10

Restructuring a University Course – from Chaos to Control

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It is old news that students cannot keep focused during 45 min's of one way communication and thus not surprising that this type of teaching does not create room for deeper learning (Biggs & Tang 2007). However lecturing is still the type of teaching many teachers tend to use or fall back to using, probably because "it is what I have always done" and because it seems easy and less time-consuming. However all the classic arguments for keeping lectures as the most common teaching method are being disqualified very thoroughly by G. Gibbs (1981) in his "Twenty terrible reasons for lecturing". Several teachers have investigated ways to activate students to keep them awake and induce deeper learning in the class room (e.g. Mazur (1997)) and have shown that it is indeed possible. So it is about time to change!

Based on the tools I have learned during my participation in "Adjunktpædagogikum" and especially during Introduction to University Pedagogy (IUP) I here present my suggestions on how to restructure a specific course and how to implement these "new" teaching methods to assure deeper learning. The course will not be offered again until fall 2012 (six months after I have handed in this assignment) and by that time the new structure will be tried out – so as I am writing this I cannot say anything about the effect the suggested changes will have on the outcome of the teaching and learning. However I am confident that it will have a positive effect if the teachers manage to go true with the changes.

Facts about the course

ETCS 7.5
Level Master
Offered every $1\frac{1}{2}$ year; last time spring 2011; next time fall 2012
Number of teachers in 2011 7 (2 professors, 3 assistant professors, 2 PhD students)
Planned number of teachers in 2012 7-8 (2 professors, 3 assistant professors, 1 Post Doc, 2 PhD students)

Methods

Since this is a course I never took or taught myself the first step was to gather all available information about the course. This was given to me in the form of a) course description (Appendix A, Danish), b) a course syllabus (Appendix A) and c) a course plan (Appendix A). Furthermore, I had an interview with a professor teaching on the course as well as with the associate professor who is responsible for the course. After this I decided to make a questionnaire (Q1, Appendix B) to get an idea of the other teachers' impression of the course. I also tried to get hold of student feedback from pervious courses however this was not available. Last time the course was given no students filled out the questionnaire and any answers prior to 2011 apparently are hand written and for unexplainable reasons out of my reach. So in my questionnaire (Q1) I decided to include a question about how the teachers perceived the students impression of the course.

After restructuring the course based on the input and tools I learned during "Adjunktpædagogikum" and IUP I invited all former and future teachers on the course to a meeting where I presented the ideas for the new structure, got input and feedback and discussed content, ILO's and rewriting of the course description. Finally I gave them a second questionnaire (Q2, Appendix B) to gather information about their views on the new structure, the efforts involved with carrying it out and their willingness to meet these criteria.

Results

Old structure

From interviewing the two professors I got an impression of a course that was totally without structure both concerning academic content and teaching format. They both said that the course lacked structure, continuity in the lectures and that they would like to change the exam format from a written 4h exam into a more continuous evaluation form followed by a final oral exam. The feedback from the other teachers based on questionnaire Q1 confirmed this impression as seen below in figure 10.1.

The students did learn some things, but they could have learned a lot more and gained much stronger competencies. They seemed interested enough but also confused and frustrated due to the lack of structure on the course – this was clear to everyone.

	Question		Summary of answers
A	What is your impression of the course in its old format? What is good / Less Good?	Good	Research oriented based on scientific litterateur and articles. The intension is good - but due to lack of planning/structure it is not working.
		Less good	Nothing is good! There is a lack of structure and planning, too much overlap, too many teachers, too few practical exercises, and the requirements are not very different from what they have had before on other courses.
B	What is your impression of the students? Did they learn what you expected? Do you have any ideas about what they thought about the course?		The students did learn some things, but they could have learned a lot more and gained much stronger competencies. They seemed interested enough but also confused and frustrated due to the lack of structure on the course - this was clear to everyone.
C	What would you like different?		Much more structure and a better teaching plan. More practical exercises and instruction on how to read scientific articles. More student activation teaching and preferably an oral exam instead of a written one and a way to measure the participation during the course.

Fig. 10.1. Summary of interviews and feedback on questionnaire 1. The course did not follow any specific structure or plan.

