



Teaching climate change: An interdisciplinary challenge

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Abstract: Climate change education is inherently interdisciplinary. It requires teachers to possess a broad range of competencies and to apply a variety of teaching methods, bringing into play the skills and knowledge of the whole classroom. If one defines interdisciplinary learning as the ability to know and coordinate a growing number of perspectives, it becomes the teacher’s primary task to support students in their explorative and coordinative efforts. Preliminary findings from a research project at the University of Copenhagen highlights several barriers as well as opportunities. In general, there is weak institutional support for interdisciplinary teaching, and a lack of teacher coordination among topics covered in the curricula. At its worst, teaching becomes a kind of ‘serial disciplinarity’ where modularly formatted perspectives produce mutually incomprehensible monologues. At its best, lead instructors use a variety of inductive teaching methods and provide an impartial overview of the conceptual schemes involved.

Purpose and Goals of the Research

A research project running from 2013 to 2016 at the University of Copenhagen (UCHP) investigates the pedagogical and didactical challenges of two interdisciplinary Master’s Programs, one of them called ‘Master of Disaster’ (MDMa), situated at the Faculty of Health, and the other, a two year old ‘Master of Science in Climate Change’ (CCIMA) offered by the Faculty of Science.

Here we will focus on the Master of Climate Change (CCIMA) only, and try to answer three questions related to the teacher’s role:

- Which teaching styles are best suited for an interdisciplinary climate change education?
- What kind of collegial and institutional support do the teachers need in order to fulfill their roles?
- How can we use the heterogeneity of students as a resource for transformational and contextual learning, for instance by using identity and role play in order to learn to navigate multiple scientific methods and perspectives?

The empirical data consists of qualitative interviews with six teachers (including the program director and lead instructor) and six students from CCIMA. In addition, workshops with five CCIMA students and ten students from similar interdisciplinary programs were held in order to compare student expectations and impressions. On top of that, an extensive literature review was performed by members of the working group.

Structure of Master’s program

	Block 1	Block 2	Block 3	Block 4
1. year	Climate change - an interdisciplinary challenge			
	Climate change, impacts, adaptation and mitigation			
2. year	Interdisciplinary project course		Thesis	

Program structure: The light gray areas with red/black font are compulsory courses. The dark gray areas are restricted electives, and the white areas are free elective courses.

The diagram above shows the program structure for CCIMA. Students are expected to come with Bachelor of Science. The number of electives is huge compared to other master programs in climate change. They span from paleo-climate over energy systems to geopolitics and climate solutions.

Typical Teacher Challenges

Interdisciplinary study programs like CCIMA are often a mix of old and new courses, involving many teachers and disciplinary perspectives. In addition, teachers have little or no knowledge at all about the choices, skills, and interests of students entering the classroom. This creates a distinct danger of too many teachers spoiling the broth.

Here is a list of observed teacher challenges, which of course, to some degree, are common for all teachers, but are exacerbated for interdisciplinary educations where old and new modules are mixed and when many teachers are involved:

- What is this study program about and what is my role as a teacher?
- How are the courses and their contents coordinated?
- How do we teachers communicate if there is no active research environment, and if all teachers are sitting at separate institutes?
- What is the best way to teach and assess my course?
- How do I align the different student skills and abilities?
- How do I bridge the gap to other disciplines taught in this program?
- Should I know the contents of my colleague’s courses?
- Do I have time for the extra work load?
- Hey, how does this contribute to my own research?

Archetypes of Interdisciplinary Teaching

Interviews with teachers and students reveal three recurring strategies by which teachers cope with the challenges listed above. The worst and sadly most common approach is to teach your part of the course as you always have taught it, no matter what kind of students are on the receiving end. The second most common strategy is to insist that students first learn the basics of a discipline before they branch off to their interdisciplinary fads. The third and least common strategy is to take interdisciplinarity seriously. This involves strong communication efforts across disciplinary fault lines, alternating inductive teaching methods, and the ability to shift and synthesize perspectives at will.

