



Evaluation Protocol

Guideline for evaluation

STEM-CPD@EUni Intellectual Output 6

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STEM-CPD@EUni



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Introduction

Evaluation is a key element in educational projects as it enables us to measure progress and enhance accountability for intended in the project intellectual outcomes. In the STEM-CPD@EUni project, it allows the evidence-based development of the proposed activities as well as supplying data for their refinement and adjustment, and ultimately provides recommendations and guidelines for similar initiatives in the area of professional development in higher education. The aim of the STEM-CPD@EUni project is the development of TPACK competences of the European university STEM lecturers who wish to become CPD-Ambassadors and return to their home universities to organize STEM-CPD activities among their peers, improving the quality of the courses, to equip them with the skills and tools for planning, promotion, organization and evaluation of CPD activities, and establishing an international Community of CPD Ambassadors as a community of Learners/Practitioners.

The STEM-CPD@Euni project design is based on the ADDIE model for instructional process design. This process contains five steps: analysis, design, development, implementation and evaluation.¹ Hence, the evaluation planned is more than a usual project effects evaluation at the managerial level. Using the ADDIE model we can monitor and evaluate the whole project through all its phases from different perspectives, the managerial part is only one of these. It is part of the whole process plan and a source of feedback for this project and other similar initiatives in the area of continuous professional development in higher education. Figure 1 presents the project's evaluation design, following described principles.

¹ Molenda, Michael. "In search of the elusive ADDIE model." *Performance improvement* 42.5 (2003): 34-37.

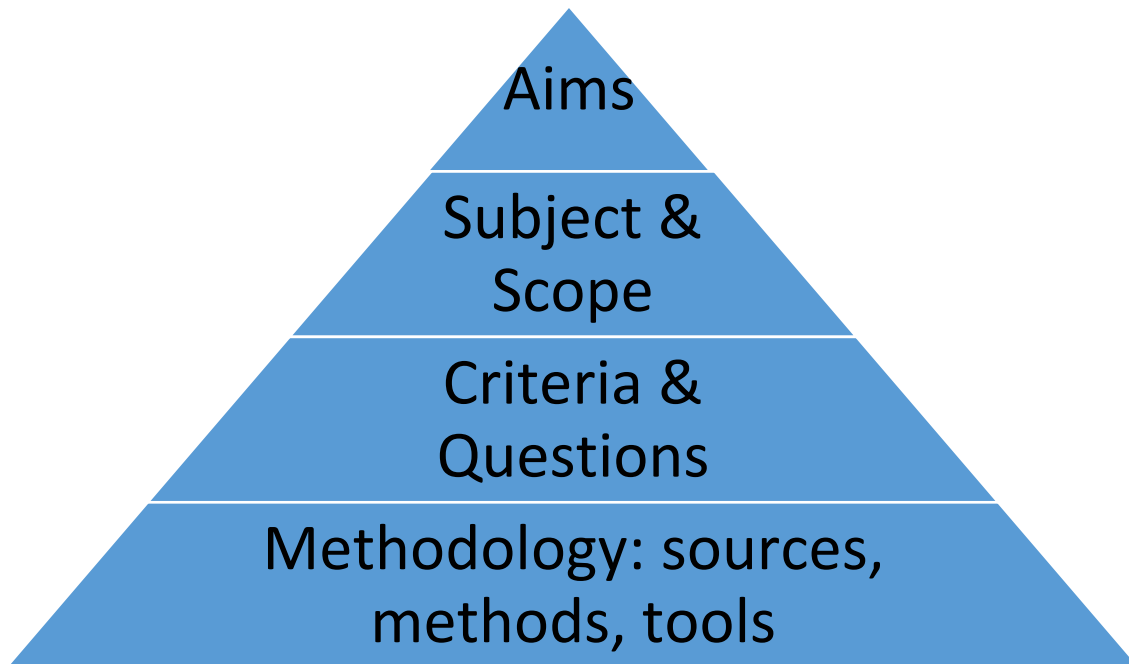


Figure 1. STEM-CPD@EUni evaluation design

A series of evaluation tools will be developed and put into practice. Through the evaluation of Summer Schools and local CPD User Cases, we will proceed according to a data collection protocol and perform analysis in order to allow a greater understanding of STEM-CPD at higher education institutions. Based on the analysis in cycle 1 (summer school 1) improvements of the outcomes will be carried out for cycle 2. To support evidence based development, we will prepare guidelines and evaluation forms for partners on how to collect data from the local CPD activities to assure that the results are comparable. The qualitative methodology and case study method will be used. Analysis of STEM-CPD user cases and scenarios and the evaluation of the first summer school will create inputs for the second summer school, the design of CPD activities and a list of practical recommendations. Figure 2 presents the scheme of summer school evaluation.