Approaches to changing the structure

Based on the information I now had on the course I sat down and brainstormed on possible methods, teaching techniques and approaches to change the structure, content and teaching format (Fig. 10.2).

	Brainstorm; How to make this course better!
1	Structure each class in a similar way, so students know what to expect and prepare for.
2	Have clear ILO's for each teaching
3	Let all teachers present the ILO's for each other so any unnecessary overlap can be removed
4	Use much more student activating teaching such as: let them present, discus in groups, use buzzing questions, concept questions, quizzes, exercises and written assignments (electronic?), let students make their own Wikipedia on Absalon use peer review on the assignment, and presentations.
5	Give the students a solid introduction on "How to read a scientific article" and hand out good abbreviation lists and lists of difficult scientific language to each article.
6	Change the exam format to an oral exam, based on the written assignments.
7	Arrange meetings or other ways of information and communication between the teachers along the way!

Fig. 10.2. Brainstorming; ideas on how to change the course.

New structure and teaching format

To ensure that students know what to expect and what to prepare for I have introduced a consistent class structure (Fig. 10.3). This means that each teacher should follow this structure within certain flexibility. During the first class it is very important to give a solid introduction and explanation to the new format and to make it clear to the students what expectations and benefits this structure gives them. The expectations include active participation during all classes and assignments and this will be valued a certain % of their grade to the exam (if this is possible, I have not been able to get a confirmation on this). During active participation and involvement in e.g. the assignment (see bullet point 4 below) they should benefit strongly

once they start preparing for the exam as each assignment will constitute an exam question.

Group work

Since the number of students participating in the course is between 12 and 24 students the possibility of changing the teaching format from lectures to discussion classes should be very straight forward. The students will be divided into 4-6 groups, and since the content of the course mainly includes scientific papers the idea is to have a rolling schedule (Fig. 10.3) where each group swops between different tasks:

1. One group presents key issues from the paper, everyone in the group should be active.
2. Another group is assigned to lead the discussion and thus prepare a list of questions, to which they also think about possible answers. Again it is important to state that each person in the group should be active (if there are more than four groups, there will be more question groups focusing on different parts or areas of the paper).
3. The third group focuses on pin pointing weaknesses in the paper, they will be given a list of questions to help them look for this.
4. Last group is responsible for writing the assignment for that particular week/topic. The assignment is to write a summary of the topic no longer than one A4 sheet. This paper is to be published on Absalon within a week after the last presentation/discussion round on that topic. Hereafter each group/student should comment and give written feedback to the assignment, this can be monitored by the teacher on Absalon. After another week the final outcome of the summary should be handed in. This assignment will then be used as a topic for the oral exam.
5. One group (if more tasks are needed) could be asked to design an experiment to answer a given problem.

Class structure

The first class will as mentioned above focus on introducing the format, structure, expectations and benefits to the students. To make the expectations clear there will be a “demo” of how to read a paper and how to

	Day 1. (1x3 hours 9-12) TOPIC 1	Day 2. (possibly 2 x 3 Hours 9-12 + 13-17) TOPIC 1
Week 1	45 MIN: **Detailed intro to:** Course ILOs and structure Expectations and structure for - group work, presentation, discussions, written assignments (summaries) and question techniques. **Intro:** How to read a scientific article. **Exercise**: read a short article and discuss in groups based on a hand out with questions. BREAK 45 MIN: Exercise continues - and is wrapped up by the teacher for the last 20 min. What did you learn from this article? Go true words, definitions, methods – perhaps use concept questions. BREAK 45 MIN: Background to topic 1. REVIEW article + other background material. Next week's article is handed out and teacher is present for questions – also on Absalon. Wrapping up last 15 min: Contextualize, answer questions…etc.	45 MIN: Presentation from **group 1** Discussions **(group 2,3)** Questions and answers (should be send to the teacher the day before) Feedback to **group 1.** BREAK 45 MIN: Wrap up with teacher: What did you learn from this article? Go true words, definitions, methods – perhaps use concept questions. BREAK 45 MIN: Background to topic 2. REVIEW article + other background material. Next week's article is handed out and teacher is present for questions – also on absalon. Wrapping up last 15 min: Contextualize, answer questions…etc. (Demonstration can be used to show key methods or key points.)
Week 2	= Group 2 / Article 2 / Topic 2	= Group 3 / Article 3 / Topic 2
Week 3	= Group 4 / Article 4 / Topic 3	= Group 5 / Article 5 / Topic 3
Week 4	= Group 6 / Article 6 / Topic 4	= Group 1 / Article 1 / Topic 4
Week 5	= Group 2 / Article 2 / Topic 5	= Group 3 / Article 3 / Topic 5
Week 6	= Group 4 / Article 4 / Topic 6	= Group 5 / Article 5 / Topic 6
Week 7	= Group 6 / Review / Summary	= Contextualization and summary on all topics

