

Progress Report ECTN Working Group

Lecturing Qualifications and Innovative Teaching Methods

November 2018

Ambition of the working group

The effectiveness of laboratory classes is often not achieved to their full potential. The ECTN WG Lecturing Qualifications and Innovative Teaching Methods is committed to improving this.

Aims of the Working Group

The ECTN WG Lecturing Qualifications and Innovative Teaching Methods is developing an online course for the lecturers in higher education who give laboratory teaching. The course is targeted at relatively inexperienced university teachers. The aims of the Working group are:

- improve teaching practice in chemistry laboratory classes in higher education
- improve quality of newly appointed higher education lecturers teaching in laboratory classes
- promote activating teaching methods for laboratory courses
- stimulate collaboration between the lecturers at different universities
- exchange experiences in international context

Summary of Results of the Working Group up to now

The ECTN Working group has developed an online course entitled **Teaching in University Science Laboratories (Developing Best Practice)** that is located on the MOOC platform Coursera (partner institution University of Amsterdam). The idea for the course was initiated at ECTN GA in Ljubljana in 2015 and is based on the response on the inventory distributed among the members of the working sessions at the ECTN GA Gdansk and Malta. The Working group has developed a framework of the course key learning goals and the format of the online course. The online course **Teaching in University Science Laboratories (Developing Best Practice)** has 6 modules, being each one week long, with a working load of two hours per week. In 2016 a position paper is published in VIRT&L-COMM (2016) (link to paper: <http://services.chm.unipg.it/ojs/index.php/virtlcomm/article/view/148>).

The first trial of the online course entitled Teaching in University Science Laboratories (Developing Best Practice) was organized in December 2017, as a Small Private Online Course (SPOC) that was launched on the MOOC platform Coursera. There were 88 applications for the course, 77 lecturers logged in the course and have seen it, about 40 participants finished one or more assignment. 29 participants completed all assignments and earned the certificate. The course was extensively evaluated and the experiences are collected. In their evaluation, the participants were very positive about the course structure, its reading material and assignments. They enjoyed following the course and they would recommend it to others. The members of the working group also have evaluated the experiences with the course and analyzed the feedback of the participants. After the ECTN meeting in Prague the group has made a detailed plan for the improvements.

The work on improvements took place from September until November 2018 until the start of the course. To discuss the developments the group has organized weekly a one-hour online meeting on Webex. No face to face meetings took place after the GA in Prague.

The following elements were improved:

- the sequence of two modules has been changed,
- time on task of the assignments and readings
- technical quality of the videos in the course.

As announced, the Working group has launched a second private online course (SPOC) on November 12 2018. After six weeks the course will remain open for two more weeks in the Christmas holiday time to allow all the participants to complete any not finished work if they wish.

In appendix a short summary per module as this is published on Coursera can be found.

The advertisement of the online course **Teaching in University Science Laboratories (Developing Best Practice)** started directly after the meeting in Prague. The information and the application form for participants are available on the ECTN website of the working group: <http://ectn.eu/work-groups/lecturing-qualifications-and-innovative-teaching-methods/online-course-for-lecturers/>

170 applicants from 22 different countries from Europe, Canada, Australia and China completed the application form on the ECTN website. 82% are university chemistry teachers, the rest are university teachers from other STEM disciplines. 42% of the participants indicated as their goal to finish the course and get the certificate. 140 applicants accepted the invitation for enrolment in the course and are working now on the course.

The working group is following the learning process of the participants and will analyze the results after the course is finished. To get more insight in their progress, the participants in the course were asked to complete a reflective questionnaire on their teaching beliefs and intentions as a pre-test and will be asked to complete it again at the end of the course (post-test) to compare the results. 42 participants have completed the pre-test. There is also a survey about the appreciation of the course that will be taken after the course is finished.

The ambition of the Working group is to continue after the trial period making the course a MOOC, which means open and (more) massive (MOOC) and also to explore other ways of exploitation of this online course.

Core development team:

Natasa Brouwer (WG leader, University of Amsterdam),
Iwona Maciejowska, (coordinator modules 1 and 2, Jagiellonian University in Krakow, Poland),
Claire McDonnell (Dublin Institute of Technology, Ireland),
Gunther Fleerackers (coordinator modules 5 and 6, University College Leuven-Limburg, Belgium),
Mauro Mocerino (coordinator modules 3 and 4, Curtin University, Perth, Australia),
Nineta Hrastelj Majcen (EuCheMS, EU) (first trial period)

Appendix

Description per module of the course on Coursera

About Module 1:

In this module you will learn about different types of laboratory sessions and get acquainted with several strategies that can improve student's engagement in lab sessions. You will also get an introduction about this course as a whole and set your personal goals for it.