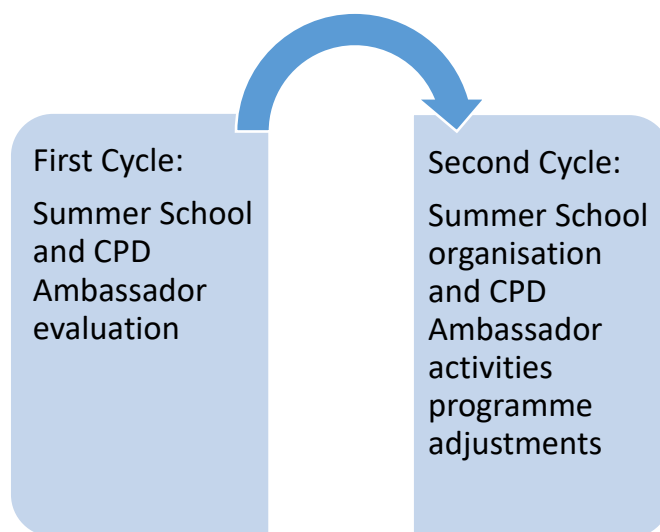


Figure 2. Summer school evaluation scheme

The development and description of the sustainable framework for continuous professional development for STEM university lecturers based on the principles of train-the-trainer approach and co-creation is one of the main objectives and results of this project. It will be a handbook of STEM-CPD for the CPD Ambassadors which includes a graphical representation (model) of the sustainable STEM-CPD framework, evidence based (on literature and on experiences from the project), i.e., description of typical didactic structures of the CPD activities. The handbook will also describe the EU CPD programme profile-based on the collected CPD scenarios and user cases and (specific) STEM-lecturers (example of university chemistry) and the CPD-Ambassador certification framework. In the position paper “The Need for STEM Continuous Professional Development at European Universities” (Brouwer, 2020) we have given our argument for this framework for STEM-CPD according to the CPD-Ambassador principle. The effect of the STEM-CPD framework will be evaluated on four levels according to the Kirkpatrick and Kirkpatrick (2016) approach and by using different evaluation tools or monitoring qualitative and quantitative indicators relevant for a specific level.



The main indicators to be checked are:

- Number of higher education lecturers and other teaching staff involved in STEM-CPD activities at different European universities
- Number of CPD-Ambassadors involved in developing and sustaining STEM-CPD at their universities (Kirkpatrick level 3)
- Number of certifications issued to CPD-Ambassadors (Kirkpatrick level 2)
- Levels of completion of activities (e.g., microMOOCs) with feedback from end-users (Kirkpatrick level 2)
- Satisfaction rate among Summer School participants measured with two indicators: expectation fulfilment and self-assessment improvement immediately after the Summer School (Kirkpatrick level 1)
- Impact on CPD at local universities of CPD-ambassadors. Survey for (or interview with) CPD-ambassadors at participating universities after 6 months to one year after the Summer School about the impact of their User Cases on professional development and quality of education at the local level (Kirkpatrick level 4)
- Level of satisfaction of participants regarding the STEM-CPD working sessions and training materials used, based on the surveys taken after the summer schools. The indicator will be checked on the 4 level scale to avoid neutral answers.
- Quality of digital open educational resources produced (microMOOCs, STEM-CPD scenarios and user cases)
- Efficiency of dissemination in terms of number of articles published; number of events organized; number of visitors to website

The evidence-based evaluation approach driving/guiding the process of STEM-CPD in higher education described in intellectual output 6 is transferable to other disciplines. Criteria and instruments will be developed taking the example of chemistry, which can be transferred to any of the other STEM disciplines. Moreover, this approach can be transferred widely to any CPD programme at any university in the world.