To be able to go to the Exam	**Activity**	**Assignment + Exam**
1) Active participation throughout the course. (If possible let this be valued 20% of the grade) **2)** Oral exam – based on weekly hand ins (summary of each subject).	Students will be evaluated on their activity level during presentations, question/answers etc.	***Summary:*** Each week one A4 paper with a summary of the topic is handed in online and all others should comment on this until its final format is handed in. ***Exam*** Each of these summaries will then cover all 6 topics and the content of the course, and will be used as the base for "drawing" at the exam. However all other subjects within the content can of cause be included at the discussion for the exam.

Fig. 10.3. Schematic overview of the new structure.

prepare for the different assignments (table 3,upper left column). The last 45 minutes or so of all classes will be used to introduce the topic for the next class – in a lecture format using various teaching and learning activities such as buzzing questions, concept questions and what else the teacher finds supportive to his or her teaching.

After this each class will more or less (depending on the teacher) follow the structure outlined in figure 10.3, upper right column. This means that during the first two thirds of the class the paper is presented by one group and the discussions are lead by the question groups first focusing on general questions then pinpointing weaknesses as described above under group work followed by a wrap up from the teacher where further questions can be discussed and the teacher can strengthen the intended learning outcome (ILO) by a few tasks, buzzing questions or by explaining methods or key points more thoroughly and contextualizing the topic.

Scientific content

My aim was to include in this assignment a new and final course description, course syllabus and course plan. However I have not been able to get the needed feedback from the course responsible and thus I am not capable of doing this. Instead I have chosen to attach my suggestions to a reformulation of the course description (Appendix C) and pinpoint weaknesses and how to assure alignment between course description and actual outcome (Appendix C). Also attached is a combined suggestion on how to plan and structure the content (Appendix C) in order to avoid unwanted overlap when a course involves several teachers. This can be used when the teachers meet again to discuss their ILOs and structure the final content and literature for the course.

Feedback on the new structure

After brainstorming and restructuring the course as describe above I invited all former and future teachers on this course to a meeting. My intension was to introduce, discuss and get feedback on my suggestions to the new structure and to coordinate the teaching plan and course content as well as to rewrite the course description. I thus send out an invitation with a very strict agenda and clearly stated preparation tasks for the participants (Fig. 10.4).

We had a very constructive discussion about the structure and I got a lot of useful feedback and suggestions on the planning, teaching and how to activate the suggested group work. The summary of the answers to questionnaire 2 can be seen in figure 10.6.

Meeting invitation:

Important: Preparation time for you before the meeting approximately 30 min.

I) Please send me feedback on the attached course description.
II) Take a look on the new structure and suggested guidelines for the syllabus.
III) Decide on the topic you would like to focus on during your teaching in this course and find the necessary background literature and scientific paper for the students.
IV) Write the Intended Learning Outcome for your topic and prepare to present them in 5 minutes.

Fig. 10.4. Extract of meeting invitation. Expected preparation time.

Meeting invitation:

Meeting agenda:

1) Short intro to the new structure (max 20 min / Ulla)
2) Discussion and feedback about this (30 min / everyone)
3) Course description (30 min)
   a) Teaching format and content.
   b) Competence description.
   c) Aim / Criteria (for grade 12)

4) Academic content (60 min)
   a) How do we change the academic content so the students learn as much as possible.
   b) What would you want to include, please present your ILOs (intended learning outcomes) and literature.
   c) Topics and course syllabus outline.

Fig. 10.5. Extract of meeting invitation. Agenda.

