Roadmap for Continuous Professional Development of STEM Lecturers

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Eurovariety 2021

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http://ectn.eu/work-groups/stem-cpd/
STEM-CPD@EUni project

- Professional development specific for the HE lecturers in STEM
- 5 European universities and European Chemistry Thematic Network (ECTN)
- 2020-2023

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STEM-CPD@EUni project

CPD-Ambassador

a lecturer who innovates own courses to improve students’ learning, organizes activities about teaching and learning for fellow-lecturers, promotes continuous professional development at the faculty, and shares knowledge and experiences about it.

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Mission of CPD-Ambassadors

- Promote awareness of STEM teaching competence
- Define (didactics) needs teaching staff
- Organize didactic support teaching staff
- Promote STEM-CPD as a requirement for a sustainable quality of university teaching

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Mission of CPD-Ambassadors

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STEM-CPD@EUni project

1. What knowledge need lecturers to improve teaching and learning in HE STEM in their local context?

2. What need CPD-Ambassadors to reach fellow-lecturers?

STEM-CPD@EUni project gives handles, support, framework, community

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STEM-CPD@EUni project

Developments

- Roadmap with Recommendations and guidelines
- Summer school for CPD-Ambassadors
- User cases, scenarios
- Short online modules (microMOOCs)
- Evaluation
- STEM-CPD Community (EU)
- Framework for STEM-CPD

User case University of Amsterdam

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Development of Roadmap

• Stage 1:
  • Development of questionnaires for lecturers and educational managers
  • Conduct questionnaires at partner institutions November 2020

• Stage 2:
  • Conduct questionnaires at EU universities December 2020 – January 2021

• Stage 3:
  • Analysis of the results
  • Deriving guidelines and recommendations

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Three Dimensions of Roadmap

- **Dimension 1**: Improvement of STEM-teaching competence
- **Dimension 2**: Teaching attitudes
- **Dimension 3**: CPD activities

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Questionnaire

Number of statements: 66

Three parts:
Part 1: STEM-teaching competences (30 statements)
Part 2: (CPD) teaching attitudes (17 statements)
Part 3: CPD activities (19 statements)

Two perspectives
Perspective 1: general importance
Perspective 2: personal practice / programme practice

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Questionnaire

Number of statements: 66

Part 1: Teaching competence

- frame the course in the context of the study programme
- define intended learning outcomes in every course they teach
- choose an appropriate assessment method for their course
- engage students and arouse interest for the discipline in the class
- teach holistically by integrating social and art aspects teaching complex chemical concepts
- cope with heterogeneous pre-knowledge of students
- being able to bring out and correct misconceptions
- develop critical thinking by students
- give prompt feedback and support students during learning
- support students in socializing (specifically e.g. during a pandemic)
- stimulate discussion
- design laboratory courses
- teach about lab safety using digital tools/platform (where appropriate)
- teach large groups of students
- teach small groups of students (group's dynamics)
- design interactive lectures
- design online exams
- design problem solving sessions
- design active learning classes / sessions using digital technology
- use digital tools in lab courses
- use design thinking methods
- use research based teaching methods
- use project based teaching methods
- use blended learning approach
- use interactive online boards for teaching and learning
- use voting in lectures to activate thinking and understanding of [e.g. chemistry] concepts
- organize peer-assessment / peer-feedback in their courses
- organize online collaborative learning
- use advanced tools, based on AI, in supporting students in their learning process
- make/produce short MOOCs

Part 2: Lecturer’s attitude

- be reflective teachers and reflect about their courses / lectures.
- have high expectations for the students and themselves.
- inspire a positive attitude in their class.
- make students feel special, included, safe and secure.
- be interested in their students’ progress.
- use students evaluations and the feedback of students to improve courses.
- read literature about teaching and learning in higher education.
- discuss teaching with their colleagues.
- observe (some) lectures / teaching sessions of colleagues and give feedback.
- record (some) own lectures / teaching sessions on the video to reflect on.
- organize / attend meetings of their own teaching team to discuss / reflect on the teaching methods and on the effect of these on student’s learning.
- share experience and knowledge gained through continuous professional development (CPD) with lecturers from other institutions.
- analyze the effect of teaching and introduce changes in an evidence based way.
- set their own goals for professional development.
- attend training for lecturers at the university.
- apply for specific professional development programmes to obtain certificate(s) in teaching. (If this doesn’t exist in your country, please indicate in General importance what is your personal opinion about it and choose in Personal practice not applicable).
- participate in conferences about teaching in higher education.

