these problems proved to be essential for the planning of my teaching.

“Why bother”?

Multiple complex subjects

As a student, the amount of information presented in courses, like the one I am teaching, often feels out of proportion with the short time given to understand each subject. This will negatively affect the motivation of the students as it may reduce their expectation of success. Without expectation of success the students may block their attention with a “why bother” attitude. This attitude often collides with that of the teacher which is teaching the single lecture. Teachers are often unaware of the factors negatively affecting student motivation and expect that they can proceed to transmit a deep understanding of the complex subject at hand. Teachers have to realize and address this issue of complexity and try to boost the student’s expectation of success. Otherwise, this will negatively affect student motivation and create an evil circle which will feed back into -and further decrease student motivation.

Timing offset between learning and application of complex subject

Apart from the few among us, that are entirely curious and are also in possession of a brain capable of absorbing endless amounts of information, I believe we as human beings perform a sound cost/benefit analysis when presented with new information. University students in a course like the one I will be teaching are prime examples. The students know very well that they will not use the taught material in actual work until maybe 2 years later, when they are making their masters or PhD projects. At that point it will be impossible to remember details of something they were taught during one week two years earlier.

Moreover, it is likely that by that time the technologies will have developed significantly and they will have to learn something else all over again. If the teacher, does not realize this perception and proceeds to overload students with information and details (which to the students seem unnecessary) the result will be that the students will create their own intended learning outcomes (ILO). Again they will not bother to try to understand everything the teacher is teaching. A common student-created ILO is to extract from the lecture information necessary to pass the exam.

For the teacher this is a paradox. Students at a university are there because they choose so and they are supposed to be interested “by nature”. It is therefore incomprehensible for the teacher when he or she is faced with this attitude which to the teacher is interpreted as lack of interest. Unfortunately, the perceived “student-lack of interest” will inevitably affect the performance of the teacher who may become unmotivated. Needless to say an unmotivated teacher will not be able to motivate the students and as a result learning is not achieved.

Paradoxically, I believe that this “student-lack of interest” perception by the teacher is a misconception. On the contrary, I believe that the students are generally very interested and fascinated by the subjects in their study and that they look forward to get to work with the theories and techniques during their bachelor or masters projects. In fact, the focus on “what is necessary for the exam” (which may be interpreted as lack of interest by the teacher) originates from their wish to work with the subject. But, in order to be given exciting projects at their masters the students have to obtain good grades at their exams. For the students, alignment between teaching activities and assessment is therefore of higher importance than the actual deeper understanding of the subject at hand, which they decide must come later when necessary.

As a teacher it is important to realize this “student perception” as you will then realize that we as teachers and students are actually working towards the same goal, which is, to educate scientists eager to work with the technologies and answer the questions in our field. By realizing this we (teachers and students) could unify and balance our perceptions on what is important to get there and thereby create a splendid teaching environment.

More is less

Researchers teaching

As a teacher at the university I primarily regard myself as a researcher who teaches and not the other way around. Moreover, my interaction is primarily with fellow researchers with a fundamental understanding of most techniques and subjects relevant to our field. Explaining subjects to colleagues therefore involves very little introduction, and contextualization is often understood beforehand. Moreover, inherently, we as researchers care deeply about and are fascinated by our subjects. This is often reflected in the level of detail we will seek to transmit to our audience because “it is all important”. Finally, as a researcher you slowly but surely become accustomed to acquire knowledge in a fragmented fashion with little or no coherent context, e.g. at conferences and meetings or institution seminars. Instead we rely on our own ability “to make sense of it all”.

Needless to say these characteristics are incompatible with good teaching in a course like the one I am to teach in. It is important to remember what context we are teaching in and how much attention we can realistically expect to receive from the students. In the previous paragraphs I have discussed the issues that we as teachers must address to initiate student motivation. It is equally important to maintain this motivation all through the lecture. Even now as mature scientist, one will often see us after exiting lectures at conferences shaking our heads saying “*he had me spellbound until halfway through and then my brain was overloaded*”. The same applies to students attending lectures. If you as a teacher wander off on a tangent or overload the students with information, the door you have opened during the introduction of your lecture will be closed shut and remain shut for the rest of the lecture. It is a balance to find the appropriate amount of information to deliver. Too little may also negatively affect the students attention as they may think “*this is too easy - so I do not have to listen*”. Moreover, unfortunately the performance and attitude of the other teachers on the course is very likely to affect the teaching of my week. Lack of urgency to coordinate with the other teachers, putting prime importance on what you teach, lack of knowledge or concern about student perspective or workload, inability to simplify and focus teaching activities and curriculum to fit the amount of attention that can be expected from the students and finally different teaching climates from the other teachers may precondition the students in such a way that I may only have very small margin for error before the students loose motivation during my lecture.