What do you think about the suggested changes to the course? What is possible what is challenging?	Possible	The suggestions are good and constructive. The group work is a good way to activate deeper learning and make the students engaged during the course.
	Challenging	To ensure that the students get/have enough background knowledge to each topic to solve the assignments and to create a red line in the content since we want to cover quite different topics.
What does it take for the teachers, to meet the new structure?		That the all follow the structure and use the group works assignments. That each teacher has clear ILO's that is communicated to the other teachers to avoid unnecessary overlap and to make good use of any expected overlap. More interaction and communication among the teachers. That it is stated clearly to the students what is expected of them.
Are you ready to meet the demands you mentioned above? If not what would it take to make it possible?		YES! Everyone who filled out the questionnaire answered a clear YES to this question. Unfortunately the key-person(s) did not participate in the meeting and did not respond to the questionnaire (a professor and the course responsible.)

Fig. 10.6. Summary of answers to questionnaire 2 (Q2).

Discussion, conclusion and learning points

It has been a very interesting process to reorganize this course. Coming up with the ideas and restructuring the course was a fairly easy task based on all the information and tools I had been presented to and read about during "Adjunktpædagogikum" and IUP. The hardest part was to get the involved teachers to respond to my inquiry, find time to answer questionnaires, and prepare for the meeting. The six teachers who did respond, answer the questionnaire and showed up for the meeting were all very positive, engaged and motivated.

Future perspectives

It is the intension to follow the new structure as described in this report when the course is offered again during fall 2012. It thus remains to be seen what effect the structural changes will have on the student activity and learning, and whether or not the teachers will be able to carry it out.

A Old course description, syllabus and plan

Udgave:	Forår 2011 NAT
Point:	7,5
Blokstruktur:	3. blok
Skemagruppe:	A
Varighed:	8 uger
Uddannelsesdel:	Kandidat niveau
Skema- oplysninger:	**Tid:** Tirsdag og torsdag kl. 9.00-12.00
Undervisnings- form:	Forelæsninger, demonstration.
Formål:	At give forskningsmæssig forståelse for den menneskelige hjernes funktion og evne til at tilpasse sig nye krav.
Indhold:	I kurset lægges vægt på en forståelse af hvordan den menneskelige hjerne og rygmarv fungerer i sammenhæng med omgivelserne. Særligt fokuseres på plasticiteten i neurale netværk. Kurset vil give et indblik i det neurobiologiske grundlag for ændringer i motoriske funktioner, sensorisk bearbejdning, indlæring, hukommelse, søvn og sprog. Studier fra dyre- og humanforsøg inddrages.
Kompetence-beskrivelse:	**Faglig kompetence:** Kendskab til plasticiteten i menneskets centralnervesystem. Indsigt i nogle af de grundlæggende principper i neurobiologiforskning og forståelse af en række nøgleforsøg indenfor feltet neuroplasticitet. **Anvendelseskompetence:** Kunne anvende neurobiologiske kundskaber til udførelse og tolkning af neurobiologiske forsøg. **Omverdenskompetence:** Kunne sætte faget i relation til samfundet og tage stilling til biologisk-etiske problemer. **Personlig kompetence:** Grundlæggende neurobiologisk indsigt.
Målbeskrivelse:	Deltagere på kurset skal: • Opnå forskningsmæssig forståelse for den menneskelige hjernes funktion og evne til at tilpasse nye krav. • Opnå kendskab til plasticiteten i menneskets centralnervesystem. • Få indsigt i nogle af de grundlæggende principper i neurobiologiforskning og forståelse af en række nøgleforsøg indenfor feltet neuroplasticitet. • Kunne anvende neurobiologiske kundskaber til udførelse og tolkning af neurobiologiske forsøg. • Kunne designe og udføre (simple) eksperimentelle forsøg der tester en problemstilling relateret til neuroplasticitet. • Kunne formidle eksperimentelle forsøgsresultater og perspektivere/diskutere disse i forhold til eksisterende frysiologisk viden (indenfor pensum og relevant udvalgt litteratur). **Kriteriebeskrivelse for karakteren 12:** Evaluering af eksamensopgave vil ske ud fra nedenstående kriterier. Karakteren 12 gives når: • Eksaminanden har demonstreret en overbevisende evne til at kunne præsentere, analysere, sammenfatte/konkludere og desuden har taget kritisk stilling til avancerede problemstillinger og kan perspektivere/diskutere disse i forhold til pensum og relevant udvalgt litteratur. • Eksaminanden har demonstreret sikker anvendelse af fagets repræsentationsformer og standarder for rapportering. • Eksaminanden har demonstreret beherskelse af kursets centrale emner, evne og overblik i forhold til de udvalgte problemstillinger. • Besvarelsen fremstår som en helhed.

