

Progress Report ECTN Working Group Lecturing Qualifications and Innovative Teaching Methods

April 2019-November 2019

22 November 2019

Ambition of the working group

The ECTN WG Lecturing Qualifications and Innovative Teaching Methods is committed to improving quality of chemistry teaching at tertiary level by stimulating a development of teaching competences of university staff.

Aims of the Working Group

1. improve teaching practice in chemistry laboratory classes in higher education
2. improve quality of newly appointed higher education teaching staff (for example in laboratory classes)
3. promote innovative active learning methods
4. stimulate cooperation and partnership between the lecturers at different universities in their continuous professional development
5. exchange of teaching experiences in international context

After the ECTN WG Lecturing Qualifications and Innovative Teaching Methods has developed the online course “Teaching in University Science Laboratories (Developing Best Practice)” which support the aims 1, 2 and 3, in coming years the working group would like to focus more in lecturers qualifications, stimulate continuous professional development (CDP) of the HE lecturers and promote innovative teaching methods via a professional discourse.

In this report we describe the activities of the working group and we summarize the relevant results achieved in the period from April to November 2019.

The activities of the Working group Lecturing Qualifications and Innovative Teaching Methods are divided in two parts with each having a specific focus:

- 1.) Online course “Teaching in University Science Laboratories (Developing Best Practice)”
- 2.) Developments on new activities of the working group focused in continuous professional development (CPD) of HE lecturers

1. Online course “Teaching in University Science Laboratories (Developing Best Practice)”

1.1 Development process

The ECTN Working group has developed a MOOC (Massive Open Online Course) entitled **Teaching in University Science Laboratories (Developing Best Practice)** that is located on the Coursera, one of the largest MOOC platforms on the world. The online course is targeted at relatively inexperienced higher education teachers who give laboratory teaching. The idea for the online course as a MOOC was initiated at ECTN GA in Ljubljana in 2015. The content of the online course is based on the response on the inventory distributed among the members of the working group sessions at the ECTN GA Gdansk and Malta. In 2016 a position paper is published in VIRT&L-COMM (Brouwer et al., 2016). The MOOC was developed according to an adapted ADDIE course development model (Peterson, 2003) in three cycles (Figure 1).

