

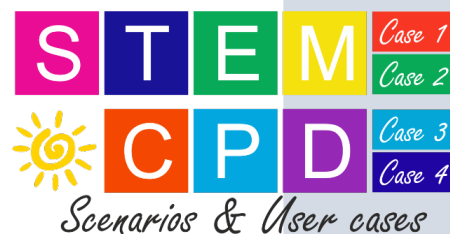
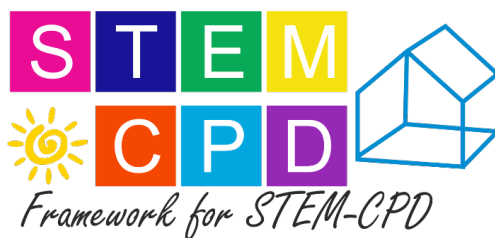


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STEM-CPD@EUni



# HANDBOOK FOR STEM-CPD AMBASSADORS



<http://ectn.eu/work-groups/stem-cpd/>

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## Introduction

This handbook is meant for all of those who have an ambition to promote continuous professional development (CPD) in teaching and learning in higher education. It gives practical advice on how to implement CPD in a local higher education context. This handbook is developed for CPD-Ambassadors in STEM disciplines to support them in implementing CPD activities bottom up.

The handbook contains a selection of materials that are used in the STEM-CPD Summer schools. The handbook has three parts. In the first part we introduce the framework for sustainable continuous professional development in teaching and learning that was developed in the STEM-CPD@EUni project. The second part is devoted to CPD User cases, how to develop User cases and how to collaborate in this on Starfish. In the third part we provide guidelines for sustainable development of User cases.

### 1. STEM-CPD framework

The CPD Ambassadors strongly emphasize the significance of adopting a student-centered teaching and learning approach. The handbook for STEM CPD Ambassadors is rooted in established pedagogical frameworks such as constructive alignment (Biggs, 2011), the TPACK framework (Mishra, 2006), and the Community of Inquiry model (Garrison, 2000).

In this introduction, you will find descriptions of who a CPD Ambassador is, what a CPD User case is, and what the purpose of a CPD Summer school is. Recommendations and tips are provided on how the attributes of the User case can be utilized by CPD Ambassadors in a sustainable way.

#### 1.1 CPD-Ambassador

CPD Ambassadors are lecturers, higher education managers, or others involved in higher education who support the professional development of academic teaching staff. They promote awareness of university teaching competence in STEM or other disciplines, and they explore the CPD needs of fellow lecturers or other teaching staff in a study program. Additionally, they organize professional development activities connected to the local context needs and advocate for CPD as a requirement for sustainable quality of teaching and learning at their institution, while emphasizing its importance in higher education in general. STEM CPD Ambassadors collaborate with each other and share their experiences across programs, institutions, and countries within a community of STEM-CPD Ambassadors created at the STEM-CPD Summer Schools. The guidelines and recommendations for CPD Ambassadors are published in the Roadmap for STEM Continuous Professional Development at European Universities, Recommendations, and Guidelines (Grecea et al., 2021).

#### 1.2 STEM-CPD Summer School

The STEM-CPD Summer Schools are organized to educate CPD Ambassadors. Lecturers or others involved in higher STEM education can apply for a Summer school and become CPD Ambassadors. The STEM-CPD Summer Schools program is based on active learning, and the schools are designed according to the principles of constructive alignment (Biggs, 2011) and the TPACK approach (Mishra, 2006).

During the Summer School, participants develop their own CPD User case to implement it in their educational practice, and they share their CPD User Case on the Starfish platform. Upon successful

completion of the STEM-CPD Summer School, participants receive the CPD Ambassador Certificate. CPD Ambassadors remain connected within the network of CPD Ambassadors.

### 1.3 User Cases

A CPD User case is a description of a CPD approach and solution for a local teaching and learning challenge. A User case encompasses the following attributes (Figure 1): Challenge and topic, Context and goals, CPD activities, Learning environment, Time to complete, Impact (Evaluation), and CPD scenario.

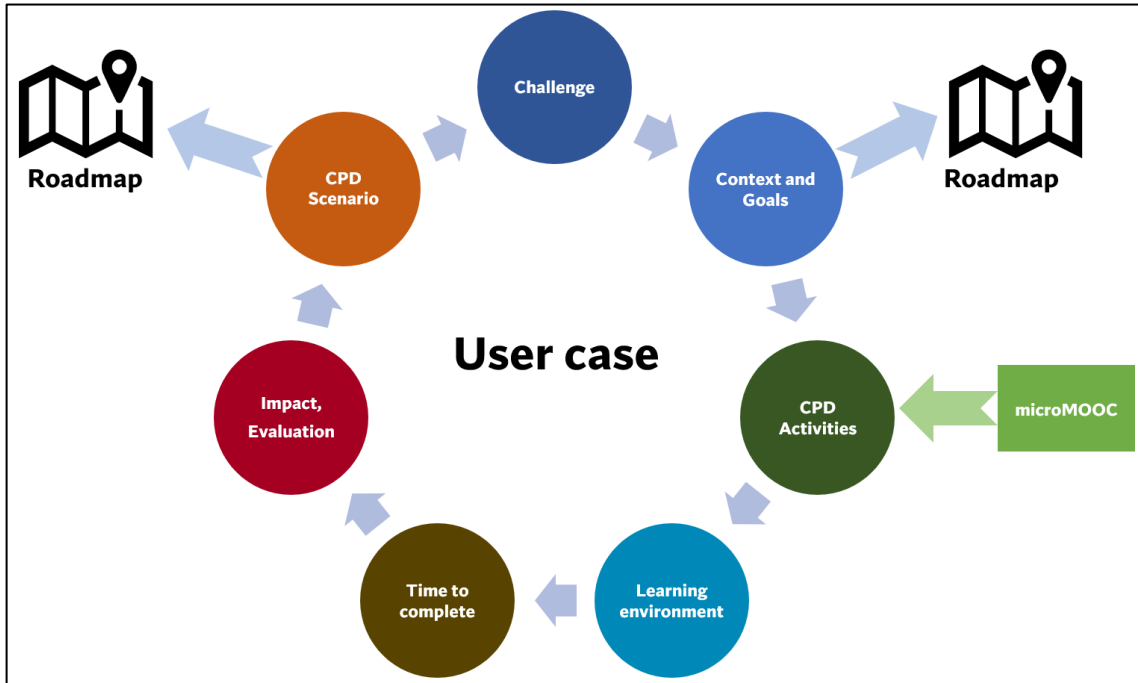


Figure 1: Attributes of the User case

**Challenge.** The key attribute of the User case is the Challenge. The challenge provides the background for why an intervention and actions are needed, and why organizing CPD activities is necessary. The Challenge defines the educational situation and identifies common difficulties or problems faced by teachers/local teaching staff. It also outlines how the challenge impacts students and the learning process. Additionally, other stakeholders may also experience problems as a result of this challenging educational situation.

**Context and Goals.** The attribute Context and Goals frames the challenge within specific situations in the local education context. It defines the specific teaching competences that need to be developed or improved by the local staff, as well as the teaching attitudes that require attention. In other words, this attribute identifies the needs of the participants in the User case.

Based on a survey conducted among lecturers and educational managers in Europe (Brouwer et al., 2022), a list of 30 relevant teaching competences and 17 teaching attitudes has been defined. The relevance of each teaching competence on the list and the urgency to develop it through CPD were determined based on the evaluation of its overall importance for the quality of higher STEM education, as well as the extent to which it is already applied in one's own teaching practice (for lecturers) or in the teaching practice of one's own teaching staff (for education managers). The same process was followed to determine the relevance of the 17 teaching attitudes on the list.

