## Formal Educational Training

I completed the SDU Lecturer Training Program (2014) where I took the following short courses/workshops:

- Using philosophy for children and Socratic questions to develop deeper thinking
- Interactive lecturing
- Engage your students with discussion forums, blogs and wikis
- Oral examination in higher education in Denmark
- Attendance of the Conference on Teaching for Active Learning Nov 3 2014

## Administrative tasks related to eduction

I am the course coordinator for:
BB512 - Population biology and evolution (5 ECTS)
BB852 - Data handling, visualization, and statistics (5 ECTS)

I was the course coordinator in the past for BB529 - Introduction to biodemography and BB839 - Planning and evaluation of biological studies (5 ECTS).

I am the semester coordinator for the 5th Semester of the biology bachelor programme.

## Experience with teaching, supervision and examination

I am the course coordinator and teacher for the following courses:

BB512 - Population biology and evolution (5 ECTS)
BB852 - Data handling, visualization, and statistics (5 ECTS)

I have previously coordinated and taught on:
BB529 - Introduction to biodemography (5 ECTS)
BB839 - Planning and evaluation of biological studies (5 ECTS)

I supervise first-year projects (FF501, 5 ECTS), typically focussing on population dynamics in birds or phenology and climate change.

I have also supervised numerous individual study activities (IABB501-5, 5 or 10 ECTS).

I have supervised >40 bachelor projects between 2014-2022.

I have supervised >20 SDU Masters projects between 2014-2022.

I have supervised 3 Ph.D. projects.

- Gesa Römer, 2020, "Variation in Demographic Traits Across the Tree of Life"
- Sophie Lund Rasmussen, 2019, "The Danish Hedgehog Project How Humans Influence Hedgehogs and How Hedgehogs May Affect Humans When Living Closely Together"
- Dani Sherman, 2018, "Comparative Life-History and the Demography of Ageing in Plants"

I am the examiner for BB512 and BB852, and have been masters project examiner (censor) for several masters projects.

I have been the external examiner for 3 PhD projects in Spain, UK and Switzerland.

## Methods, materials and tools

I use a combination of methods in teaching including traditional lectures, smaller workshops, computer exercises and other practical class exercises.

I produce my own teaching materials including lecture slides (e.g. Powerpoint), worksheets and exercises. I also develop and use computer-based tools using Excel, R, and Netlogo.

## Educational development and educational research as well as educational awards

I won a “Læringsrum og undervisningsteknologi” grant for “Innovative teaching of theory and method in evolutionary demography” in 2013. This was to develop the capacity of our research group to use digital methods such as making educational videos and to record our lectures.

I particpated in the development of a Talent Programme for Citizen Science at SDU (approved to start in February 2020). I

supervised a group of these students who did a project on the hunting behaviour of domestic cats and their impact on wildlife in Denmark.

## Reflections on teaching practice (Teaching Philosophy)

Teaching is an important part my job and I enjoy it for two reasons. Firstly, it is very rewarding to inspire students to develop an enthusiasm for and knowledge of the subjects that are close to my heart. Secondly, teaching is an excellent way for me to gain a broader understanding of my field outside my immediate specialist area - I love to keep an eye out on the literature to find good new examples that can contribute to my teaching.

There is good evidence (e.g. Freeman et al. 2014) to support my belief that learning is best considered as an active rather than a passive process: students must actively learn rather than passively absorb the information transmitted to them by the instructor. As instructors we cannot force students to learn. Instead we must engage and motivate students, and make it possible and easier for them to learn by developing their curiosity, and providing them the tools they need to succeed.

I believe that like scientific progress, the acquisition of knowledge is an iterative process, building on the foundations that have already been laid in previous learning (i.e. it is inherently constructivist). It is therefore important that, as an instructor, I have a sound knowledge of what the students are likely to have covered before in earlier classes. It is then useful to deliberately build on this knowledge scaffold using problem-based and inquiry-based methods. There is perhaps evidence that these approaches can be effective (e.g. Guthrie et al. 2004; Hmelo-Silver et al. 2007), but also that they require that students have the existing mental models to build upon (Sweller 1988; Mayer 2004; Meyer 2013). In this case, for completely new topics a guided discovery model is perhaps more useful (Mayer 2004; Meyer 2013). In practice, I therefore use a combination of these two approaches, weighted according to the prior knowledge of the students. Effectively this leads students from an initial phase of guided learning that transitions to self-guided inquiry when knowledge allows.