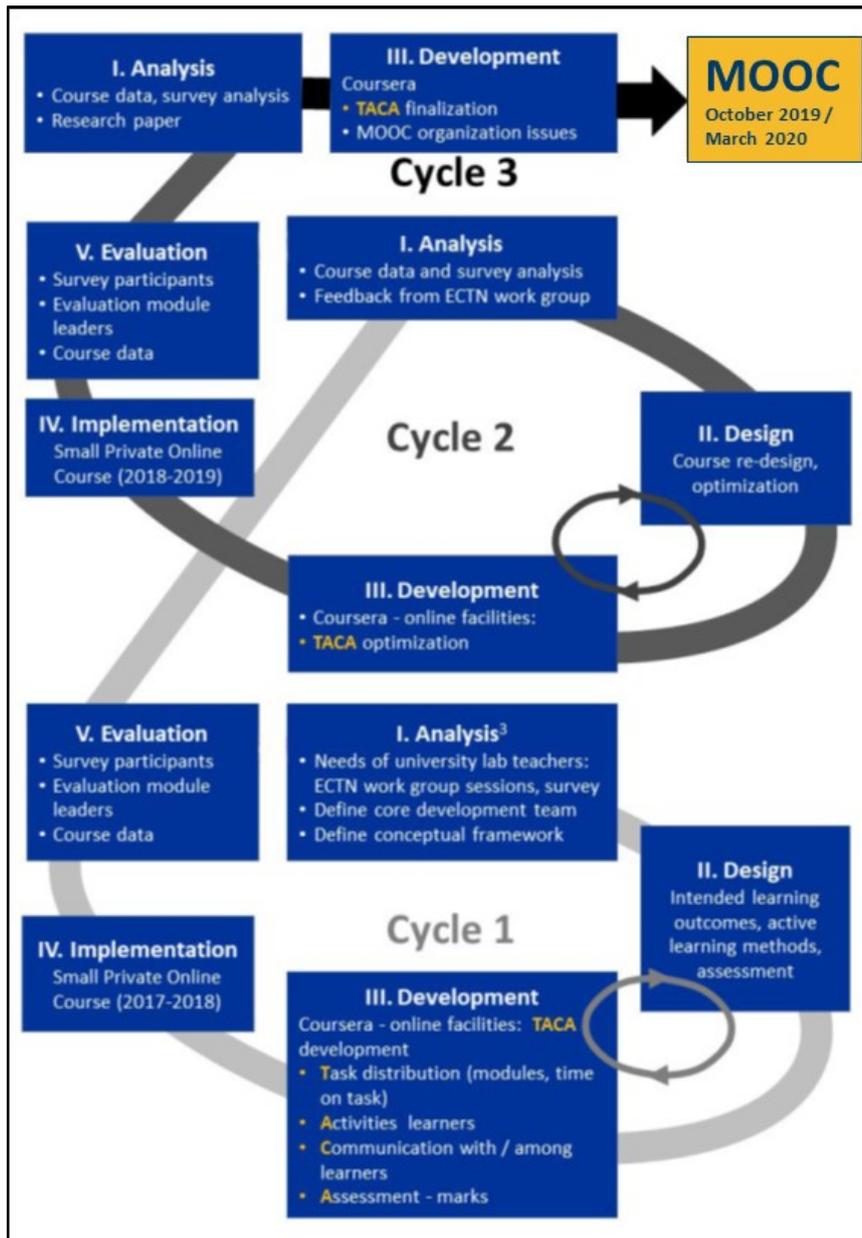


Figure 1: MOOC creation process, adapted ADDIE model

In cycle 1 (Figure 1) the first version of the course was developed and on December 4, 2017 the online course was launched as a small private online course (SPOC) on the MOOC platform Coursera. Based on the evaluations, the improvements were introduced and a second pilot was organized as a small private online course (SPOC) starting on November 12, 2018 (Figure 1, cycle 2). This version was again extensively evaluated. In cycle 3 (Figure 1) the online course was launched as a MOOC.

The online course Teaching in University Science Laboratories (Developing Best Practice) as a MOOC has 6 modules and takes in principle in total 6 weeks with a working load of two hours per week. The summary of the online course and an example of the learning activities in the modules can be found on the ECTN WG website (<http://ectn.eu/work-groups/lecturing-qualifications-and-innovative-teaching-methods/online-course-for-lecturers/>).

1.2 Research results of the two SPOCs

As already mentioned above in 2017 and in 2018 the online course was given as a small private online course (SPOC) which were also two research pilots. Both SPOCs were extensively evaluated and the

learning data and the experiences were collected. After every delivery the course was improved and perfected. The participants of the SPOCs came from 22 different countries and they were in general very positive about this course. The completion rates of the SPOCs were very high. In total in both SPOCs 85 participants completed the course and received the certificate which means 53% completion rate. This is extremely high in terms of open online courses where in average only a few % of the participants who start an online course also complete it.

In the context of our research about the learning process in our course, we have asked the participants to fill in a pre- and a post-questionnaire about their teaching beliefs and intentions and an evaluation survey to tell us about their personal experiences with the course. From both SPOCs the working group this way has collected a lot of data about learning.

The results were presented at the conference **8th Variety in University Chemistry Education** in Prato, Italy, July 2019 in a plenary oral presentation and on a poster (McDonnel et al., 2019, Brouwer et al., 2019). The working group is now preparing a paper for publication in a scientific journal.

1.3 MOOC

Based on the evaluation and the experiences of participants and the staff in the second SPOC, the course was further optimized and **the online course was launched on Coursera as a massive online open course (MOOC) on October 14, 2019** (Figure 1, cycle 3). 136 participants from all over the world started the MOOC, with the majority coming from Europe. At the moment of writing this report the course is still running and we don't have a detailed demographic information yet. This is because of the privacy regulations in MOOCs. Figure 2 that is generated by Coursera presents the education level of our participants in comparison to average Coursera MOOCs.

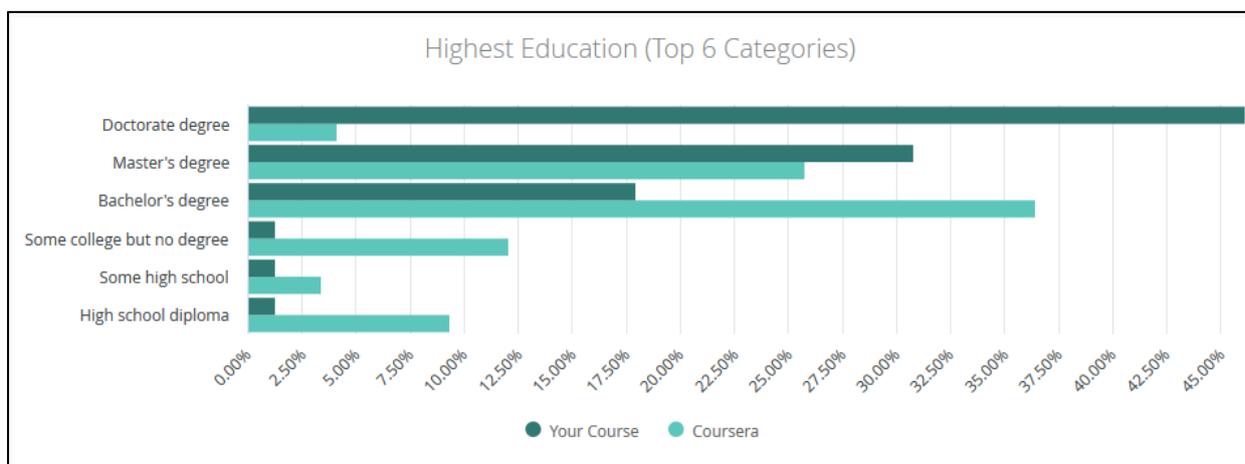


Figure 2: Education level of participants. Comparison of our online course with the average of Coursera MOOCs

From Figure 2 it can be seen that a large majority of the participants of our course have a PhD or a Master degree. It can be concluded that considering the education level we have reached the target group it was meant for. At this moment module 6 has officially started and after that there is another week but the participants can work faster on their own pace if they wish. At the moment of writing this report 27 participants have already completed the MOOC and have filled in the evaluation form. They are all very positive about the course. We give one example of a reflection on the course of one participant:

"I consider that this course opened my eyes for students' problems and with their struggle. The most important lesson for me concerned listening to students and giving instructions. It's a principal skill

which each good teacher should possess. Thanks this lesson i will try to change my way giving instructions, which i suppose will fruitfull in better understanding commands by students."