The attribute Context and Goals is strongly connected to the STEM-CPD Roadmap (Grecea et al., 2021; Brouwer et al., 2022) (Figure 1). The lists of competencies and attitudes, along with the priorities identified in the Roadmap survey, provide inspiration and guidelines for CPD Ambassadors to develop sustainable User cases that can be utilized by others.

**CPD activities.** The attribute CPD activities outlines the activities that will be organized by the CPD Ambassador to achieve the goals of the User case. In the Roadmap survey (Brouwer et al., 2022), 19 different types of CPD activities were evaluated. The survey results provide an indication of the relevance of each specific CPD activity. The relevance and urgency are determined by evaluating the overall effectiveness of the CPD activity for the quality of higher STEM education and the frequency with which lecturers and educational managers who participated in the survey have experienced that CPD activity.

With this prioritized list, the Roadmap provides inspiration and guidelines to CPD Ambassadors on the types of CPD activities that could be organized. Sharing experiences about different CPD activities used in the User cases supports the sustainability of those User cases.

Among the 19 different types of CPD activities, there is an online course (or a MOOC, Massive Open Online Course) that lecturers can utilize to independently or collaboratively learn about a specific teaching and learning competence or teaching attitude. A short online course or a microMOOC can be integrated into the CPD activities of the User case using a Flipped classroom approach. This means that participants in the User case can engage with the course at their own pace, either before or after other CPD activities.

The goal of the short online course or a microMOOC, which typically lasts no more than a few hours, is to support the learning of a single pedagogical concept that is relevant to a specific teaching competence. Additionally, it can shed light on a particular teaching attitude crucial for achieving the goals of the User case and overcoming the challenge. The course design of the short online course emphasizes active learning among participants and is based on evidence-based practices.

The basic structure of the short online course for one specific concept includes:

- A short introduction/explanation of the pedagogical concept, which can be presented as a text of approximately 1-2 pages or a video lasting about 3-5 minutes (or both).
- Three short active learning modules:
  - Module 1: Reading (a part of) a relevant article from the literature about the specific pedagogical concept.
  - Module 2: Engaging in a short development assignment that involves applying the treated pedagogical concept in one's own teaching practice and evaluating the quality of the development/application.
  - Module 3: Reflecting on one's own learning process in the short online course.

In the STEM-CPD@EUni project, numerous microMOOCs (short and focused Massive Open Online Courses) have been developed. These microMOOCs are accessible to everyone and freely available on the OpenEdX platform at <https://ectnmoocs.eu>. They are utilized in various User cases. Furthermore, they can be reused in new User cases or independently for other purposes.

The course design of the microMOOCs developed in the STEM-CPD@EUni project emphasizes active learning. The number of modules and activities in these microMOOCs may differ from the basic structure of a short online course that focuses on a single concept. This variation depends on the specific objectives of each microMOOC.

On the OpenEdX platform, there is a course available that provides guidance on creating microMOOCs. It offers instructions on utilizing different features and tools in a MOOC and serves as a source of inspiration. CPD Ambassadors can use a "ready-to-go" template for the basic structure with three modules that concentrate on a single concept. This template can be imported into a new online course they develop on OpenEdX.

**Learning environment.** This attribute describes the specific environment in which the CPD activities take place. Different environments can be utilized, and they can be combined within a single User case. The professional development of lecturers in User cases is typically, but not mandatory, focused on teaching practice. In such cases, the CPD activities are connected to the participants' teaching practice or, in other words, to their "workplace" context. The participants of a User case can meet either in person or online. Additionally, participants have the option to learn at their own pace and independently online through an asynchronous approach. For this purpose, a short online course or a microMOOC can be employed.

**Time to complete.** The time to complete a User case can range from a few hours to several months or even longer.

**Impact, evaluation.** The authors of the User case share the expected impact of their User cases and reflect on their intentions and expectations regarding the User case. They also share their experiences afterward, which supports the sustainable re-use of the User cases and the development of new User cases in a sustainable manner.

**CPD Scenario.** The last attribute of the User case is its CPD scenario. The CPD scenario is determined by teaching and learning competences, teaching attitudes developed in the User case, the learning environment of the User case and the time to complete it. CPD scenarios are classified using pedagogical scales for teaching and learning competences, teaching attitudes, and CPD activities defined in the Roadmap publication (Brouwer et al., 2022). See examples in Chapter 4. Each User case can have only one CPD scenario, while one CPD scenario can describe multiple User cases. The CPD scenario is automatically created on Starfish if the authors select the Roadmap teaching and learning competences and attitudes developed in the User case, as well as the CPD activities used in the User case.



## 2. User cases on Starfish

In this section we describe how the users, lecturers or other people who are involved in Higher Education can collaborate on developing CPD User cases and share them on Starfish (Figure 2). Starfish is a social knowledge sharing platform based on the TPACK model. Due to tagging, searching in Starfish leads to a structured information about technological, pedagogical, and content knowledge on the query connecting it to one or more available designs associated to the query (User case) and to the persons (Person) who has developed and applied one CPD design in practice.

All User cases developed in the STEM-CPD@EUni project can be found on Starfish open and free for all who are interested at: <https://starfish-education.eu>.

The screenshot shows the Starfish search homepage. At the top left, the 'Starfish' logo is visible, and a 'Browse' button is highlighted with a red box. To the right, there are 'Contribute' and 'Account' links. Below the logo is a search bar with the placeholder text 'e.g. #TPACK', a dropdown menu set to 'Everything', and a 'Search' button. The main content area is divided into four colored boxes representing different knowledge domains: 'Pedagogy' (yellow), 'Technology' (pink), 'Content' (light blue), and 'Context/Topic' (teal). Each box lists 'Examples' and 'Reflection' links. Below these is a 'Special/CPD' section with examples 'P1-1', 'P1-3d', and 'P2-3'. In the center of the page is a Venn diagram illustrating the TPACK model. It consists of three overlapping circles: 'Technological Pedagogical Knowledge (TPK)' (pink), 'Pedagogical Knowledge (PK)' (yellow), and 'Content Knowledge (CK)' (light blue). The intersections are labeled: 'Technological Pedagogical Content Knowledge (TPACK)' at the top, 'Technological Knowledge (TK)' on the right, 'Pedagogical Content Knowledge (PCK)' at the bottom, and 'Technological Content Knowledge (TCK)' on the left. The entire diagram is enclosed in a dashed blue circle with the label 'Contexts' at the bottom.

Figure 2: Starfish search homepage <https://starfish-education.eu>

To find the collection of User cases click **Browse**, select Everything and then choose **User Cases** (Figure 3) or go to: <https://starfish-education.eu/browse?type=usercase>

The screenshot shows the Starfish website interface. At the top, there is a search bar with the text "e.g. #TPACK" and a "Search" button. Below the search bar, there is a "Sorting" dropdown menu set to "Most recent". On the left side, there is a "Categories" sidebar with the following items: Good Practices (25), Projects (45), Events (55), Glossaries (88), Information (78), People (39), **User Cases (35)**, and CPD Scenarios (30). The "User Cases" category is highlighted with a red box. The main content area is titled "User Cases" and displays six user case cards. Each card includes a title, a representative image, a list of tags, and a brief description of the case and its authors.

**User Cases**

Most recent

Categories

- Good Practices 25
- Projects 45
- Events 55
- Glossaries 88
- Information 78
- People 39
- User Cases 35**
- CPD Scenarios 30

**Continuous Online Assessments**

Chemistry (MScChemistry) (STEM-CPD@EUn) FormativeAssessment SummativeAssessment AssessmentTools DigitalAssessment

Matti Niemelä, Johanna Kärkkäinen University of Oulu / Faculty of Technology / Chemistry degree programme Challenge and goal Assessment is a crucial part of both traditional and online e...