Lack of context

Due to the many teachers, the context of each lecture is often not clear on a broad scale until very late in the course. This is very detrimental to student learning. Phenomenography and constructivism both agree that the acquisition of information alone is not enough to achieve learning. It is the way we structure this information which will bring about the conceptual change which is learning. Although these two theories are concerned with how we can increase learning of a new concept by relating to already acquired knowledge, I feel the underlying theory can be extended to stress the importance of contextualizing ones teaching. It is therefore important that we as teachers put our teaching into the framework which is the larger picture of the student's career and study plan.

Conducting my Teaching

Prosser and Trigwell (1998) state that teaching is about changing the learners perspective as that is what determines the learning outcome. As such, the problem does not lie in the difficulty of the lecture content but rather in the attitude and expectation of the students. This means that I could prepare the perfect lecture and still not teach the students anything unless I change the preconditioned perspective of the students. In addition, I am always very ambitious in my teaching and aim to attain fascination-based learning. For this reason I decided to spend a significant time of my lecture and slides to change the perspective of the students. In this paragraph, I describe and reflect upon the teaching activities that I chose during the planning of my teaching.

Contract between the teacher and students

Realizing that I might be introducing new teaching activities in the lecture (student involvement via questions in plenum and assignments), I decided to use the didactical tool where I as a teacher make a contract with the students. Briefly, I presented myself and during the introduction let them know that on that day I was also a student under supervision (my supervisor and external pedagogic supervisor were both present). This allowed me to, in an informal way, win the goodwill of the students. This was also done to set a friendly atmosphere aiming at building a climate Y teaching environment with a small distance between me the teacher and the students.

I recognized that this can sometimes backfire. I was, however, able to succeed by employing humour. An example, was to say with a smile in my introduction "that I knew that the dream of the students was to become like me" and then insert a pause before continuing to say "a researcher". This worked very well and I felt that the students after the introduction were comfortable asking me questions.

Contextualization

I could feel how my introduction had stirred an emotion of goodwill among the students which might lead to increased motivation. However, this had to be built upon. As a next step I had therefore chosen to address the contextualization issue. I chose to do this in collaboration with the students, by asking the students themselves what the context of the entire course was in relation to their future career.

First, I asked what the overall aim of the entire course is. Then I continued by contextualizing the course in the frame of their entire study plan and future career. I found that this was a very good idea, as it reminded the students why they were there and made them think that it is not just about the exam, but actually about gathering knowledge and understanding of techniques that might benefit them in the future as well. Then I pinpointed where the week I was teaching fit in into the course plan and although it represented a small brick it was a necessary and important piece of the puzzle. Until this point I was deliberately catering the perspective I had assumed that the students came with. Namely, "*How will this course benefit me? And what can it be used for?*" By reiterating the grand perspective I felt that I succeeded in blasting the common frame, where the student just wanted to extract necessary knowledge to pass the next exam.

As a conclusion of the discussion I had made a visualization using a general diagram which showed what any researcher in our field tries to achieve (what kind of questions) and how they achieve it (by which tools and techniques). This diagram was very well received and will constitute a permanent component of all my teaching in the future.

Fascination

As a true researcher I could not live with having only changed the students' perspective to an attitude where they listen because they are now convinced

that the course might benefit their future career. I wanted to make the students experience the same fascination that I have for the subjects and techniques at hand. I tried to obtain that by utilizing videos (which I was able to copy of the video database www.youtube.com). The videos showed how the analysis techniques I would be teaching could be used to characterize processes which are essential for life (such as the transpiration of water through plants and the function of the brain). By this time I would be almost 15 minutes into the lecture (2 hours long) and I would not yet have had a single slide about the actual material they were going to learn. The beneficial trade-off I was hoping for was however that by this time I would have thoroughly activated the motivation of the students to learn.