We expect that the evidence-based evaluation on different levels in the project will result in:

1. effective high quality Summer Schools that meets expectations of participants and different stakeholders (measured with Kirkpatrick 4 levels and ADDIE approach)
2. insight into the elements needed for effective STEM-CPD within a specific university context
3. recommendations on STEM-CPD at European universities

Evaluation objectives

The main goal for the evaluation is to provide comprehensive feedback on the effectiveness of CPD in STEM disciplines. We have used the ADDIE model² and Kirkpatrick's model³ of four level evaluation to provide a complete picture of the effects of CPD activities on lecturers, their day-by-day teaching and on their institutions. Therefore, the four levels of evaluation in STEM-CPD@EUni project are oriented on our Ambassador training programme and include:

1. **Evaluation of the experience/satisfaction of the participants of the CPD summer schools.**
2. **Estimation of the learning success of the summer school participants (two editions).**
3. **Estimation of the application of the gained knowledge by the CPD-Ambassadors in their local university practice.**
4. **Estimation of the impact of the CPD activities implemented by the CPD-Ambassadors on the local teaching practice.**

² Molenda, M. "In search of the elusive ADDIE model." Performance improvement 42.5 (2003): 34-37

³ Kirkpatrick, J. D., & Kirkpatrick, W. K. (2016). Kirkpatrick's four levels of training evaluation. Association for Talent Development



Target audiences

Different products prepared within the evaluation process of STEM-CPD will have different target audiences. It is crucial in the evaluation design to define these. Depending on the audience, the main goal of the evaluation documents, as well as their structure might differ. The emphasis for internally targeted documents will be on the development areas and highlighting good practices, whilst the externally oriented documents will focus on recommendations or description of procedures.

Table 1 presents the target audiences for the particular project results in the area of each evaluation item:

Table 1. Evaluation items and their target audiences

No.	Evaluation Item	Target Audience
1	Evaluation Protocol	Consortium Partners, National Agency (NA), other CPD projects
2	Summer School Evaluation Report 1	Consortium Partners, Summer School organizers, broader public: other educational projects, organizers of all CPD Summer Schools that might be take place in the future (ECTN or others).
3	Summer School Evaluation Report 2	Consortium Partners, other Summer Schools organizers, other educational projects
4	Recommendations	NA, policy makers, Summer Schools organizers, universities' authorities, ECTN members



Principles for Quality Assurance for evaluation

We have indicated five principles to the evaluation process that will assure quality.

These address every step of the evaluation process from its design to gathering and analysing data.

1. Carefully designed process
2. Detailed description of evaluation scope and subject
3. Duly prepared evaluation questions
4. Method and tool choice adjust to:
 - Target group
 - Sources of information
 - Evaluation questions
5. High quality of provided tools and analysis

Timeline for evaluation

The evaluation process starts almost immediately with the project and will be executed in two cycles in order to improve the quality of the outputs based on the results of the first cycle. This all put together creates **the 360 degree evaluation process** which will enable development and improvement of STEM-CPD in higher education. That is far more than only continuous evaluation of the project activities, as the final report will contain recommendations on STEM-CPD at European Universities pointing out the key elements of the CPD process, the pitfalls and a handful of possible ways to overcome difficulties that may occur under different working contexts.

Development of the Data collection protocol. This would guide the partners on collecting data to evaluate:

- summer schools (O5),
- user cases (O3) and scenarios (O3),
- MOOCs (O4).

Data collection protocol is the essential part of the project's evaluation protocol and concentrates on one of the most important activities in the evaluation process: plan and guidance for collecting the information needed for the process. The collection of



evaluation data takes place in 4 stages. For each of these stages the instruments have been developed and the activities are planned.

Table 2. Stages and activities planned for evaluation process (O6)

STAGE	SCOPE OF ACTIONS	ACTIVITIES	Timeline
Stage 1	Kick-off evaluation process	O6-1 Evaluation protocol	October 2020 January 2022 Ongoing
Stage 2	Development of instruments needed for evaluation on four levels. Development of the survey questions and criteria for evaluation of the user cases	O6-2 Survey to measure satisfaction of the participants of the summer schools O6-3 Template for evaluation of the user cases (collected in O3) using case study approach	December 2020 February 2021 September 2021
Stage 3	Collection of data at Summer School 1. Analysis of the STEM-CPD user cases (O3) at the universities of the participants of Summer School 1 (O5) (CPD-Ambassadors). Data analysis and preparation of evaluation report, cycle 1.	O6-4 Evaluation report of Summer School 1 and estimation of learning success of participants based on the assessment procedure developed in O5. O6-5-10 evaluation case studies O6-6 Recommendations for improvements of the summer school, STEM-	January 2023 September 2022