**Bridging Pre-knowledge Gaps**

AnalyticalChemistry (STEM) (MScChemistry) (STEM-CPD@EUn) ConceptMaps KnowledgeGaps PriorKnowledge

Stefania Grecea, Bob Pirok, Lotte Schreuders, Jocelyne Vreede, Natasa Brouwer Faculty of Science, University of Amsterdam, The Netherlands Challenge and goal Students enrolled in spec...

**Encouraging implementation and improvement of peer assessment in university teaching**

(STEM-CPD@EUn) Evaluation FormativePeerAssessment PeerAssessment

David Titovšek, Črtomir Podlipnik, Krištof Kranjc University of Ljubljana (UL)/Faculty of Chemistry and Chemical Technology (FKKT)/Chemistry and Biochemistry Bachelor's and Master's programme, Slo...

**Communication between students and academics**

ExperimentalSciences ScienceVocabulary (STEM-CPD@EUn) CommunicationModels InformationOverload InstructionsLaboratory OnlineInteractiveBoard

Iwona Maciejowska, Michał Woźniakiewicz, Bartosz Trzewik, Katarzyna Zięba, Aleksandra Lis Jagiellonian University, Krakow, Poland Challenge and goal The investigation and discussion on ...

**High School to STEM BSc degrees: from a steep to a smooth transition**

HighSchoolSTEM-BSc (STEM-CPD@EUn) TeachersWorkgroups AlternativeConceptions CommunicationModels PriorKnowledge

Martino Di Serio, Alessio Petrone, Vincenzo Russo, Oreste Tarallo, Italo Testa University of Naples Federico II, Italy Challenge and goal It is a common experience that BSc freshmen can ...

**Mentoring Lecturers in Higher Education**

JuniorLecturer (STEM-CPD@EUn) Community-engagedLearning Mentoring Peer-feedback

Lotte Schreuders, Bob Pirok, Stefania Grecea, Jocelyne Vreede, Natasa Brouwer University of Amsterdam, The Netherlands Challenge and goal In today's dynamic society, teaching in higher e...

Figure 3: Collections of User cases on Starfish

By clicking the title of the User case, the visitors can read more about the User case. Each User case has a landing page (Figure 4) with the basic information including the title, authors, tags, challenge, a topic of the User case and four tabs: Context and Goals, CPD Activities, Evaluation and CPD scenario. In Context and goals, the specific Local context is described explaining the needs for developing the User case and the Local CPD goals.

Starfish Browse Contribute Account

## Bridging Pre-knowledge Gaps

Posted by @jvreede @LotteSchr @natasabrouwer @Stefania Grecea on Oct. 9, 2021, 12:19 p.m.

**STEM-CPD@EUn**

STEM-CPD is continuous professional development of lecturers in Science, Technology, Engineering and Mathematics (STEM). In the project STEM-CPD@EUn ( <https://ecth.eu/work->

[Explore](#) [Read more...](#)

**ConceptMaps**

A concept map or conceptual diagram is a diagram that depicts suggested relationships between concepts.

[Explore](#) [Visit...](#)

**KnowledgeGaps**

Knowledge gap is a gap between the knowledge that student actually have learned and the knowledge that a students was expected to know.

[Explore](#)

**Pedagogy** ConceptMaps KnowledgeGaps PriorKnowledge

**Content** AnalyticalChemistry STEM

**Context/Topic** MScChemistry STEM-CPD@EUn

**Stefania Grecea, Bob Pirok, Lotte Schreuders, Jocelyne Vreede, Natasa Brouwer**  
Faculty of Science, University of Amsterdam, The Netherlands

### Challenge and goal

Students enrolled in specific courses have broad pre-knowledge background and skills. This has influence on how they acquire, interpret and organise new knowledge. Mismatch between the student's knowledge and lecturer's expectation hampers the learning process of students. Therefore, some students cannot follow the course whilst others even fail. Diverse pre-knowledge background and skills are also challenging for the lecturer who has to teach while adapting to class fluctuations, all within a specific context.

### Topic of the user case

Prior knowledge, knowledge gaps, initial situation

Context and Goals
CPD Activities
Evaluation
CPD Scenario

### Local context (specific)

Students entering the MSc Chemistry programme at the University of Amsterdam have broad pre-knowledge background and skills. This is because they come from different education programs all over the world. Also in the Netherlands, there are two types of higher education comprising higher professional education and university education. This leads to large differences in the pre-knowledge background of students. Yet, lecturers expect that students will have specific chemistry pre-knowledge that they need to study the courses in the master.

The aim of this user case is to increase the awareness of the lecturers concerning the diversity of the different student's backgrounds in the classroom and facilitate learning in the conditions of the students' heterogeneous knowledge background without lowering the level of the courses in which they teach.

**Local educational scope** (science, technology, engineering, math, science in society)  
MSc Chemistry with different tracks

**Pre-knowledge / Background of the participating local teaching staff**

Most of the lecturers in this user case have achieved the Netherlands nationally recognized University Teaching Qualification certificate after following the UTQ programme organized at the Faculty of Science. Several lecturers are following the UTQ programme during this User case.

### Local CPD goals

**A.** Create a microMOOC that will help fellow lecturers to improve the following skills:

1. explain why it is necessary to know what pre-knowledge students have
2. set up a method to get and give insight in knowledge gaps
3. make a list of pre-knowledge requirements
4. create assignments for students to be able to fulfill the list of requirements at specific moments in the course (just in time teaching)

**B.** Make the fellow lecturers and educational managers aware that it is necessary to get insight in pre-knowledge of your students.

**C.** Community "Bridging the Pre-knowledge gaps" who use the microMOOC and meet to discuss this topic and to present each other solutions and discuss them.

Needs defined in STEM-CPD Roadmap

### See also

- P Natasa Brouwer
- P Jocelyne Vreede
- P Lotte Schreuders
- P Stefania Grecea
- U Test for Error




Figure 4: Example of User case by University of Amsterdam

<https://starfish-education.eu/usercase/1077/>

In the next section of this handbook, we include a manual on how to use Starfish to share STEM-CPD User cases and how to collaborate.

## 2.1 Developing User Cases and collaboration on Starfish

Starfish is a knowledge sharing network in higher education and in professional development of higher education teaching staff. Starfish website <https://starfish-education.eu/> is publicly available to read.

For publishing, Starfish is only available to users with a Starfish account. When logged in, you can contribute new articles and edit the existing contributions where you are an author or co-author.

### Register on Starfish

Register at <https://starfish-education.eu/>. Read [Terms of use](#) before you register (Figure 5). The account needs to be approved by the Starfish administrator.