We have chosen to call these three different strategies ‘*Archetypes of Interdisciplinary Teaching*’. We have chosen to attribute to each strategy a movie character, inspired by Sergio Leone’s classical western ‘The Good, the Bad and the Ugly’. Although it should be noted that teachers in general have much more noble intentions than the gangsters, we still believe that it is worth considering some important similarities of style. Let’s have a closer look at each of them:

The Ugly Teacher

The ugly teacher is the teacher who’s mind is on autopilot. He only acts through own impulses and routinized skills. In fact, this is the only way he *can* teach. When a student asks a question out of plan, she is referred to another session or another class. The ugly teacher doesn’t

Archetypes of Teaching

The good teacher is just like the good gangster. He knows when and how to act - and when to get out of the way. The bad teacher exploits the weaknesses of people and expects things to go his way or the highway. The ugly teacher is like the ugly gangster in Sergio Leone’s classical movie. He only acts on own impulses and skills. And he has no clue about what’s going on in the minds of other people.



Credits: Collage of three drawings made by Kevin Keele.

communicate with colleagues either (except exchanges of niceties), and delivers the course content solely from his idiosyncratic perspective. He has no clue about what’s going on in the minds of other people – or he doesn’t want to know.

If ugly teachers are stacked serially, their modular and silo-formatted perspectives will produce mutually incomprehensible monologues with little chance for a student to make sense of the greater picture.

The Bad Teacher

The bad teacher is a kind of bad-ass. He is really unsatisfied with the skills of the students, and demands them to master the tasks at hand before going any further. But at least he recognizes the strengths and weaknesses of his students. Often he takes pleasure in seeing them suffer because that’s how they learn best. For the weak and unmotivated students the bad teacher is, in this sense, not bad at all. He has a clear plan and expects things to go his way or the highway.

If bad teachers dominate the study program, students will have a hard time getting through. Some strong students, though, will find pride in having endured the disciplining and start to copy their master’s style.

The Good Teacher

A good teacher knows when and how to act - and when to get out of the way. He uses a variety of inductive teaching methods such as problem based learning, case-based instruction, project assignments, and discovery learning, all depending on the situation and subject at hand. These methods generally help putting salient competencies of students into play, and make subject matters feel much more relevant and motivating. Of course, if needed, he also gives standard lectures.

If you observe Clint Eastwood carefully in the movie, you will see that he rarely is overstrained by work. The same goes for the good teacher. The less he says the stronger his message becomes. Preferably, he only intervenes when people have lost their way. His true mastery is his ability to put himself out of the equation and provide people an impartial overview of the conceptual schemes involved. This makes him seem harmless, but in reality it makes him extremely powerful.

Conclusion

Interdisciplinary teaching and learning requires teachers to possess a broad range of competencies and to apply alternating teaching methods, bringing into play the skills and knowledge of the whole classroom. If one defines interdisciplinary learning as the ability to know and coordinate a growing number of perspectives, it becomes the teacher’s primary task to support students in their explorative and coordinative efforts.

This research project has revealed that far from all teachers live up to such high standards. Most teachers disregard the need to do things differently, and opt for an easy solution such as sticking to their own field of expertise or teach the way they always have done. This autopilot-type of teaching is ugly, not only because it is ineffective, but because students quickly realize that the teacher is not really present.

Much better is the bad teacher approach of disciplinary strictness and rigor. At least this makes students feel that they have been taken serious. But if you really want to be a skilled expert in interdisciplinary teaching you will have to cultivate the following competencies:

- Know thy Clint and remember his credo: The less you say, the stronger you become.
- Learn to adapt your teaching to the situation at hand, and make active use of the mixed skills and cultural backgrounds of your students.
- Go beyond the default solution of ‘serial monologues’, and integrate several disciplinary approaches actively by shifting and synthesizing perspectives continuously.
- Whenever reasonable, use inductive teaching methods such as problem based learning, case-based instruction, project work, and discovery learning.
- Coordinate your work with colleagues and collaborate across normal academic divisions.
- Use open-ended assessments methods instead of closed tasks. Self- and peer-assessments can be very helpful too.
- Put the students at the center, not yourself.