		CPD user case template and STEM-CPD scenarios	
Stage 4	<p>Collection of data from summer school 2.</p> <p>Analysis of STEM-CPD user cases (O3) of the participants of summer school 2 (O5) (CPD-Ambassadors)</p> <p>Data analysis and preparation of evaluation report cycle 2</p>	<p>O6-7 Evaluation report cycle 2: evaluation report of summer school 2 (O5), and estimation of learning success of participants based on assessment procedure developed in O5.</p> <p>O6-8 Evaluation of case studies</p>	<p>December 2022</p> <p>March 2023</p>
Stage 5	<p>Preparation of publication based on the evaluation of summer schools, performance measurements of CPD-Ambassadors, and comparative analysis of collected evaluation of case studies.</p> <p>Recommendations about STEM-CPD at European universities.</p>	O6-9 Publication (open access)	June 2023



Deployment of Evaluation

The evaluation will be deployed in three areas of the project activities:

1. Summer Schools
2. User Cases
3. microMOOCs

Summer Schools

To provide the overview of effectiveness of CPD activities for STEM lecturers, we have decided to concentrate on the four areas that correspond to the four levels of Kirkpatrick (2016). The areas of evaluation conducted within the STEM-CPD@EUni project are:

1. Experiences of participants,
2. Learning success of participants
3. Application of knowledge
4. Impact of CPD activities implemented by CPD-Ambassadors

Following this approach, we will be able to provide information on how to efficiently provide CPD activities, check if positive experiences are followed with learning success of participants and how this is applied by lecturers at their home institutions. Finally, adding the fourth area we will be able to address the recommendations to CPD Ambassadors on how to act to achieve the impact at local institutions.

Evaluation questions

In Table 3 are core evaluation questions that correspond to the indicators and the list of questions used in the evaluation forms for the respondents. The majority of questions will be formed as Likert scale evaluation statements but some are set as open questions. This approach will provide information on particular elements of the Summer School and learning process (in the form of statements listed and evaluated on a Likert scale) as well as on individuals' perception of the learning process (open response). Other questions can be added if necessary.



Table 3. Evaluation questions

EVALUATION PROTOCOL: List of questions				
No.	EVALUATION QUESTION	INDICATORS	Tools	Questions asked to the respondents
1.	How efficiently was the Summer School for CPD Ambassador organized? (O5 evaluation)	1. Participation (%) 2. Dropout Rate (if any ☺) 3. Participant satisfaction 4. Relevance of covered topics	Questionnaire (online?) Attendance Lists (online / in person)	<ul style="list-style-type: none"> ● Do you feel more confident about your teaching skills? ● To what extent do you think the Summer School will affect your daily practice as a lecturer? In what way? ● Content: to what extent was it new? Versatile? Relevant? What was new for you? ● How do you think the gained knowledge and skills could be applicable to your teaching practice? ● To what extent do you think the Summer School will affect your daily practice <u>as a member of your faculty teaching staff community?</u>



				<ul style="list-style-type: none">● 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 a Summer School? Why?● How do you rate the access to T&L material?● Rate the general organization of the Summer School.● Rate the technical organization of the Summer School.● What can be improved in any aspect of the Summer School? (e.g. organization, technical, social, content,...)
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				<ul style="list-style-type: none"> ● Indicate your average attendance of the Summer School. Number of sessions attended. ● What is your main take-home message after attending the Summer School?
2.	<p>What is the level of learning success of Summer School Participants?</p> <p>(input form O1 and O5)</p>	Number of certificates	<p>O 3, O 5 & O 6</p> <p>collected data</p> <p>Reflective diary</p> <p>Report of given actions e.g., providing MOOC, User cases</p>	<ul style="list-style-type: none"> ● What are the CPD activities you would like to organize at your home institution? ● To what extent have you developed a CPD user case to be used at your home university? <p>The real effects (Kickpartick levels 3 and 4) of the Summer School will be obvious only after a year (or more) - when the participant will be able to use his/her knowledge gained at the Summer School. i.e., benefits will be shown after application of the</p>



				gained knowledge in the practice.
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Gathering information strategy

We will gather data throughout the whole event. The self-evaluation and expectations questions will be delivered twice – at the beginning and at the end of Summer School. Moreover, the daily evaluation form will be produced and given to the participants to gather immediate response on the participants' reaction on the training, especially the speed and relevance of the offered courses.

