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Sustainable summer school

for CPD Ambassadors
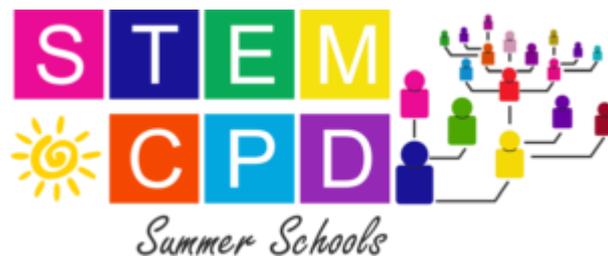
http://ectn.eu/work-groups/stem-cpd/

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Introduction

Through the Summer Schools, the project brings a broad spectrum of learning opportunities to participants and their institutions in order to not only improve the quality of education in STEM disciplines, but also that of learning and teaching practices in general.

Our unique European summer school format is based on the STEM-CPD framework – "*The summer schools develop the CPD-Ambassadors in three dimensions: competencies, attitudes and use of different types of CPD activities. The content of the summer school is determined by the needs of the CPD-Ambassadors. The course design of the summer schools is based on Constructive Alignment (Biggs and Tang, 2011), using co-creation activities and community of inquiry approach. The summer schools have in several aspects a flipped classroom approach. The participants have to prepare for the event in advance and need to submit a proposal about their user case to be allowed to follow the summer school*" (STEM-CPD Framework, 2021).

The central element of this framework is the CPD-Ambassador. We assume that the development of competences necessary for CPD - Ambassadors activities should start in the form of a summer school whose attendees will be university lecturers (staff teaching students employed in any position) who will return to their home universities to organize STEM-CPD activities among their peers. The participants coming from different countries will share their experience in the field in a European and international context.

The format of the summer schools enable an autocatalytic cascade process, where the *learners of today will become teachers of tomorrow* promoting continuous professional development (CPD) in teaching. The CPD-Ambassadors will bring a change in their local organization using different scenarios and methodologies acquired at the summer schools and this will lead to both improvement of the teaching skills of the local staff and the quality of the BSc and MSc level courses at their institution and have a positive impact on the learning outcomes of the participating students.

At the summer school the CPD-Ambassadors gain knowledge, receive relevant material and produce their own resources to organize CPD activities at their home universities, the so-called user cases. They will stay in contact with their summer school staff and peers and get (peer) feedback. In this way, the summer school peers will form a community of practice which will last beyond the event.

In these schools we wish to address strategies to incentivize excellence in university STEM teaching for example by evidence based course design using educational action research practice.

In particular, the value of this approach can be envisaged in:

· Setting up an international network in order to connect and stay connected to a continuously growing community focused on CPD that will allow the exchange of knowledge and experiences on pedagogical content knowledge;

· Ongoing improvement of teaching practices by acquiring the understanding of scientific teaching and thus boosting the implementation of such practices;

· Developing a solid understanding of pedagogical content knowledge teaching skills thus practicing a more student-centered teaching;

· Having a greater sense of self-efficacy as a teacher.

The concept of the summer school based on CPD-Ambassadors is transferable to any discipline in higher education.

Recruitment process/Participants

Academics participating in the "STEM CPD summer schools" will be selected from the teaching staff according to the interest shown to become CPD-Ambassadors and develop their teaching competences, share new knowledge and skills with peers and organize STEM-CPD activities at their institution.

Content, objectives, timetable and requirements to participate in the training and summer schools will be published beforehand and lecturers can apply to attend. Applications can be submitted on the webpage portal or through local contact points. For participation, equal possibilities for all interested partners are secured, including gender and disabled persons. The organizing host, together with the steering committee will conduct a pre-selection process. The main elements of this will be based on the motivation to attend the summer school given by the applicant. All steps of the selection will be transparent and fair.

The number of participants should be appropriate to the purpose, working conditions and the teaching and learning methods used. Too many may make it difficult to use effective methods based on participants' activity, discussion, work in small groups.

List of intended learning outcomes of the summer school based on the Roadmap recommendations.

The main goal of the summer school is to promote active student-centred teaching and learning practice and person-centred Continuous Personal Development, as well as to stimulate cooperation in a sustainable way via the CPD-Ambassadors community.