Lærebøger:	Vil fremgå af kursushjemmesiden.
Faglige forudsætninger:	Bachelorgrad
Eksamensform:	3 timers skriftlig eksamen med alle hjælpemidler. Bedømmes efter 7-trinsskalaen. Ekstern censur. **Re-eksamen:** Som ordinær eksamen.
Eksamen:	Skriftlig prøve den 7. april 2011. Reeksamen: Skriftlig prøve den 1. september 2011.
Bemærkninger:	Kan være på dansk, hvis ingen udenlandske studerende er tilmeldt. Valgfrit modul på den Humanfysiologiske kandidatuddannelse.
Sidst redigeret:	15/11-2010

Dato	Titel
01.09.09	**Praktisk om kurset**
	(absalon, eksamen, forelæsninger)
	Historisk oversigt
03.09.09	**Cellulær og Molekylærbiologi**
08.09.09	**Cellulær og Molekylærbiologi**
10.09.09	**Cellulær og Molekylærbiologi**
15.09.09	**Gliacellers betydning for Neuroplasticitet**
17.09.09	**Plastiske ændringer i rygmarven/Spasticitet**
22.09.09	**Motorisk indlæring - cortical mapping**
24.09.09	**Visuo-motorisk indlæring - adaptation**
29.09.09	**Konsolidering, Transfer og Interference**
01.10.09	**Neurorehabilitering**
06.10.09	**Immobolisering**
	Mental træning
08.10.09	**Styrketræning**
	Afrunding

B Questionnaire 1 and 2

Questionnaire 1 (Q1)

Name:

For my adj. pæd. course assignment I need your answer to the questions below, thank you:

a. What is you impression of the course in its old format? What is good / Less good

b. What is your impression of the students? Did they learn what you expected? Do you have any idea about what they thought about the course?

c. What would you like to change?

Questionnaire 2 (Q2)

Name:

For my adj. pæd. course assignment I need your answer to the questions below, thank you:

d. What do you think about the suggested changes to the course? What is possible what is challenging?

e. What does it take for the teachers, to meet the new structure?

f. Are you ready to meet the demands you mentioned above? If not what would it take to make it possible?

C Suggestion to new course description, plan and syllabus

Color codes on how to read this text:
In blue = suggested text to new course description.
In red = further suggestions to changes.
In black = translated directly from the old course description, or not translated at all as I found it to be irrelevant for this assignment.

Course description, suggested

Point: 7,5
Blokstruktur: Bloch 1 or 2
Skemagruppe: A
Varighed: 8 Weeks
Uddannelsesdel: Master level
Kontaktpersoner:

Skema- oplysninger: **Tid:** Tirsdag og torsdag
Teaching format: Student activating teaching using presentations, problem solving, written assignments, group work, and to a lesser extent, lectures and demonstrations.

Goal: To give a research related insight to the function and ability of the human brain to adjust to new demands (plasticity) by working with scientific literature and other relevant syllabus.

Content: During the course students will learn how the human brain and spinal cord works focusing especially on plasticity (ability to adjust to new demands) of neuronal networks. The aim is to build up the students' insight to the neurobiological processes that lay behind changes in motor function in reference to scientific literature from animal- and human experiments.
This part should be aligned with the ILO's once they are written.

Competence description: By going through some of the key experiments in neuroplasticity the course provides basic neurobiological insight. From this students will be capable of describing basic principles in neurobiological research and plasticity in the human central nervous system.