Multiple response - a frequency analysis for data which includes more than one response per participant (limited number and straightforward questions) online forms to be submitted after 6-12 months from the end of the school.

The CPD-Ambassadors at the Summer School will get a certificate based on the assessment of their competence in accordance with the evidence material produced.

User cases & scenarios

The evaluation will be carried out in three layers, each having specific goals:

- Layer 1: Personal experience of authors
- Layer 2: User case quality based on quality criteria and peer-evaluation
- Layer 3: Implementation of User case in the local education practice

Below we present some suggestions of the type of the questions that we could ask at each of the three layers

Layer 1:

Personal experience of each author of the user case

Feedback: (1) name one or two positive points about how the development of user case was organized at the Summer School; what was most inspiring for you? (2) give one tip on how to improve the development (process) of user cases at the Summer School

Reflection: (1) what was your contribution in your team to the development of your user case? (2) how are you satisfied with the development process of your user case in your team?



Feed forward: (1) what will be your role in the further development and implementation of the user case at your university? (2) What (associated with the user case) are you going to do first when you return to your university from the Summer School? (3) Are you going to share your Summer School experience with anybody at your university? If yes, with whom?

Layer 2:

User case: quality of description

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?

Peer evaluation of user cases (during Summer School)

Background and design: Peer assessment should be undertaken before the first Summer School. It should be short and concise, ideally possible to complete in 10 minutes or less. Each participant should evaluate two or three user cases. The questionnaire should use the 5-levels Likert-like scale with assigned assessment categories: Strongly Agree, Agree, Neither Agree or Disagree, Disagree, Strongly Disagree. The evaluation will not be provided anonymously.

Except for the questionnaire, open questions after each section for comments and remarks shall be developed. The template for the user cases evaluation is an Appendix to the protocol.

Layer 3:

User case - degree of implementation in the local teaching practice

4 to 6 months after the 1st Summer School (December 2021): What is the state of the user case development? Has some implementation started?

After 6 months after the 1st Summer School (April 2022): What is the state of the user case implementation? Can you already notice some impact?



microMOOCs

The development of the microMOOCs follows the ADDIE course development approach in three cycles. The evaluation process (the E in ADDIE) for microMOOCs will be organized first as peer-review inside the consortium (see Appendices). After the peer-evaluation, authors have the opportunity to improve their open online course where applicable by analysing the results (D and D of the ADDIE). The second improved microMOOC will be provided to broader audience on the MOOC platform (I of the ADDIE), openly to participants outside the consortium and outside the partners' institutions for the first time and the feedback from the participants will be analyzed and used to introduce any improvements (third ADDIE cycle). After this the evaluation form will remain a part of the open online course.

The evaluation of the microMOOCs will be standardized by using the same template for all microMOOCs in the project to provide the consortium feedback during the piloting phase and before releasing courses to a broader audience. Later the evaluation forms will be part of all microMOOCs as long as they are used. Using the guidance and previous experiences, Partners are developing online tools to evaluate the participants' experience right after taking the course (e.g. UvA: https://uva.fra1.qualtrics.com/jfe/form/SV_0BxwLWBx595i4aG)



Table 4. Evaluation of MOOCs template

EVALUATION SHEET FOR microMOOCS AT STEM-CPD@EUni			
PROJECT: SPECIMEN			
Title of the microMOOC:			
Link to the microMOOC (or how/where it is available):			
Specific question(s) dealing with the content of the microMOOC (up to three questions required)			
Evaluation:			Evaluators:
Please take special care of: <i>(answers on scale 1 to 5, where 1 = "not at all"; 5 = "absolutely")</i>			



- How interactive is the microMOOC?			
- How motivated were the participants to progress and finish the microMOOC?			
- How challenging was the contents for the participants?			
- Is the time frame of the microMOOC appropriate (were you able to finish in the prescribed time?)			
Comments/suggestions/ideas/corrections/challenges for the authors of the microMOOC:			
	<i>(add your initials at the end of the comment)</i>	Agreement of others <i>(put your initials in the box if you agree with the comment)</i>	
1.	The content is... and I could not find... and there was... So, I suggest that the following is added... (XY)	XZ, ZX	



2.			
3.			
4.			



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