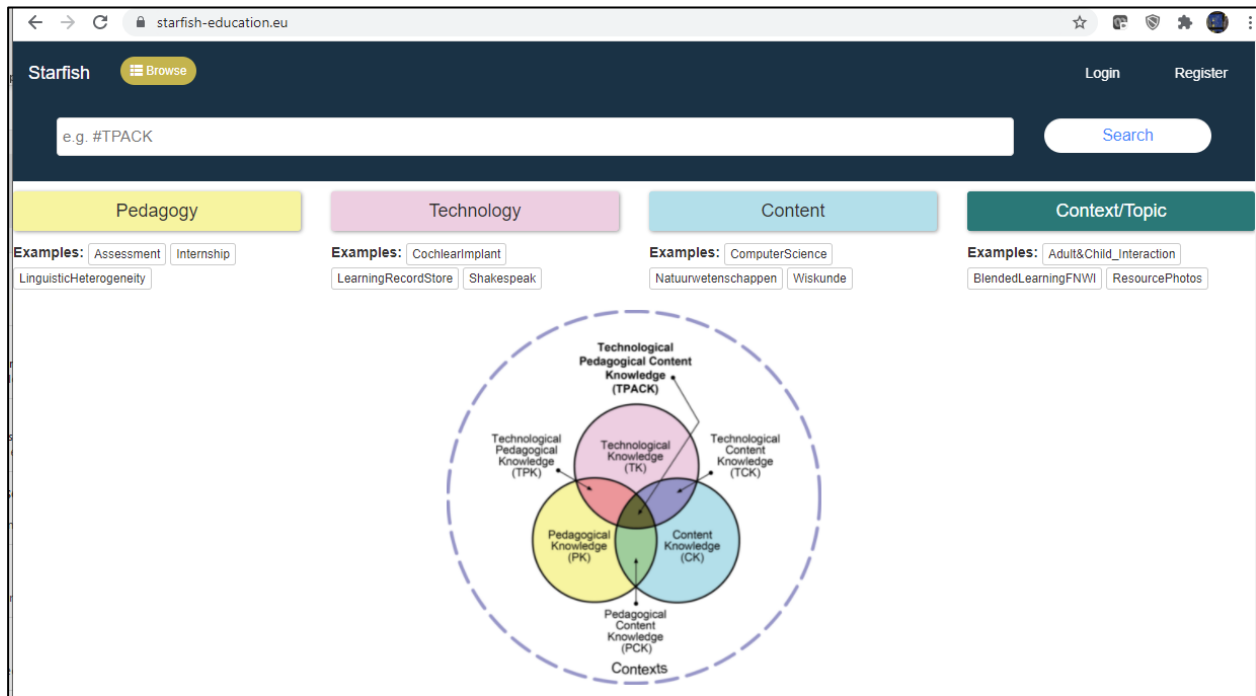


Figure 5: Login and Register button on Starfish

After you login find the **Account** (Figure 6) where you can edit your Contributions, your Profile and your Account settings (i.e. your e-mail and your password).

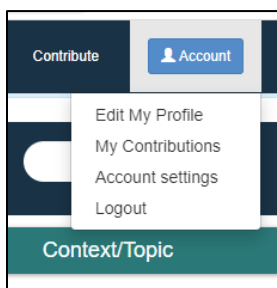


Figure 6: Account

## 2.2 Manual How to Create a new User case

To create and publish a User Case click **Contribute** (Figure 7) and choose User Case.

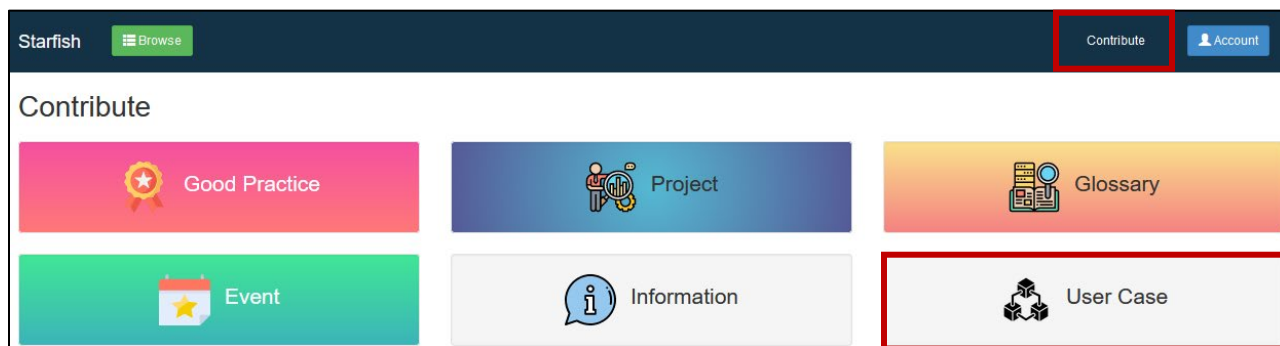


Figure 7: Template to share knowledge and contribute on Starfish

Write your User Case in the given template. This template was developed in the STEM-CPD@EUni project. Structure of the User case template is presented in Appendix 1.

The template has several sections.

- Wallpaper and Title of the User Case

Figure 8: How to add a wallpaper image and User case title.

Each User case has a Wallpaper, an image that symbolizes the subject of the User Case. This image is also a thumbnail image of the User Case in Starfish's search view. The dimensions of the image should be approximately 10×7 cm at 72 dpi. Note that this image and all material on Starfish must be copyright free or in Creative commons. In this section, you will find the Draft checkbox to check it in if you do not wish to publish the User Case immediately.

In the template there are four fields to describe your User Case (Figure 9):

- Challenge and topic
- Context and goals
- CPD activities
- Evaluation

# User Case

Wallpaper Title of the User Case Draft

No file selected.

**Challenge and topic**

Styles | Format | **B** *I* U ~~S~~ | | | | |

Write name of authors in form James Doe, Tony Black  
Faculty, University, Country

Challenge and goal

Topic of the user case

**Context and Goals**

Styles | Format | **B** *I* U ~~S~~ | | | | |

Local context (specific)

Local CPD goals

Figure 9: Part of the form to upload User cases showing boxes for Challenge and topic and for Context and Goals.

Follow the given subtitles in the template fields to describe your User Case. Note that “Context and goals”, “CPD activities”, “Evaluation” and “CPD scenario” will appear online each in its own tab.



Figure 10: Tabs in User case on Starfish

At the next stage, TPACK tags, links and communities are added in each User Case.

You can add the existing tags by selecting them from the menu (Figure 11). If the tag does not exist yet, send an email to the Starfish administrator ([natasa.brouwer@uva.nl](mailto:natasa.brouwer@uva.nl)) to create the new tag or just a synonym if the concept is already tagged in Starfish with a different name.

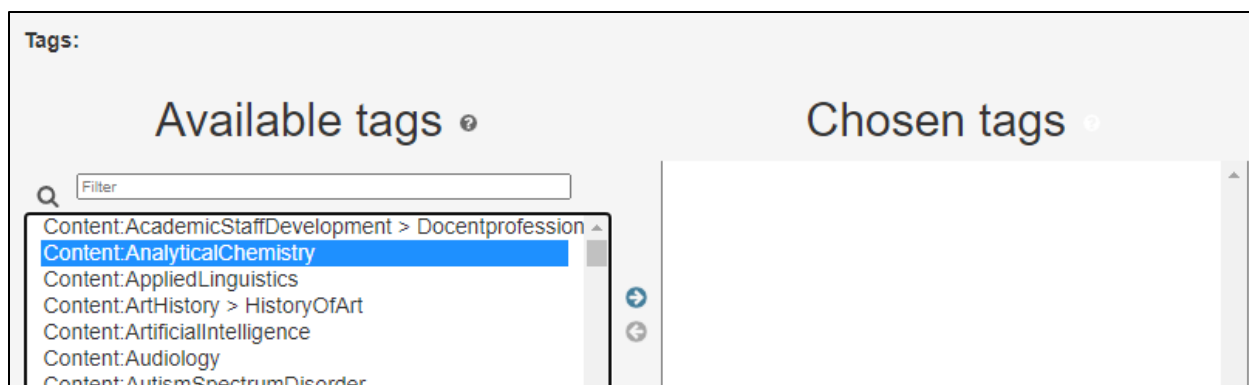


Figure 11: Add existing tags

You can select existing articles on Starfish that you find relevant for your User Case as links (Figure 12). They will appear in your User case in See Also:

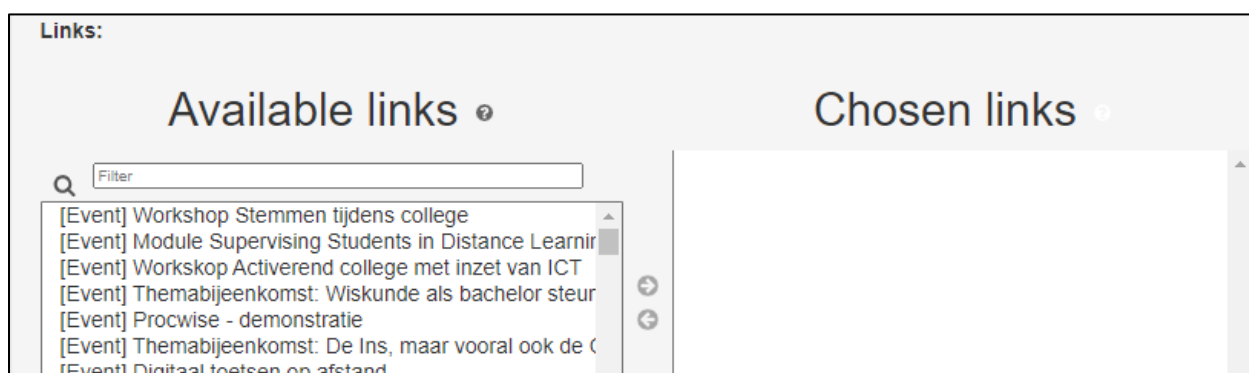


Figure 12: Add relevant articles in Starfish

When selecting Communities in the next step, Select both Public and ECTN (Figure 13):

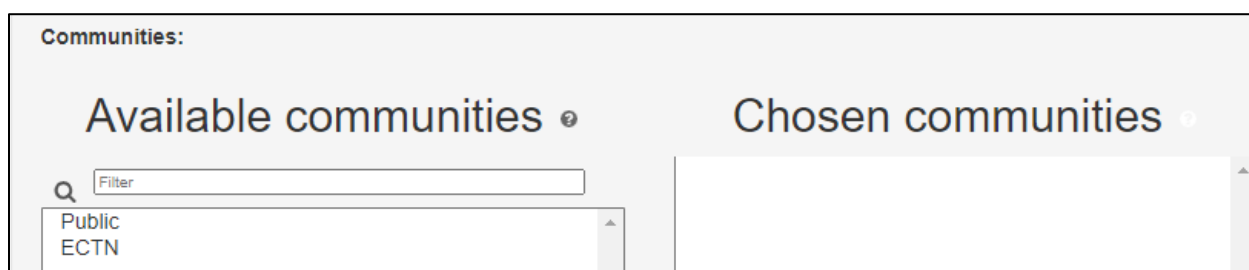


Figure 13: Add Community Public and ECTN

To define the CPD scenario of your User case you must select the CPD questions (Roadmap items) that fit to your user case (Figure 14). To select appropriate CPD Questions, you need to clarify for yourself what is the connection between your challenge and the Roadmap questionnaire statements related to Competences, Lecturer's attitudes and CPD activities. With other words, you define which competences and which attitudes the participants of your user case will develop and which CPD activities will take place in your user case. The full list of the Roadmap items can be found in Appendix 2. The list is also available on Starfish in the User case template (*Overview of questions and classifications*).

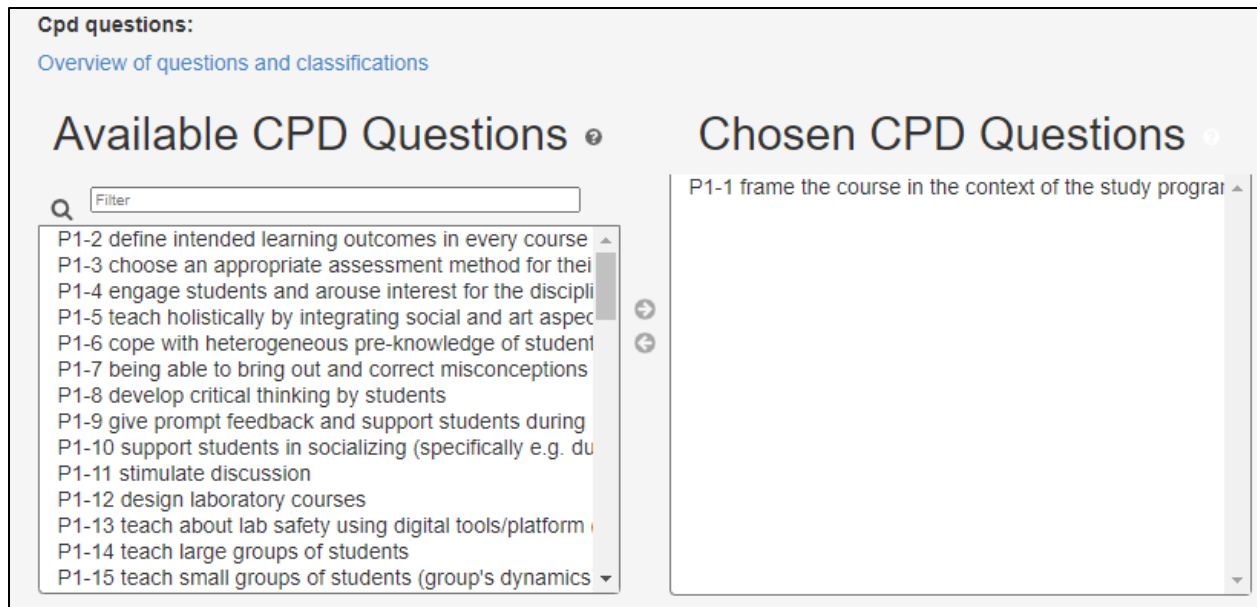


Figure 14: Add appropriate CPD Questions (Roadmap items)

Finally, you select the time necessary to complete the User case i.e. the User case implementation time (Figure 15), and finally the CPD learning environment(s) used in your User case (Figure 16).

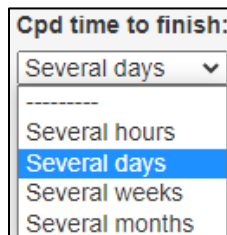


Figure 15: Time to complete the user case

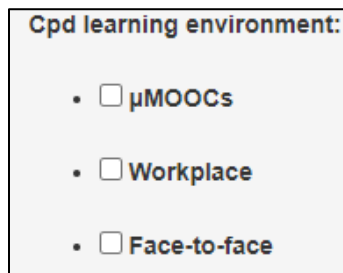


Figure 16: CPD learning environment

Press then Contribute on the bottom of the page (Figure 17).

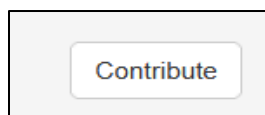


Figure 17: Button Contribute on the bottom of the page

If you did not check in Draft, you can see the User case online immediately if you click Browse and then User cases:



## User Cases

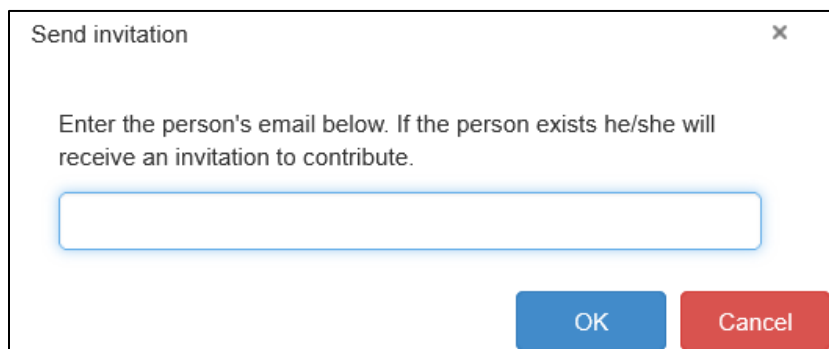
Note! By using the selected CPD questions, CPD time to finish and CPD learning environment, CPD scenario will be automatically created. At the same time, a larger cluster of teaching competences, CPD attitudes and CPD activities are automatically added to the “*CPD scenario*” section. In addition, CPD questions selected for the User case are now automatically shown in the “*Context and Goals*” section.