These two general objectives have been operationalized in the form of the learning outcomes of the summer school developed according to the Roadmap recommendations (Roadmap, 2021). Learning outcomes include abilities to:

1. **Organize local CPD activities**: to define challenge for own user case, to design a CPD scenario, to use b-learning approach (combining online educational materials and interaction with traditional classroom based teaching and learning methods), to propose limitations and advantages of different CPD activities;
2. **Promote student and CPD participant centred learning** based on learner autonomy and independence, focused on skills and attitudes that enable lifelong learning and problem-solving;
3. **Apply Constructive Alignment approach**: to choose STEM teaching and learning methods in line with intended learning outcomes as well as their evaluation methods and techniques, to apply these in CPD activities;
4. **Apply TPACK** (technological pedagogical content knowledge) approach, to design learning activities in flipped classroom, to propose elements of a µMOOC that assure online active learning;
5. **Support three dimensions of STEM-CPD**: development of teaching competences, development of teaching attitudes, development of CPD activities;
6. **Stimulate and enable cooperation** in a sustainable manner via CPD-Ambassadors community, to describe who is CPD-Ambassador and his/her mission, to justify the need of collaboration in education and CPD programme, to create proper conditions for this.

Learner-centered education puts learners' interests first: learners choose what they will learn, how the learners will learn, and how the learners will express their achievement of learning outcomes.

Constructive alignment requires from a course a design in which intended learning outcomes, learning activities and assessment are aligned with each other (Biggs, 2011).

The TPACK model told us that teaching is most effective when content knowledge (CK), pedagogical knowledge (PK) and technological knowledge (TK) are applied in an integrated way (Mishra and Koehler, 2003). Framed on TPACK methodology, the events will constitute a unique way of delivery and acquisition of knowledge on integration of digital technologies in the classroom, which will benefit the participants by offering novel teaching and learning methods and pedagogics.

Description of the instructional design of the activities of the summer school based on the active learning and co-creation approach

The Summer School study programme should be based on active learning and be designed according to constructive alignment principle and TPACK (Technological Pedagogical Content Knowledge) model. The Summer School should offer interactive workshops and training sessions, collaborative groups, and discussion.

1) During **group work**, lecturers will discuss and refine proposals for teaching improvements to be implemented in their practice. Each group would be led by a moderator, who will organize peer-feedback as well as provide suggestions and directions for the design of the proposals.

The aims of the group work can be summarized as follow:

- collaboration and co-creation
- designing and developing user cases
- sharing good practices

2) **Workshops** are interactive sessions guided by a leader focused on methods and tools that will inform the CPD proposal. The aim is basically to develop skills and ideas in the use of specific educational tools to be applied in every-day teaching practice as well as CPD.

- how to use results from research to design student/person-centered activities;
- how to stimulate the wide use of innovative tools (by STEM teachers) that support active learning, critical thinking and promote learning to reach deep understanding or support mastery learning;
- organize meetings with guests who present the use of specific digital tools (e.g., tools to prepare before lectures or laboratory sessions, to bridge their own (pre-) knowledge gaps on their own pace);
- how to design CPD activities based on the TPACK model;

3) **Interactive presentations** by international experts will provide the theoretical bases to ground the teaching proposals.

4) **Discussion sessions** will be held concerning different pedagogies, their benefits and drawbacks based on educational research.

Description of assessment approaches/methods for monitoring and assessment of development of competences of participants of the summer schools

A key moment of a summer school should be assessment, to make aware the future CPD Ambassadors of their teaching skills, before and after the summer school.

Several tools could be proposed:

- Questionnaires
- Quizzes
- User cases development and peer feedback
- Reflective diary
- Reports
- Rubrics

Self-evaluation is also a very important element in the development of CPD-Ambassador.

"Reflection is a process of reviewing an experience of practice in order to describe, analyse, evaluate and so inform learning about practice" (Reid, 1995). A reflective journal is defined as the "written documents that students create as they think about various concepts, events, or interactions over a period of time for the purposes of gaining insights into self-awareness and learning" (Thorpe, 2004).