Complexity

As mentioned earlier the subjects I would be teaching are rather complex. In order to understand the course I would for example be introducing the students to a larger number of abstract terms. I was therefore afraid of losing the motivation momentum I had built through my introduction. I addressed this issue using several didactical tools.

First, I started out by stating the ILOs of the day. I stated several ILOs with decreasing priority. As stated by Gardner (1993) the greatest enemy of understanding is coverage, more is much less. I therefore kept the aim of the ILOs with highest priority very simple. At this point I also decided to cater the students who might still only be focussed on the alignment with the assessing exam and highlighted ILOs of importance for passing the exam.

Second, I recognized that the subject at hand contained a lot of new and to the students abstract terms. I therefore decided to spend a substantial amount of time on introducing the necessary terms. I used two didactical tools. First, I used familiar analogies to illustrate what the terms meant when translated to common language. Then, I handed out an exercise which was to be solved by the students in pairs. Deliberately, I had omitted necessary information from the exercise. This would make the students think more about the assignment and in the end return a set of possible answers depending on the value of the missing information. Moreover, in order to allow more time for the students to process the information about the new terms I would collect the answers from the students on the blackboard. This was done deliberately to allow students who had perhaps not been able to solve the exercise to follow the answers as they were written on the blackboard. In total, I had made two exercises and I found they worked satisfac-

torily based on the number of responses and also answers I had not myself thought of beforehand.

Lastly, I realized that taking notes during a complex lecture often stresses the students and makes them inattentive while writing. As a result I had summarized the important take home messages on three text heavy slides in the lecture. Early on in the lecture I informed the students of this and encouraged them to reduce the amount of note taking and instead to listen to me and that these summary slides would be available online together with the rest of the slides from the lecture.

Evaluation of my Teaching

It was a pleasure to see the didactical tools working to my advantage during the planning and conduction of the lecture I was teaching. Of the different modes of assessment of my own teaching I have in this project chosen to include those of my own supervisor and that of the external supervisor. I was especially interested in learning how well I had addressed the issues I had foreseen as problematic with teaching a course like the one described. Several other factors indicated that the planning and conducting of my teaching had been successful. First of all two out of the 30 students later on in the semester have approached me asking to do their master's project under my supervision. This indicated to me that I had successfully been able to inspire and fascinate the students to such a degree that they would like to work with us using the taught techniques. Another indication was that even late in the lecture I would still get responses from the class when asking them questions. When insisting I would even get responses from students that had not raised their hands previously.

During the meeting with the external supervisor Jan Sølberg I was also very pleased to hear that he had noticed all the didactical tools I had employed and agreed that I had focused on some important issues. Of the critical comments he presented was the following:

- Firstly I forgot to take breaks during the 2 hour lecture. It was not until Jan mentioned this to me that I realized I had not taken any breaks. This is a classical example of an enthusiastic teacher who gets carried away. This will of course be rectified in future lectures.
- Second critical comment was when I got to the part where I was explaining the complex issues in detail. I have always used constructivism

in my teaching, e.g. through the heavy use of analogies. In this case Jan thought that I had achieved a good teaching environment and also succeeded in motivating the students to learn so the gateway was open to explain the complicated subjects as is instead of oversimplifying. I think this illustrates my inexperience with the didactical tools that I employed. I was able to plan and conduct my teaching satisfactorily but I was not able to realize that I had actually succeeded in obtaining my goals with motivating the students. According to Jan I could easily have spent more time on the complex issues and actually gone to deeper learning levels. I look forward to doing that in my future teaching.

- Lastly, as I was correcting the reports handed in by the students at the end of the week, I had the opportunity to compare to last years reports. There was a marked improvement in the understanding of the students of the complex issues and in several cases I asked the students whether I could use their illustrations in my future teaching material.

The idea of choosing a specific area to focus on worked well (in this case I chose to focus on the planning part). I will continue to employ this approach in my future teaching e.g. next time focus specifically on the different ways by which I can involve the students in the teaching, i.e. through group work or problem based learning.

All contributions to this volume can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/2009-2-1/

The bibliography can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/kapitler/2009_vol2_nr1_bibliography.pdf/