### 2.3 Manual How to Collaborate on Starfish

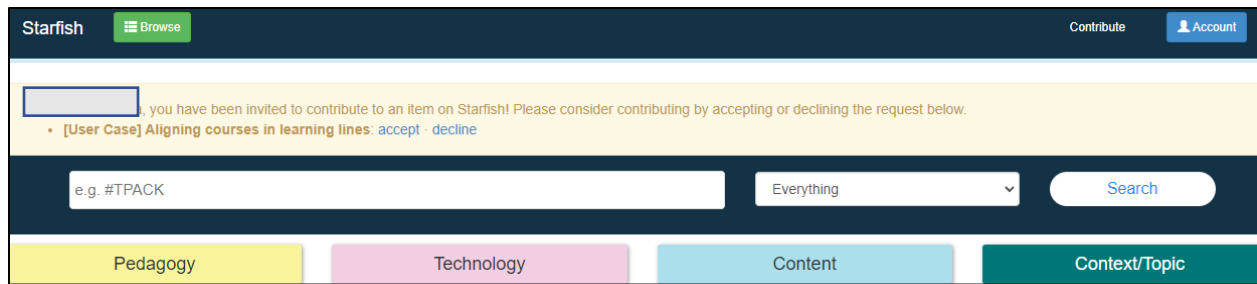
After you have posted your User Case, you can invite one or more colleagues to continue writing it together. Click Invite contributor.



You can see the names of your collaborators whom you have already invited. Note that the colleagues whom you invite for collaboration need to be registered on Starfish. You need to know their emails to invite them to collaborate.



Starfish never sends automatic e-mails. The invitation will appear in Starfish as a pop up and can be seen when you are logged in with your Starfish account. If you wish to collaborate on the User Case you need to Accept the invitation.



If you have any questions about Starfish, send an email to [natasa.brouwer@uva.nl](mailto:natasa.brouwer@uva.nl).

## 2.4 Examples of STEM-CPD User cases and their CPD scenarios

In the next pages of this handbook, we include a couple of examples about the User cases and corresponding scenarios developed. All User cases developed during the project STEM-CPD@EUni are available at Starfish platform. <https://starfish-education.eu/browse/?community=2&ftype=usercase>

## User case example I

# Pre-assignments to enhance heterogeneous students' learning in laboratory

Johanna Kärkkäinen, Katja Lappalainen, Matti Niemelä  
Faculty of Technology, University of Oulu, Finland

**Pedagogy** [KnowledgeGaps](#) [PriorKnowledge](#)  
**Technology** [InteractiveVideo](#) [OnlineAssessmentToolEducation](#)  
**Content** [Chemistry](#) [GeneralChemistry](#) [LaboratoryCourses](#)  
**Context/Topic** [STEM-CPD@EUni](#)

### Challenge and goal

Students attending chemistry laboratory courses have different backgrounds. Their major could be mathematics, physics, biochemistry, biology, process engineering as well as chemistry and due to it their knowledge about theory, safety and practical skills may differ a lot. Also, the time that students spend in a laboratory is limited. Therefore, it is important that students are prepared well enough before entering the laboratory. Using digital tools, such as interactive videos and online quizzes, in the pre-assignments may offer a good way to enhance students' learning prior to the laboratory work. E.g., pre-assignment videos about the laboratory techniques offer students a possibility to familiarize themselves with the techniques already before the laboratory session. Quizzes allow students to test their knowledge before starting the laboratory work. These practices will not only help students (from different backgrounds) to learn the subject but also enhance their time management in the laboratory.

### Topic of the user case

Pre-assignments to enhance heterogeneous student's learning in laboratory and to level out pre-knowledge gaps.

### Context and goals

#### Local context (specific)

Pre-assignment of the laboratory work needs to include theory of the work, chemical safety and calculations. Well-designed pre-assignments also prepare students for the use of new laboratory techniques as well as analytical methods. These practices will not only help students from different backgrounds and with different pre-knowledges to learn the subject but also to make observations, to enhance their time management and safe working in the laboratory along with the reporting and group working skills. For example, interactive videos, online quizzes and written assignments can be utilized in different ways to enhance students' knowledge prior to laboratory work.

#### Local CPD goals

Focus on the laboratory teaching to level out the pre-knowledge gaps of heterogeneous students and teaching attitudes related to it.

- Collect examples of current pre-laboratory assignments
- Using our own pre-laboratory assignment examples to motivate fellow lecturers to develop their own teaching practice in a specific field.
  - Use of evidence-based approach to justify our approach
  - Literature
- Share ideas among the fellow lecturers and improve teaching attitudes

## **Needs defined in STEM-CPD Roadmap**

### Competences

- 6 cope with heterogeneous pre-knowledge of students
- 9 give prompt feedback and support students during learning
- 13 teach about lab safety using digital tools/platform (where appropriate)
- 24 use blended learning approach

### Attitudes

- 3 inspire a positive attitude in their class.
- 5 be interested in their students' progress.
- 8 discuss teaching with their colleagues.

### Activities

- 2 attending presentations about teaching approaches.
- 11 collaborating with a peer-lecturer on a redesign of a course.
- 12 getting peer-feedback on your own teaching practice from a colleague.

## **CPD activities**

### **CPD activities at the local university**

All CPD activities organized in UOulu are closely related to the local teaching practice and workplace learning.

#### Stage 1:

- Existing pre-assignment practices are collected
- Local meetings where pre-assignments and good teaching practices are shared.
- Local topics are e.g.
- Lab pre-assignments
- Digital tools for pre-assignments

#### Stage 2:

- Collaborative learning in the group of lab teachers developing pre-assignments for their courses.
- Peer-feedback and support
- Peer-assistance with unfamiliar pre-assignment types (e.g., H5P)

#### Stage 3:

- Sharing experiences of used pre-assignments in local meetings

## **Teaching and learning materials**

- Materials collected, selected, and developed for CPD activities.
- Zoom, Teams, Moodle

## **Sustainable implementation**

At the first stage of this user case, collaborative learning and experience sharing among lab teachers developing pre-assignments in their courses will be performed. Pre-assignments will be developed by using a teacher and student-centered approach and online tools. At the next stage, results from the user case will be utilized in the Chemistry degree program and shared at seminars to other chemistry teachers. Finally, to reach other STEM teachers and managers, results are shared at the faculty and/or university level. This approach will support the integration of the changes in the teaching and learning practice on a larger scale.

## **Evaluation**

### **Expected impact of the CPD User Case**

Positive change towards laboratory pre-assignments by encouraging teachers to use various pre-assignment types, such as interactive videos and online quizzes, in addition to written assignments. Students are better prepared for the laboratory

### **CPD scenario**

#### **Constructive alignment, Competence teaching, Engagement and motivation, facilitation discipline specific learning, Blended learning (type P1-1, P1-2a, P1-3b, P1-4b)**

This CPD scenario describes a User case in which lecturers develop their competence in sound course design and teaching in higher education and how to engage and motivate students and how to facilitate discipline specific thinking and how to use blended learning and develop attitudes in supporting student development and enabling students' well-being in a learning process and inclusivity and knowledge sharing.

The approximate duration of a User case that follows this scenario is several months.

In this CPD scenario the participants professionalize in a close connection to their own teaching practice (at their workplace) and meet in person on location with the training staff and with other participants

#### Competences

Constructive alignment

Competence teaching

Engagement and motivation, facilitation discipline specific learning

Blended learning

#### Attitudes

Pastoral interest

Knowledge sharing

#### Activities

Imparting information (trainer-centered)

Collaboration

Mentor-mentee support

## User case example II

### Bridging Pre-knowledge Gaps

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Pedagogy [ConceptMaps](#) [KnowledgeGaps](#) [PriorKnowledge](#)

Content [AnalyticalChemistry](#) [STEM](#)

Context/Topic [MScChemistry](#) [STEM-CPD@EUni](#)

#### Challenge and goal

Students enrolled in specific courses have broad pre-knowledge background and skills. This has influence on how they acquire, interpret and organise new knowledge. Mismatch between the student's knowledge and lecturer's expectation hampers the learning process of students. Therefore, some students cannot follow the course whilst others even fall. Diverse pre-knowledge background and skills are also challenging for the lecturer who has to teach while adapting to class fluctuations, all within a specific context.