Rubric is a set of criteria for evaluating assignments (knowledge and/or skills), which usually contain evaluative criteria and description at particular levels of achievement. An example of assessment tool for user cases development could be the following peer-evaluation rubric:

	Unacceptable (0/10)	Poor (3/10)	Satisfactory (6/10)	Excellent (10/10)
Presentation of the user case	The user case presentation was only drafted	The main characteristics and objectives were presented but not enough in details	Characteristics and objectives were clear but proposed implementation is only partially explained	Characteristics and objectives were clearly exposed together with the implementation strategy
Expected impact of the user case	The impact of the user case is not present	Only a general impact was considered, not framed to the local institution	The impact was described and framed to the local institution, but no schedule was provided	A detailed schedule was provided, including the description of the impact and the frame to the local institution
CPD goals	CPD goals are not described	CPD goals are described but the expected impact of the user case are only drafted	CPD goals are described and the impact well framed, but they are not aligned to the local environment	The planned CPD activities are related to the teaching practice/workspace learning.

The evaluation protocols and assessment methods suggested, developed in cooperation with O6, are available at https://ectn.eu/wp-content/uploads/2021/06/Evaluation-Protocol_general-document_30.06.2021.pdf).

The details about the evaluation protocol are reported below.

EVALUATION PROTOCOL: List of questions			
No.	EVALUATION QUESTION	INDICATORS	Tools	Questions asked to the respondents
1.	**How efficiently was a summer school for CPD Ambassador organized?**	1. Participation (%) 2. Rate of dropout 3. Participants satisfaction 4. Relevance of covered topics	Questionnaire Lists of attendance (online / physical)	• Do you feel more confident about your teaching skills? • To what extent the summer school will affect your daily practice as an academic teacher? • Content: to what extent was it new? Versatile? Relevant? • How applicable is the gained knowledge to your teaching practice? • To what extent the summer school will affect your daily practice as a member of your faculty teaching staff community? • Do you feel prepared to be a CPD-Ambassador at your institution after the summer school? • Did you establish any valuable contacts? • Do you think there was enough interaction with other colleagues? • Would you recommend your colleagues to participate in such summer school? • Access (depends on whether online or onsite) • Rate the general organization of the school. • Rate the technical organization of the school. • Indicate your average attendance of the school. • What is your main take-home message after attending the school?
2.	**What is the level of learning success of Summer school Participants?**	Number of certificates	IO 5 & IO 6 collected data Reflective diary Report of given actions (e.g. providing MOOC)	• What are the CPD activities you would like to organize at your home institution? • Have you already developed a CPD user case and scenario to be used at your home university? • Do you plan to work in cooperation with other colleagues? • Do you have an idea about how to measure the impact of the CPD activities?

Design of the CPD-Ambassador certificate

Criteria to attribute two different certificates were developed. Within the summer school, it shall be attributed:

- Summer School participation certificate,
- CPD-Ambassador certificate.

In particular, the participant of the Summer School who attended at least the 70% of the activities (either onsite or online), including both lecturing and hands-on activities, will be awarded the **Summer School participation certificate.**

CPD-Ambassador certificate will be awarded after an evaluation process having specific goals. In particular, the participant must demonstrate to be an active part of CPD activities in their local environment. With the contribution of O3-O5-O6 meetings, the CPD activity that the participant shall fulfil is related to the development (and possible realization) of the User Cases and their correct upload on Starfish platform.

User Case description shall be correctly defined and in line with the Summer School ILOs, taking into account all the following points:

- Are all required parts of user case uploaded on Starfish?
- How relevant is the challenge (general importance)?
- How realistic are the local context and the goals described?
- How logical are the CPD activities set up and described in time?
- Is the expected impact described?

Collection of materials for summer school

Summer school's teaching and learning materials will include examples of scenarios and user cases developed by its participants. All materials will be available online when needed and openly available. The format of the materials for the participants of the summer school will be documents to be read and/or videos and assignments.

Programme of the summer school and description of the sessions

The design of the summer school is based on the *train the trainer* approach and *co-creation*. In this framework, the program of the summer school will address different issues with different goals:

● impart innovative active teaching methods for STEM university practice in order to inspire the CPD-Ambassadors to try them out in their local universities. Discussion sessions will be held about different pedagogies, their benefits and drawbacks based on educational research.

● put into practice train-the-trainer methodologies and work in co-creation in order to empower the CPD-Ambassadors to be able to transmit TPACK to their colleagues

● develop strategies to organize CPD activities at local universities, tuned to the specific local situation.

● strategies to incentivize excellence in university STEM teaching such as evidence based course design using educational action research practice.

