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Report on pedagogical experience

1. Teaching experience and development

As an Senior Research Fellow (2012-2014) with teaching responsibility, I have planned the curricula for four undergraduate courses at the University of Oulu at both Bachelor and Master's level. I have also supervised multiple bachelor's and master theses as a main supervisor and four completed doctoral theses as a secondary supervisor. A the moment I am the main supervisor of two doctoral students.

My teaching skills took a substantial step forward during my pedagogic studies (2009-2011) where I for the first time became familiar with the theoretical approach to teaching. The pedagogical training period was a true eye-opener in terms of my personal teaching philosophy. Without learning about constructive alignment and principles of evaluation, for example, I would probably keep preparing my lectures without giving much thought to different learning styles and learning objectives.

Until 2015, I have collected written feedback and sometimes arranged a discussion at the end of the course. Since 2016, I have collected documented and archived feedback via *palaute.oulu.fi* system from an extensive master's level "DNA Analysis in Population Genetics" 10 ECTS course. I have made changes based on feedback, such as clarifying the curriculum and providing the study material in advance.

Example of the evaluation from 2016-2017

Teaching and guidance

Question	Totally disagree	Some what disagree	Don't disagree or agree	Some what agree	Totally agree	Average
Teaching methods supported learning and helped me to achieve learning outcomes.	0	0	2	3	4	4.22
Course material supported my learning.	0	0	0	1	4	4.8
Instructions to the course tasks were clear.	0	0	0	4	6	4.6
There was enough support and guidance in the course.	0	0	0	2	3	4.6

And the same course in 2017-2018

Teaching and guidance

Question	Totally disagree	Some what disagree	Don't disagree or agree	Some what agree	Totally agree	Average
Teaching methods supported learning and helped me to achieve learning outcomes.	0	0	0	2	1	4.33
Course material supported my learning.	0	1	0	0	2	4
Instructions to the course tasks were clear.	0	0	0	2	1	4.33
There was enough support and guidance in the course.	0	0	0	1	2	4.67

List of pedagogic education and teaching experience

Theses supervised:

- Officially appointed primary post-graduate supervisor of Jaakko Tyrmi and Sandra Cervantes, University of Oulu
- Officially appointed secondary post-graduate supervisor of Tuomas Toivainen (graduated 2014), Alina Niskanen (graduated 2014), Tiina Mattila (graduated 2017) and Marja Heikkinen (graduated 2017), University of Oulu
- Officially appointed primary undergraduate supervisor of Robert Kesälahti and Emmi Aikio (graduated 2018), University of Oulu
- Officially appointed secondary undergraduate supervisor of Matti Salmela (graduated 2007) and Annika Marjamäki (graduated 2014), University of Oulu
- Officially appointed primary supervisor of four completed bachelor's theses, University of Oulu

Follow-up groups

- Member of three and the head of two follow-up groups for doctoral training in University of Oulu Graduate School

Teaching experience

- Teacher in charge of the planning and implementation of the following undergraduate courses at the University of Oulu:

    - DNA Analysis in Population Genetics (10 ECTS, 2016–2019)
    - Basics in Population Genetics (8 ECTS, 2012–2014)
    - Basics of Bioinformatics (3 ECTS, 2013-2014)
    - Human Genetics (4 ECTS, 2011)

- Part-time teaching (116 hours in total) of the following undergraduate courses in the University of Oulu:

    - Basics of Genetics, 2002
    - Basics of Bioinformatics, 2004
    - Molecular Evolution, 2004 and 2005
    - Special Questions of Population Genetics, 2004

- Oulu University of Applied Sciences, School of Health and Social Care, DNA sequencing course for students of bioanalytics (2010, 22 hours)
- Assisting teaching responsibilities on graduate level courses at the University of California, Davis in 2011–2012

- Main organizer of workshop on evolutionary, developmental and population genetics, 2013, University of Oulu
- Senior tutor in the Field of Biology, 2010-2014, University of Oulu
- Counselor for international genetics students, 2012-2014, University of Oulu

Teaching in international workshops (Doctoral and Post-Doctoral level)

- GenTree Training course, Aleksandro Stulginskio Universitetas, 2018, Lithuania.
- Genomics of the speciation continuum, 2014, Fribourg, Switzerland
- ProCoGen Training Workshop, 2013, Umeå University, Sweden

2. Pedagogical training and thinking

Pedagogic training

- Oulu University of Applied Sciences, School of Vocational Teacher Education, 31 October 2011, Pedagogical studies (60 ECTS)

I conducted my pedagogic studies at the School of Vocational Teacher Education at the Oulu University of Applied Sciences with special emphasis on university-level education and internationality. The studies and the training period clarified my attitudes and ideas about teaching and the educational sciences substantially. I want to be a teacher who is up for discussion and debate, who activates and inspires her students and who encourages critical thinking. My selection of evaluation methods and instruments is guided by the learning objectives. I enjoy teaching and want to put my pedagogical skills to use in everyday teaching.