#### Topic of the user case

Prior knowledge, knowledge gaps, initial situation

#### Context and goals

##### Local context (specific)

Students entering the MSc Chemistry programme at the University of Amsterdam have broad pre-knowledge background and skills. This is because they come from different education programs all over the world. Also in the Netherlands, there are two types of higher education comprising higher professional education and university education. This leads to large differences in the pre-knowledge background of students. Yet, lecturers expect that students will have specific chemistry pre-knowledge that they need to study the courses in the master.

The aim of this user case is to increase the awareness of the lecturers concerning the diversity of the different student's backgrounds in the classroom and facilitate learning in the conditions of the students' heterogeneous knowledge background without lowering the level of the courses in which they teach.

Local educational scope (science, technology, engineering, math, science in society)

MSc Chemistry with different tracks

##### Pre-knowledge / Background of the participating local teaching staff

Most of the lecturers in this user case have achieved the Netherlands nationally recognized University Teaching Qualification certificate after following the UTQ programme organized at the Faculty of Science. Several lecturers are following the UTQ programme during this User case.

##### Local CPD goals

A. Create a microMOOC that will help fellow lecturers to improve the following skills:

1. explain why it is necessary to know what pre-knowledge students have
2. set up a method to get and give insight in knowledge gaps
3. make a list of pre-knowledge requirements
4. create assignments for students to be able to fulfill the list of requirements at specific moments in the course (just in time teaching)

B. Make the fellow lecturers and educational managers aware that it is necessary to get insight in pre-knowledge of your students.

C. Community “Bridging the Pre-knowledge gaps” who use the microMOOC and meet to discuss this topic and to present each other solutions and discuss them.

### **Needs defined in STEM-CPD Roadmap**

#### Competences

3 choose an appropriate assessment method for their course

6 cope with heterogeneous pre-knowledge of students

4 engage students and arouse interest for the discipline in the class

27 organize peer-assessment / peer-feedback in their courses

25 use interactive online boards for teaching and learning

#### Attitudes

3 inspire a positive attitude in their class.

5 be interested in their students' progress.

#### Activities

2 attending presentations about teaching approaches.

11 collaborating with a peer-lecturer on a redesign of a course.

12 getting peer-feedback on own teaching practice from a colleague.

### **CPD activities**

#### **CPD activities at the local university**

##### Stage 1

The microMOOC development team meets every two weeks. A meeting with the programme directors of the Bachelor and Master programme takes place.

##### Stage 2

The microMOOC is promoted among the lecturers teaching in BSc & MSc Chemistry programs of the UvA VU joint degree. Several meetings are organized.

##### Stage 3

The microMOOC is promoted to new members in the teaching staff once a year during a meeting.

### **Teaching and learning materials**

microMOOC (link to the MOOC, list of literature, description/ course design):

<https://micromoocs.eu/moodle/course/view.php?id=5>

[https://ectnmoocs.eu/courses/course-v1:University\\_of\\_Amsterdam+STEM03+2022\\_T1/about](https://ectnmoocs.eu/courses/course-v1:University_of_Amsterdam+STEM03+2022_T1/about)

### **Sustainable implementation**

At the first stage of this user case, the lecturers who are developing the MOOC will learn collaboratively and prepare learning material / literature to share with fellow lecturers.

One meeting will be organized in collaboration with the programme director where they will promote the MOOC and present their developments.

In the second stage it is expected that several lecturers will join the community “Bridging pre-knowledge gaps”. The members of the community will meet several times and the new lecturers will use the microMOOC.

In the third stage once a year there will be a meeting about “Bridging pre-knowledge gaps” to keep paying attention to this issue and each time several new lecturers will join this community.

## Evaluation

### Expected impact of the CPD User Case

Implementation of the method how to get insight and give insight in knowledge gaps to students and how tackle pre-knowledge gaps in the MSc Chemistry programme.

### Plans for eventual continuation of the CPD within the same topic

Share knowledge and experience with other programmes.

### CPD scenario

**Constructive alignment, Engagement and motivation, facilitation discipline specific learning, Organize peer-feedback, collaborative learning, Use of digital tools for a pedagogical goal (type P1-1, P1-3b, P1-3d, P1-4a)**

This CPD scenario describes a User case in which lecturers develop their competence in sound course design and how to engage and motivate students and how to facilitate discipline specific thinking and organizing peer-feedback and collaborative learning and how to use specific digital tools in teaching for a pedagogical goal and develop attitudes in supporting student development and enabling students' well-being in a learning process and inclusivity.

The approximate duration of a User case that follows this scenario is several weeks.

In this CPD scenario the participants are using a very short open online course, a micro mooc ( $\mu$ mooc) and professionalize in a close connection to their own teaching practice (at their workplace) and meet in person on location with the training staff and with other participants.

### Competences

Constructive alignment

Engagement and motivation, facilitation discipline specific learning

Organize peer-feedback, collaborative learning

Use of digital tools for a pedagogical goal

### Attitudes

Pastoral interest

### Activities

Imparting information (trainer-centered)

Collaboration

Mentor-mentee support

## 2.5 Peer-evaluation of the User cases

The goal of peer evaluation is to help author(s) of the User cases to identify areas of improvement and get an understanding of whether they are meeting the objectives of the work. In the STEM-CPD@EUni project, the evaluation form was developed for the peer-review of User cases. The peer-evaluation procedure is validated and optimized in the first two STEM-CPD Summer Schools. The structure and questions of the peer-evaluation form is presented in Appendix 3.



### 3. Guidelines for Sustainable development of STEM-CPD User Cases

Based on the results of the Roadmap survey conducted as part of the STEM-CPD@EUni project (Brouwer et al., 2022), priority lists of teaching competences, teaching attitudes, and CPD activities have been created. These lists reflect the importance that most lecturers and educational managers place on developing and applying these aspects to ensure the quality of STEM higher education. It is crucial for the User case to align with the local educational context and address local needs. However, the Roadmap survey indicates that there are minimal differences between institutions in terms of the priority which competences to develop. Therefore, it is recommended to consider the priority lists when designing User cases and refer to the Roadmap for inspiration. In the following three subchapters, you will find the most relevant teaching and learning competences, teaching attitudes, and CPD activities identified by lecturers and education managers in 2021. Please note that these preferences may change over time. Nevertheless, you are encouraged to examine the existing User cases and CPD scenarios to determine their suitability for your specific institution and draw inspiration from them when developing your own User case.

#### 3.1 Teaching competences

The five most relevant teaching and learning competences according to lecturers and education managers are presented in Table 1.

**Table 1.** Priority list of teaching and learning competences based on the survey data Part 1<sup>a)</sup> (Brouwer et al. 2022)

Lecturers			Educ. Managers			q. No	Statement
General Importance	St Dev.	$\Delta(G-P)^*$	General Importance	St Dev.	$\Delta(G-P)^*$		
4.71	0.63	0.24	4.65	0.74	0.54	8	develop critical thinking by students
4.60	0.70	0.19	4.53	0.79	0.36	4	engage students and arouse interest for the discipline in the class
4.48	0.73	0.14	4.48	0.86	0.46	9	give prompt feedback and support students during learning
4.42	0.72	0.13	4.52	0.78	0.39	1	frame the course in the context of the study programme

<sup>a)</sup> The list of teaching and learning competences Part 1 used in the survey can be found in Appendix 2.

\*G-P is the difference between General Importance and Personal or teaching staff use.

It can be observed that both groups, the lecturers and educational managers, agree that developing critical thinking and engaging students to arouse interest in the discipline are the two most relevant competences. However, the order of the next three most relevant competences varies between the two groups. The whole priority list can be found in the Roadmap publication (Brouwer et al. 2022, [Download](#)).