To match the heterogeneity of the participants and their home university situations, summer schools will have two different kinds of topics / levels to choose from: basic/general and advanced/specific. The design of the summer school will allow the participants to define for themselves which level of topics to choose.

The format of the Summer School program is here reported, together with a proposal of practical organization in order to take into account the ILOs and the workload of each session. The order of the sessions is not random.

Get together event: crucial to ice-breaker and to create the foundation of the community of learners participating in the summer school.

Session 1 challenges (problems) in T&L at STEM faculties, STEM-CPD@EUni roadmap,

Intended learning outcomes – a participant will be able to:
- tune personal goals for the Summer School considering the expectations of participants
- describe who is CPD-Ambassador and his/her mission
- explain aim of CPD user cases
- define challenge for own user case
- apply TPACK approach in designing teaching and CPD activities

Proposed activities: presentation, groupwork (using miro board), brain-storming session, watching knowledge clip, assessment activity

Session 2 CPD user cases and scenarios

Intended learning outcomes– a participant will be able to:
- describe different kind of CPD activities
- define limitations and advantages of different CPD activities
- design a user case, which is based on a local teaching and/or learning challenge

Proposed activities: presentation, groupwork (using a board- padlet), assessment activity

Session 3 Collaborative learning

Intended learning outcomes– a participant will be able to:

- justify the need of collaboration in education and CPD programme
- explain factors to be considered with group work in STEM
- create proper conditions for effective collaboration
- stimulate and enable cooperation in a sustainable way via CPD-Ambassadors community

Proposed activities: presentation, groupwork, brain-storming session, cooperative learning, watching knowledge clip, use of digital tools (a board - padlet, survey – mentimeter) , assignments, assessment activity

Session 4 SCL

Intended learning outcomes– a participant will be able to:
- compare deep and surface approaches to learning
- recognize your own approach to teaching
- explain the difference between student-centered learning and teacher-centered learning
- discuss advantages and disadvantages of both paradigms in higher education
- design in cooperation with other lecturer activities for local faculty concerning SCL (student centred learning) and TCL (teacher centred learning)
- promote active student-centred teaching and learning practice and person-centred CPD
- recognize the features of the teaching model based on constructivist assumptions
- describe advantages of constructivism approach in teaching
- re-design science education scenario according to constructivism and IBST&L
- design in cooperation with other lecturers activities for your faculty concerning constructivism and IBST&L

Proposed activities: presentation, groupwork, brain-storming session, cooperative learning, use of digital tools (a board- linoit), assessment activity

Session 5 Course design, constructive alignment

Intended learning outcomes:
- describe the application of constructive alignment in course and CPD activities design
- explain the role of ILOs in effective teaching and learning
- prepare rubric as formative and summative evaluation tool
- be aware of the importance of external factors in curriculum design
- be able to explain and justify study program concept and structure

Proposed activities: presentation, groupwork, cooperative learning, use of digital tools (a board – padlet, survey), assessment activity

Session 6 Digital technology & b-learning design

Intended learning outcomes:
- describe what are the benefits of blended learning course design compared to face-to-face or online course design
- design learning activities in flipped classroom format using TPACK approach
- analyse course design from the learning type perspective
- explain elements of online active interactive courses

Proposed activities: presentation, groupwork, use of digital tools (a board - miro, Starfish) assessment activity

Session 7 How to design mMOOC?,

Intended learning outcomes:
- argue for the use μMOOCs in professional development of lecturers providing its reasons and benefits'
- design structure of interactive online presentations aiming for professional development
- describe designing elements for μMOOC
- propose elements of a μMOOC that assure online active learning

Proposed activities: presentation, groupwork, use of digital tools, hands-on activities, assessment activity

Session 8 Development of user cases,

Intended learning outcomes:
- design a user case, which is based on a local teaching and/or learning challenge

Proposed activities: presentation, groupwork, survey, assessment activity

Session 9 Presentation of the user cases,

Intended learning outcomes:
- describe (the idea of) the local user case in a structured way
- present challenges and goals of a user case
- peer evaluate and assess a user case

Proposed activities: presentation of the user cases, groupwork, peer- assessment of the user cases, forum

Advanced sessions

Session Teaching in Laboratories

Intended learning outcomes– a participant will be able to:
- discuss with peers different approaches to work with students during on laboratory sessions
- explain the role of an assistant at laboratory classes as well as the influence of collaboration between assistants and their continuous training
- design effective construction of a laboratory exercise

Proposed activities: presentation, groupwork, brain-storming session, cooperative learning, use of digital tools (a jamboard), assessment activity

Session Designing a study programme curriculum

Intended learning outcomes– a participant will be able to:

- identify the importance of external factors in curriculum design.
- explain and justify study program concept and structure

Proposed activities: presentation, open discussion

The 1st summer school programme is presented below.