The next start of the course is scheduled on March 2 2020. Further on the course will start twice per academic year.

2. Next targets of the working group

2.1. Activities after the ECTN GA in Krakow

Now the MOOC is developed and its exploitation can continue without specific efforts of the working group it was time to consider about the following direction and possible extensions of the targets of the working group. At the ECTN General Assembly in Krakow, the working group has organized two sessions to discuss about it. The group has decided to focus in the coming years on the WG aim lecturers' qualifications, and to extend the focus from the lecturers who only give laboratory courses to lecturers who teach in different settings and their continuous professional development (CPD) for this. At the Krakow meeting **a list of possible activities was made:**

1. Connect to already existing repositories of open access materials with recommendations which can help university teachers to find resources.
2. Stimulate Communities of Practice of those who are involved in continuous professional development (CPD) of university teaching staff
3. Stimulate creation of local communities of teachers in (CPD)
4. Organize a Summer School for teacher educators, CPD staff at faculties of chemistry
5. Stimulate exchange: eg. one week visit of groups of students with a teacher in a foreign university
6. Define standards for CPD - minimum of PCK, TPACK
7. Collect data about CPD at European universities

After the Krakow meeting in April, the working group has organized one online meeting on May 9 2019 to prepare some short term concrete actions.

The conclusions of the May 9 online meeting:

- Start working on creating a community of people who are contact persons at the universities in the field of professional development of lecturers and PhD students.
To achieve this the first action point will be to collect their names and invite them to join the CPD (continuous professional development) community.
- Start an inventory to map out the situation about professional development of chemistry lecturers and PhD students at the EU universities, in the first place the ECTN members. We will ask ECTN management and EuChemS to help us with the distribution of the survey. One of the questions of the survey will be the name of the contact person of CPD.
- The survey needs (partly) to consist of the questions that were used in the survey that the working group has organized 10 years ago. This is necessary to make a comparison.
- We need a repository to share teaching methods and good education practices. As a start we will continue using Starfish (University of Amsterdam) where materials in this working group were already collected before. This will give us the possibility to find out what exactly do we need in the future. A collection of teaching methods relevant for university chemistry education developed by previous ECTN WG is available at:

<https://starfish.innovatievooronderwijs.nl/information/395/>

The questions and the design of the inventory were discussed at the following online meetings of the members of the core WG and per e-mail. Then the questionnaire was created and was piloted within the core WG and outside the WG among several university teachers who represent variety of universities and variety of CPD schemes (or lack of them). Results of these discussions were implemented and the questionnaire is now ready to be distributed at:

<https://forms.gle/o7WzvukUaFjZEqZ3A>

2.2 Expected results of inventory and actions of the WG based on the results

The results obtained in this inventory will be compared with the results of the inventory that was taken 10 years ago by this working group. Next this inventory will map out the people who (wish to) support / organize CPD at their universities (faculties of chemistry/chemical engineering and similar units). Our goal is to develop a cooperation between those people and to organize a Summer School for them. This questionnaire is a starting point in the development of the Summer School. The working principle of the Summer School will be: **train the trainers**.

In continuation of these developments we formulate an additional aim on the list of aims of the WG:

“Support continuous professional development (CDP) of the HE lecturers teaching in chemistry or STEM interdisciplinary courses by promoting innovative teaching methods and a professional discourse.”

2.3 Framework for Summer school design and development

The Summer school will be based on the following general principles:

- *Goal*: “train the trainer”, developing an international community for CPD in teaching in HE Chemistry and HE Chemistry reach or STEM interdisciplinary study programmes
- *General principles*: innovative active learning methods, cooperation, partnership and active involvement of participants, teaching practice oriented
- *Design*: workshops, involvement of experts and guest trainers
- *Timing and duration*: yearly, 5 days
- *Financing (in the first two years – pilot period)*:
 - Costs of the workshops, staff/trainers, organization and location: ECTN project, sponsors
 - Personal costs for travelling and stay of participants: faculties/institutions where they come from

The Summer School will be organized in combination with the one day yearly CPD community meeting which will assure sustainability and growth of the CPD community, exchange of knowledge and experiences and the CPD of the community members - the participants of the Summer School from previous years.

After two years a business plan will be made for sustainable non-profit exploitation.

ECTN Working Group Lecturing Qualifications and Innovative Teaching Methods

Online course core developing team

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ECTN Working Group Lecturing Qualifications and Innovative Teaching Methods

Working group participants at Krakow meeting

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- Working group website:
<http://ectn.eu/work-groups/lecturing-qualifications-and-innovative-teaching-methods/>