Furthermore the students will be able to read scientific literature, extract the main points and take a critical stand point to the topic as well as to use their knowledge to design and interpret neurobiological experiments. They will be able to present difficult comprehensible material and to relate the knowledge to society and take a stand point to biological-ethical problems Will they? Is this really an aim, this last sentence?
Questions that I believe should be answered in this section:
What should they be able to do afterwards?
Make a list so they can check afterwards: Can I do this!?
Such as:
Students should be able to:
Design small experiments.
Ask the "right" questions, to take a critical stand point to the literature.

Aim: Participants on the course should:

- Gain scientific understanding of the function of the human brain and capability to adjust to new demands.
- Gain insight to plasticity in the human central nervous system.
- Gain insight to some of the basic principles in neurobiological research and understand some of the key experiments within the field of neuroplasticity.
- Be able to use neurobiological knowledge to carry out and interpret neurobiological experiments.
- Be able to design and execute (simple) experiments that tests problems related to neuroplasticity.
- Be able to present experimental results, discuss and put them into a perspective related to the

existing physiological knowledge (within the course syllabus and other relevant chosen literature).

I think the aims should be much more specific especially the first 3 are very unspecific. The last 3 can be modified so they become more concrete, specific and aligned to the ILO's.

Criteria for getting the grade 12:

The grade 12 is given when (Danish):

- Eksaminanden har demonstreret en overbevisende evne til at kunne præsentere, analysere, sammenfatte/konkludere og desuden har taget kritisk stilling til avancerede problemstillinger og kan perspektivere/diskutere disse i forhold til pensum og relevant udvalgt litteratur.
- Eksaminanden har demonstreret sikker anvendelse af fagets præsentationsformer og standarder for rapportering.
- Eksaminanden har demonstreret beherskelse af kursets centrale emner, evne og overblik i forhold til de udvalgte problemstillinger.
- Besvarelsen fremstår som en helhed.

It is difficult to be very precise here but again I believe that with clear ILO's this part could be aligned and become more specific.

Litterature and books: Scientific litterateur and relevant chapters form textbooks.

Faglige forudsætninger: Bachelorgrad [..]

Exam: Passing the course demands an active participation in the classes and during group work, presentations, discussions and assignments. Your active participation will be valued 20% for your exam grade. The short written assignments will make up the exam questions, but you can be asked questions in the full syllabus during the final oral exam.

Course Syllabus and Course Plan

To avoid unwanted repetition and use any overlap in a constructive way it is important that all teachers meet to discuss their ILO's and their topic. In this way they can quickly and easily get an overview of each other's teaching and thus coordinate the content between them.

Syllabus:
I suggest that each teacher specify the ILO's they find important for their topic. Based on this they decide on the literature which meets these criteria (they can also do it the other way around.). It is important to keep in mind that reading papers is demanding and time consuming, especially for beginners. So good abbreviation- and word lists are important to motivate the students and give them a good experience when reading scientific literature. Consider if review articles are good or bad and make sure that the content varies significantly from that given in courses on the bachelor part.

Topics: (inspired from former syllabus):
1 Molecular and Cellular level: what happens at this level to induce neuroplasticity?
2 Plasticity in the Spinal Cord: Development of spasticity, other effects of a Spinal Cord Lesion.
3 Systemic levels: Motor- and Visio-motor learning and adaptation.
4 Consolidation.
5/6 Rehabilitation in the brain and spinal cord. Immobilization, mental training, strength training.
7 Designing experiments: given the methods and insight the students have gained, they are given a set of questions that needs to be answered. They have to choose applicable methods and argue for the design of the experiment.

Course Plan (see also Table 3):

Week .Day	Teacher(s)	ILO's	Topic:	Literature	pp
1.1			Intro to the course + demo. Topic 1		
1.2			Topic 1		
2.1			Topic 1		
2.2			Topic 1		
3.1			Topic 2		
3.2			Topic 2		
4.1			Topic 3		
4.2			Topic 3		
5.1			Topic 4		
5.2			Topic 5/6		
6.1			Topic 5/6		
6.2			Topic 5/6		
7.1			Topic 7		
7.2			Historic overview used to summarize and contextualize the syllabus.		

All contributions to this volume can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/2011-4/

The bibliography can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/kapitler/2011_vol4_nr1-2_bibliography.pdf/