When	What	Description	Who
		Sunday	
18^{00} – 19^{00}	Registration		
19^{00} – 21^{00}	Ice-breaking event, introduction to the project		
		Monday	
9^{30} – 11^{00}	*Session 1.1*	*Challenges in Teaching and Learning in HE, p. 1*	Nataša Brouwer
Coffee break			
11^{30} – 13^{00}	*Session 1.2*	*Challenges in Teaching and Learning in HE, p. 2*	Nataša Brouwer
Lunch break			
Visiting Museum of the Faculty of Chemistry and our roof garden *(facultative)*			Bartosz Trzewik
14^{00} – 15^{30}	*Session 2.1*	*Previous experience about CPD – pros and cons of different activities*	Matti Niemelä, Johanna Kärkkäinen
15^{30} – 16^{00}	Coffee break		
16^{00} – 17^{30}	*Session 2.2*	*How to design user cases and scenarios? Exchange of examples from the project participants*	Matti Niemelä, Johanna Kärkkäinen
		Tuesday	
9^{30} – 11^{00}	*Session 3.1*	*Collaborative teaching and learning and CPD activities, p. 1 – Can't I do it myself?*	Iwona Maciejowska
11^{00} – 11^{30}	Coffee break		
11^{30} – 13^{00}	*Session 3.2*	*Collaborative teaching and learning and CPD activities, p. 2 – Change is the only constant*	Iwona Maciejowska
13^{00} – 14^{00}	Lunch break		
13^{30} – 14^{00}	Visiting NMR research laboratory *(facultative)*		Bogdan Musielak, Damian Muszak
14^{00} – 15^{30}	*Session 4.1*	*Shift from teaching to learning in higher education. Student-centered learning approach*	Anna Wach
15^{30} – 16^{00}	Coffee break		
16^{00} – 17^{30}	*Session 4.2 a/b*	*(a) Constructivism and inquiry-based science education*	Anna Wach
		(b) Teaching Science in Laboratory	Michał Woźniakiewicz
		Wednesday	
13^{30} – 14^{00}	Lunch break		

_13^{45} – 14^{00}_		Use of self-made 3D models in chemistry education – short presentation _(facultative)_	Paweł Bernard
_14^{00} – 15^{30}_	_Session 5.1 a/b_	_(a) Why to use Constructive alignment approach in student T&L and CPD?_	Jacek Francikowski
		(b) Designing a study programme. Link between BSc and Msc study cycles	Marek Frankowicz
Coffee break			
_16^{00} – 17^{30}_	_Session 5.2_	_How to achieve ILOs? activities and evaluation (rubrics, peer assessment)_	Jacek Francikowski
Tuesday			
_9^{30} – 11^{00}_	_Session 6_	_Blended and online learning course design_	Nataša Brouwer
Coffee break			
_11^{30} – 13^{00}_	_Session 7_	_How to design a mMOOC?_	Črtomir Podlipnik
Lunch break			
Visiting the Laboratory for Forensic Chemistry _(facultative)_			Michał Woźniakiewicz
_14^{00} – 15^{30}_	_Session 8.1_	_Development of user cases – work in groups (1)_	
Coffee break			
_16^{00} – 17^{30}_	_Session 8.2_	_Development of user cases – work in groups (2)_	
Friday			
_9^{30} – 11^{00}_	_Session 9_	_First approaches to local user cases (sketch) – participants' presentations, peer-review_	Vincenzo Russo Oreste Tarallo
Coffee break			
_11^{30} – 13^{00}_	_Session 10_	_Plans for the future, evaluation of the summer school, closing remarks_	Aleksandra Lis Iwona Maciejowska
Lunch break			
_13^{30} – 14^{00}_		Visiting student laboratories _(facultative)_	Lucjan Chmielarz

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