I have served as both main and secondary supervisor of multiple doctoral theses. The experience has made it clear that each process of writing a thesis is a special case with individual features. It depends greatly on the personality of the doctoral student, the supervisors involved, and the topic. Supervising a doctoral thesis should be considered a scientific partnership. Since doctoral students are specialists in their own field, supervision should mainly consist of scientific discussion as in any other professional relationship. Mentoring on research practices, publication processes, writing of grant proposals and other aspects of academic career are also part of this relationship. My objective is to create an atmosphere of mutual trust so that they feel comfortable, are not afraid to approach me, and feel they can talk to me about all potential problems and any questions they might have. I have an open-door policy; any student or colleague is welcome to talk to me at any time.

I have also supervised several Bachelor's and Master's theses. Most of the principles mentioned above also apply to supervision of undergraduate students. At the undergraduate level, paying close attention to basic scientific conduct is important:

how to write, how to conduct research, and what are the ethical principles of science. It must also be remembered that the thesis may be the largest and most demanding endeavour in the student's career so far, which can make the situation delicate. I consider positive feedback, regular meetings and keeping the schedule that has been mutually agreed upon the keys to a successful thesis.

Based on student feedback, my positive sides are approachability, attention given to the individual student and focusing on important concepts. Improvement is called for in the structuring of exercises to make them more understandable to my students.

3. Ability to use and produce learning materials

As new methods and findings are emerging constantly, especially in the fields of bioinformatics and population genetics, course materials have to be updated every year. Although the curriculum is in many cases based on previous years and previous courses, I have made substantial updates and changes to the courses I teach. I have collected both written and verbal student feedback and adjusted content and methods to improve my teaching. Most importantly, I have made the course structures and the evaluation criteria clearer so that they are known to all students from the very beginning of each course.

When preparing for teaching, I use a variety of different teaching methods. Conventional lectures may contain discussions and quizzes. We may sometimes watch illustrative animations or short talks from the Internet. In laboratory and computer activities, the students get an opportunity to work with their hands. Some courses feature a lot of independent work; here I have taken up the practice of providing guiding questions followed by discussion to provide an underlying structure to the independent reading tasks. In my course on human genetics, the students made a learning diary in Optima learning environment, and their fellow students were encouraged to comment on the diaries in a virtual learning environment.

Description of educational material

DNA Analysis in Population Genetics

- Course slides and handouts for lectures (6 x 2 hours)
- Computer exercise material based on R packages and other population genetics software (12 hours)
- Checklist/guidelines to help independent study (6 pages of questions)
- Problem sets (3 x 2 hours)
- Preparatory materials for independent research (such as human HapMap data)

Basics in Population Genetics

- Course slides and handouts for lectures (12 x 2 hours)
- Problem sets (12 x 2 h)
- Question sheets to support discussion on scientific articles
- Take-home examination and regular examination
- Laboratory and computer exercise material (30 hours of exercises)

Basics of Bioinformatics

- Course slides and handouts for lectures (6 x 2 hours)
- Computer exercise material (20 hours of exercises)
- Examination

Human Genetics

- Course slides and handouts for lectures (12 x 2 hours)
- Set of questions to help preparation for examination (2 pages)

4. Other teaching qualifications

- Test lecture for docenture in population genomics, University of Oulu, 7.2.2013, score: 5/5
- Awarded docenture: population genomics, University of Oulu, 1.4.2013
- Annual participation in writing the Curriculum documents for the Field of Biology, University of Oulu

Some written feedback from the "DNA Analysis in Population Genetics"course:

Positive:
"Final project was amazing, plenty of time and sufficient guidance. I enjoyed really being able to dig into a data set having practiced/learned how to use several programs in the computer exercises. I also thought the structure of the course was very nice, by the time we got to the computer exercises I felt fairly comfortable with the theoretical background necessary to understand what the programs were doing and why we were using them. Another good practice was having guiding questions to answer for the lectures (at least the first 5). I believe it helped engage us students during the lecture portion of the course which is, in my opinion, a much more effective learning environment than cut and dried lectures."

Criticism*:*
"The group discussions were painful as some people are stronger in persuading their peers about sometimes wrong answers and we could not ask the teacher for every single answer as there was another group as well."