In the sciences, students must acquire and memorise a large working knowledge of the fundamental principles and terminology of a given area. It is my job as the instructor to present these "facts and jargon" in an organized manner, illustrating the connections between different ideas and concepts, but without overwhelming students with quantity at any one time. It is important, especially in more technical subjects, to start slow and build up momentum gently. To do this, a well-thought through and logically ordered course syllabus is essential. Within the syllabus I believe that it is often important to incorporate some of the history of the development of the field (e.g. in population biology and evolution), both because it helps put ideas into context and because it illustrates how scientific progress occurs. For the same reason, I believe that even undergraduate students benefit enormously from reading carefully-chosen primary literature. Even though perhaps few will become professional scientists, a knowledge of how science progresses is important, and the associated skills of comprehension and critical thinking are vital skills in themselves.

In my statistics and programming classes I face the challenge of engaging students with learning what is effectively a new language – the R computer programming language (R Development Core Team, 2015). The subject and approach is sometimes totally new to my students who have often never been exposed to command line programming languages, or to modeling concepts before. With this subject, a purely constructivist approach is not appropriate, at least initially. Teaching the subject via traditional lectures is not effective. Instead I use a guided learning approach making use of short examples, and vignettes that the students must follow and think through. To maintain motivation it is crucial to challenge learners with tasks that are slightly, but not very much more advanced their current level of comfort (the zone of proximal development, Vygotsky 1978), and gradually extend knowledge and expertise. I therefore ensure that my material is fairly simple and explicitly explained to start with and gradually grant more-and-more freedom to explore (and learn by making mistakes!) as the course progresses and the students gain confidence.

It is sometimes said that people learn best in different ways. Although there is little empirical support for real differences in learning styles, and some researchers have called for the idea of students having a single learning style to "cease to be a fashion" (e.g. Hall & Mosely, 2006; Coffield et al. 2004) it is clear to me that students favour some methods over others. It is therefore important for me to include a range of methods in my teaching. Traditional lectures are frequently the most efficient means of presenting large quantities of information, but they must be supported by high-quality audiovisual media and handouts, and allow time for class discussion, practical learning activities, and peer-to-peer teaching etc. -- all of which act to reinforce learning. I naturally call upon a wide range of tools in my teaching. In addition to traditional lectures using slides I make use of videos, guided worksheets/websites, games. I produce some of these myself (see Appendix for examples), and borrow others from colleagues and elsewhere. I also make myself available by email and via "office hours". These can be rather demanding on my time, but students certainly value and benefit from getting one-on-one help.

In summary, my greatest wish for my students is that they take responsibility for their own learning. I want them to engage with the subjects and, after an initial period of guided learning, feel confident about learning through their own exploration.

References

Coffield, F., Moseley, D., Hall, E., and Ecclestone, K.(2004). Learning styles and pedagogy in post-16 learning: a systematic and critical review. Learning & Skills Research Centre, London.
Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active

learning increases student performance in science, engineering, and mathematics. Proceedings of the National Academy of Sciences of the United States of America, 111(23), 8410–8415. http://doi.org/10.1073/pnas.1319030111
Guthrie, J. T., Wigfield, A., Barbosa, P., Perencevich, K. C., Taboada, A., Davis, M. H., et al. (2004). Increasing Reading Comprehension and Engagement Through Concept-Oriented Reading Instruction. Journal of Educational Psychology, 96(3), 403–423. http://doi.org/10.1037/0022-0663.96.3.403
Hall, E., & Moseley, D. (2005). Is there a role for learning styles in personalised education and training? International Journal of Lifelong Education. 24(3), 243-255.
Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and Achievement in Problem-Based and Inquiry Learning: A Response to Kirschner, Sweller, and Clark (2006). Educational Psychologist, 42(2), 99–107. http://doi.org/10.1080/00461520701263368
Kirschner, P. A., Sweller, J., & Clark, R. E. (2010). Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching. Educational Psychologist, 41(2), 75–86. http://doi.org/10.1207/s15326985ep4102_1
Mayer, R. E. (2004). Should There Be a Three-Strikes Rule Against Pure Discovery Learning? American Psychologist, 59(1), 14–19. http://doi.org/10.1037/0003-066X.59.1.14
Meyer, D. L. (2013). The Poverty of Constructivism. Educational Philosophy and Theory, 41(3), 332–341. http://doi.org/10.1111/j.1469-5812.2008.00457.x
R Development Core Team (2015). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org/
Sweller, J. (1988). Cognitive Load During Problem Solving: Effects on Learning. Cognitive Science, 12(2), 257–285. http://doi.org/10.1207/s15516709cog1202_4
Vygotskii, L.S. (1978). Mind in society: The development of higher mental processes. Cambridge, MA: Harvard University Press