We expect you to spend about 2 hours of your time on this module to complete it. At each part of the module you can see the estimated time needed for it. You will see that in this module (and also in other modules of this online course) we have included some scientific papers. We have highlighted some important parts in them. Note that you don't need to read these papers fully in detail as it might take you a lot of time if you are not yet experienced in reading pedagogical literature. Of course you are very welcome to spend time as much as you wish on reading about the concepts discussed in the modules and you could also come back to the literature later at any stage.

We want you to enjoy working in this module! We hope that this module will help you to start or in the case that you are already an experienced teacher, to continue the development of your own best practice in university laboratory education.

About Module 2:

This module is about how to be(come) a good laboratory teacher. An effective laboratory teacher should be knowledgeable about concepts, techniques and safety. However this is not yet enough. He/she should also know how students learn and should be able to explain the complex material in a variety of ways and know how to use scientific or alternatively more accessible language in this as required. Finally, an effective laboratory teacher should demonstrate a concern for the student, a willingness to help and should be approachable and friendly.

The final assessment for this module will build on the responses you make in the discussion activities. We hope that you enjoy working in this module. We expect you to spend about 2 hours of your time on it to complete it. At each part of the module you can see the estimated time needed for it.

We hope that this module will help you in your journey towards improving yourself and becoming a good laboratory teacher.

About Module 3:

This module is about the learning theories that can be applied to ensure effective teaching of laboratory work. In lab sessions, students need to connect their observations to the real world and give explanations and reasoning on an abstract and/or a symbolic level. In this module, you will find some interesting reading about learning in the laboratory. How can theory be integrated into the lab session? How can lab teachers help students to construct their understanding of difficult concepts while considering experimental observations, models and calculations? The underpinning question is, what do teachers

expect students to learn in a laboratory session? That is why your first task in this module will be to identify the learning outcomes for your laboratory session.

We hope that you enjoy working in this module. We expect you to spend about 2 hours of your time on it to complete it. At each part of the module you can see the estimated time needed for it.

We hope that this module will help you in understanding the complexity of learning in the lab and how to create an effective learning process for your students.

About Module 4:

In this module you will learn how to give students instruction in a lab session. An interesting reading will provide you insights in how people process information, to be aware of information overload and of how important it is to ask students questions to support them in their learning. In this module you will learn different strategies in questioning. This will help you to prepare clear and concise instructions for your lab sessions.

The final assessment for this module will build on the responses you make in the discussion activities. We hope that you enjoy working in this module. We expect you to spend about 2.5 hours of your time on it to complete it. At each part of this module you can see the estimated time needed for it.

We hope that this module will help you in your journey towards improving yourself and becoming a good laboratory teacher.

About Module 5:

In this module you will learn how to create rubrics and how this instrument can help you to give students powerful feedback on learning. We will provide you with examples of rubrics and share experiences from teaching practice. In this module we will discuss how to steer learning by aligning it to the intended learning outcomes and using appropriate assessment instruments.

We hope that you enjoy working in this module. We expect you to spend about 2 hours of your time on it to complete it. At each part of the module you can see the estimated time needed for it. At the end of the module we will show how you can implement rubrics in a complete course programme. This is optional and intended for more experienced teachers.

We hope that this module will help you to improve the design of your lab course and to apply different assessment strategies for learning.

About Module 6:

In this module we ask you to look back at the last 5 weeks when you were following this course and to reflect on your own learning process. How did you learn in this course? Did you reach your own goals? What ideas did you get to improve your own science university laboratory course? How has doing this course influence your intended teaching practice? Have you already made a plan about it? Please share it with other participants in a discussion!

We are interested to see how your attitudes might have changed after completing this course. Therefore, we would like you to fill in the reflective questionnaire about your teaching beliefs and intentions. This is the same form that you have filled in at the beginning. We hope that this tool will help you in your reflective process. Have your answers to these questions changed? If so, how?

In this module we will also ask you to evaluate this course using a short survey. This will help us to further improve this course.