Part 3: CPD activities

- reading books / journal articles on teaching and learning in HE.
- attending presentations about teaching approaches.
- attending webinars about teaching and learning.
- attending hands-on workshops on specific continuous professional development (CPD) topics.
- following online courses / MOOC about teaching and learning.
- attending conferences on teaching and learning in HE.
- attending a summer school on teaching and learning.
- attending a professional development programme to get a teaching certificate in higher education (if it doesn’t exist in your country, please indicate in General importance what is your personal opinion about it and choose in Personal practice not applicable).
- attending workshops that are organized specifically for STEM lecturers.
- attending workshops that are organized generally for lecturers from different disciplines.
- collaborating with a peer lecturer on a redesign of a course.
- getting peer-feedback on own teaching practice from a colleague.
- collaborating on a teaching innovation project.
- getting personal coaching / support by a pedagogical expert.
- getting mentoring from an experienced colleague.
- getting just in time support on a specific teaching and learning issue.
- giving mentoring to a junior lecturer.
- giving workshops to other lecturers.
- participating in a teaching and learning network or a special interest group on teaching and learning in HE.

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Results of the survey

- 420 lecturers from 26 countries (about 80 universities)
- 46 educational managers from 11 countries
- 58% male, 40% female, 2% didn’t tell
- Age:
  - 33% 46-55 years old
  - 25% 36-45 years old
  - 23% 56-65 years old
  - 9% 26-35
  - 9% above 65
- 53% no pedagogical training
Questionnaire Part 1 – competences (30 statements)

Table 1: Four most important competences measured on the Likert scale 1 to 5

<table>
<thead>
<tr>
<th>Statement</th>
<th>Lecturers</th>
<th>Discrepancy ( \Delta(G-P) )</th>
<th>Educational Managers</th>
<th>Discrepancy ( \Delta(G-P) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop critical thinking by students (q. 8)</td>
<td>4.7, St.Dev.= 0.6</td>
<td>0.2</td>
<td>4.7, St.Dev.= 0.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Engage students and arouse interest for the discipline in the class (q. 4)</td>
<td>4.6, St.Dev.= 0.7</td>
<td>0.2</td>
<td>4.5, St.Dev.= 0.8</td>
<td>0.4</td>
</tr>
<tr>
<td>Give prompt feedback and support students during learning (q. 9)</td>
<td>4.5, St.Dev.= 0.7</td>
<td>0.1</td>
<td>4.5, St.Dev.= 0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Define intended learning outcomes in every course they teach (q. 2)</td>
<td>4.4, St.Dev.= 0.8</td>
<td>0.1</td>
<td>4.6, St.Dev.= 0.8</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Cronbach’s Alpha Part 1: 0.951 (lecturers), 0.945 (educational managers)

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Questionnaire Part 1 – competences (30 statements)

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<th>Statement</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Develop critical thinking by students (q. 6)</td>
<td>4.7, St.Dev.= 0.6</td>
<td>0.2*</td>
<td>4.7, St.Dev.= 0.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Engage students and arouse interest for the discipline in the class (q. 9)</td>
<td>4.6, St.Dev.= 0.7</td>
<td>0.2*</td>
<td>4.5, St.Dev.= 0.8</td>
<td>0.4*</td>
</tr>
<tr>
<td>Give prompt feedback and support students during learning (q. 5)</td>
<td>4.5, St.Dev.= 0.7</td>
<td>0.1*</td>
<td>4.5, St.Dev.= 0.9</td>
<td>0.5*</td>
</tr>
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<td>Define intended learning outcomes in every course they teach (q. 2)</td>
<td>4.4, St.Dev.= 0.8</td>
<td>0.1</td>
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<td>0.3</td>
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</tbody>
</table>

*significant

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Scales                                                                 | L: General | M: Δ(G-P) | L: General | M: Δ(G-P) |
<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Constructive alignment (q. 1, 2, 3)</td>
<td>4.40</td>
<td>0.13</td>
<td>4.53</td>
<td>0.36</td>
</tr>
<tr>
<td>Pedagogy, Interactive teaching</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>competence teaching (q. 9, 10, 15)</td>
<td>4.07</td>
<td>0.23</td>
<td>4.10</td>
<td>0.36</td>
</tr>
<tr>
<td>Pedagogy, Learning facilitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitation discipline specific learning (q. 4, 12, 13)</td>
<td>4.27</td>
<td>0.35</td>
<td>4.28</td>
<td>0.33</td>
</tr>
<tr>
<td>Deep learning (q. 5, 7, 8, 11)</td>
<td>4.21</td>
<td>0.22</td>
<td>4.17</td>
<td>0.45</td>
</tr>
<tr>
<td>Technology, Facilitative teaching</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>use of digital tools with a specific goal (q. 17, 25, 26, 29, 30)</td>
<td>3.13</td>
<td>0.40</td>
<td>3.49</td>
<td>0.58</td>
</tr>
<tr>
<td>Blended learning (q. 20, 24)</td>
<td>3.63</td>
<td>0.30</td>
<td>3.76</td>
<td>0.41</td>
</tr>
</tbody>
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Questionnaire Part 2 – attitudes (17 statements)

Four most important attitudes (personal characteristics)

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<tr>
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<th>Educational managers</th>
<th>Discrepancy Δ(G-P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspire a positive attitude in their class (q. 3)</td>
<td>4.6, St.Dev.= 0.7</td>
<td>0.2</td>
<td>4.5, St.Dev.= 0.9</td>
<td>0.3</td>
</tr>
<tr>
<td>Be reflective teachers and reflect about their courses / lectures. (q. 1)</td>
<td>4.5, St.Dev.= 0.7</td>
<td>0.2*</td>
<td>4.4, St.Dev.= 0.9</td>
<td>0.4</td>
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<td>Use students evaluations and the feedback of students to improve courses. (q. 6)</td>
<td>4.5, St.Dev.= 0.8</td>
<td>0.2*</td>
<td>4.5, St.Dev.= 0.9</td>
<td>0.3</td>
</tr>
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<td>Be interested in their students' progress. (q. 5)</td>
<td>4.4, St.Dev.= 0.8</td>
<td>0.2*</td>
<td>4.4, St.Dev.= 0.9</td>
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Questionnaire Part 3: CPD activities (19 statements)

Four professional development activities that work best according to lecturers and educational managers

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<td>Giving mentoring to a junior lecturer, (q. 17)</td>
<td>3.8, St.Dev. = 1.0</td>
<td>0.7*</td>
<td>3.9, St.Dev. = 1.2</td>
<td>0.8*</td>
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<td>Getting peer-feedback on own teaching practice from a colleague, (q. 12)</td>
<td>3.7, St.Dev. = 1.0</td>
<td>0.8*</td>
<td>3.8, St.Dev. = 1.1</td>
<td>1.0*</td>
</tr>
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<td>Getting mentoring from an experienced colleague, (q. 15)</td>
<td>3.7, St.Dev. = 1.1</td>
<td>0.9*</td>
<td>3.8, St.Dev. = 1.2</td>
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<td>Attending presentations about teaching approaches, (q. 2)</td>
<td>3.7, St.Dev. = 1.0</td>
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Results show:

- Lecturers and educational managers mostly show the same highest priorities
- Educational managers have higher discrepancy between general importance and programme practice (reality)
  => Feel higher urgency for CPD
- Most scattering in Part 3 and lower values
  => there is not much (diversity in) CPD activities yet
- Grouping of statements helps to define / understand the needs for CPD better.

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Roadmap Recommendations and Guidelines

1. Organize local CPD activities
2. Promote student and CPD participant centred learning
3. Follow Constructive Alignment and TPACK approach
4. CPD-Ambassadors support three dimensions of STEM-CPD
5. Train CPD-Ambassadors in the STEM-CPD Summer Schools
6. STEM-CPD community support for the sustainable development of teaching and learning in HE STEM disciplines

ECTN Special Interest Group STEM-CPD

- Associative members
- Followers

Welcome to join!

ECTN website: http://ectn.eu

Work groups > Lecturing Qualifications and Innovative Teaching Methods

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