Based on the Roadmap survey, the teaching and learning competences were grouped into pedagogical scales (Brouwer et al., 2022), and their relevance for the lecturers and educational managers was determined. The most significant pedagogical scale identified was P1-1 Constructive alignment. On Starfish, you can find all User cases that were created to support the development of one or more competences within specific pedagogical scales and associated CPD scenarios (Table 2).

**Table 2.** List of pedagogical scales based on the survey data Part 1 and the links to corresponding CPD User Cases and CPD Scenarios on Starfish

<b>Pedagogical scale</b>	<b>Numbers of the competences in the Roadmap list Part 1 (see Appendix 2)</b>	<b>CPD User Cases (link Starfish)</b>	<b>CPD Scenarios (link Starfish)</b>
P1-1 Constructive alignment	1, 2, 3, 6	<a href="#">link</a>	<a href="#">link</a>
<i>P1-2 Pedagogy - Interactive teaching</i> P1-2a Competence Teaching P1-2b Competence Design interactive teaching	9, 10, 14, 15 16, 19	<a href="#">link</a> <a href="#">link</a>	<a href="#">link</a> <a href="#">link</a>
<i>P1-3 Pedagogy, Learning facilitation</i> P1-3a Problem Solving (design/teaching) P1-3b Engagement and motivation, facilitation discipline specific learning P1-3c Deep learning P1-3d Organize peer-feedback, collaborative learning	18, 21, 22, 23  4, 12, 13 5, 7, 8, 11  27, 28	<a href="#">link</a>  <a href="#">link</a> <a href="#">link</a>  <a href="#">link</a>	<a href="#">link</a>  <a href="#">link</a> <a href="#">link</a>  <a href="#">link</a>
<i>P1-4 Technology in facilitative teaching:</i> P1-4a Use of digital tools for a pedagogical goal P1-4b Blended learning	17, 25, 26, 29, 30 20, 24	<a href="#">link</a>  <a href="#">link</a>	<a href="#">link</a>  <a href="#">link</a>

In the Roadmap (Brouwer et al., 2022, [Download](#)) you can find the complete priority list of the pedagogical scales that was defined based on the data obtained in the Roadmap survey.

### 3.2 Teaching Attitudes

The four most relevant teaching and learning competences according to lecturers and education managers are presented in Table 3.

**Table 3.** Priority list of teaching and learning attitudes based on the survey data Part 2<sup>a)</sup>.  
(Brouwer et al. 2022)

Lecturers			Educ. managers			q. No	Statement
General Importance	St Dev.	$\Delta(G-P)^*$	General Importance	St Dev.	$\Delta(G-P)^*$		
4.58	0.71	0.16	4.44	0.87	0.31	3	inspire a positive attitude in their class.
4.53	0.75	0.17	4.41	0.91	0.35	1	be reflective teachers and reflect about their courses / lectures.
4.45	0.85	0.15	4.54	0.91	0.28	6	use students evaluations and the feedback of students to improve courses.
4.43	0.80	0.15	4.39	0.88	0.43	5	be interested in their students' progress.

<sup>a)</sup>The list of teaching and learning competences Part 2 can be found in Appendix 2.

\*G-P is the difference between General importance and Personal or teaching staff use.

In Table 3 it can be seen that the priority list of four most important teaching and learning attitudes is for the lecturers and the educational managers not the same.

Based on the Roadmap survey (Brouwer et al., 2022), teaching attitudes were classified into pedagogical scales, and the survey determined the relevance of these scales for lecturers and educational managers. The most significant pedagogical scale in the domain of teaching attitudes, as identified by lecturers and educational managers, was P2-2 Pastoral interest, followed by P2-4 Evidence-based approach. On Starfish, you can find all User cases that support the development of one or more teaching attitudes within specific pedagogical scales and associated CPD scenarios (Table 4). The whole priority lists can be found in the Roadmap publication (Brouwer et al. 2022, [Download](#)).

**Table 4.** List of pedagogical scales based on the survey data Part 2 and the links to corresponding CPD User Cases and CPD Scenarios on Starfish

Pedagogical scale	Numbers of the competences in the Roadmap list Part 2 (see Appendix 2)	CPD User Cases (link Starfish)	CPD Scenarios (link Starfish)
P2-1 Motivation and self-regulation for CPD	2, 14, 15, 16	<a href="#">link</a>	<a href="#">link</a>
P2-2 Pastoral interest	3, 4, 5	<a href="#">link</a>	<a href="#">link</a>
P2-3 Reflection	1, 10, 11	<a href="#">link</a>	<a href="#">link</a>
P2-4 Evidence informed approach	6, 7, 13	<a href="#">link</a>	<a href="#">link</a>
P2-5 Knowledge sharing	8, 9, 12, 17	<a href="#">link</a>	<a href="#">link</a>

### 3.3 CPD activities

The four most effective CPD activities, based on the list of 19 CPD activities collected in the Roadmap (Brouwer et al., 2022), as indicated by lecturers and education managers, are presented in Table 5.

**Table 5.** Priority list of CPD activities based on the survey data Part 3<sup>a)</sup>.  
(Brouwer et al. 2022)

Lecturers			Educ. Managers			q. No	Statement
General Importance	St Dev.	$\Delta(G-P)^*$	General Importance	St Dev.	$\Delta(G-P)^*$		
3.80	1.04	0.72	3.93	1.21	0.84	17	giving mentoring to a junior lecturer.
3.74	1.04	0.82	3.76	1.14	1.07	12	getting peer-feedback on own teaching practice from a colleague.
3.71	1.10	0.85	3.80	1.18	0.96	15	getting mentoring from an experienced colleague.
3.67	1.04	0.79	3.78	0.99	0.72	2	attending presentations about teaching approaches.

<sup>a)</sup> The list of teaching and learning competences Part 3 can be found in Appendix 2.

\*G-P is the difference between General Importance and Personal or teaching staff use.

In Table 5, it can be observed that the priority list of the four most important CPD competences is very similar for both lecturers and educational managers, although not identical.

Based on the Roadmap survey (Brouwer et al., 2022), the CPD activities were grouped into pedagogical scales, and their relevance for lecturers and educational managers was determined. The most significant pedagogical scale in the domain of CPD activities, as identified by lecturers and educational managers, was P3-4 "Peer-Mentor - Mentee approach," followed by P3-3 "Collaboration." On Starfish, you can find all User cases that utilize one or more CPD activities within specific pedagogical scales (Table 6), along with the associated CPD scenarios. The whole priority lists can be found in the Roadmap publication (Brouwer et al. 2022, [Download](#)).

**Table 6.** List of pedagogical scales based on the survey data Part 3<sup>a)</sup> and the links to corresponding CPD User Cases and CPD Scenarios on Starfish

<b>Pedagogical scale</b>	<b>Numbers of the competences in the Roadmap list Part 1 (see Appendix 2)</b>	<b>CPD User Cases (link Starfish)</b>	<b>CPD Scenarios (link Starfish)</b>
P3-1 Imparting information	1, 2, 3	<a href="#">link</a>	<a href="#">link</a>
P3-2 Learning facilitation	4, 5, 7, 8, 9, 10	<a href="#">link</a>	<a href="#">link</a>
P3-3 Collaboration	11, 13	<a href="#">link</a>	<a href="#">link</a>
P3-4 Peer-Mentor – mentee support	12, 15, 17	<a href="#">link</a>	<a href="#">link</a>
P3-5 Personal / individual Expert support	14, 16	<a href="#">link</a>	<a href="#">link</a>
P3-6 Knowledge sharing	6, 18, 19	<a href="#">link</a>	<a href="#">link</a>

<sup>a)</sup> The list of teaching and learning competences Part 3 can be found in Appendix 2.

The CPD Ambassadors can consider the list of the CPD activities collected in the Roadmap and get inspired to try out different activities and report about their experience when sharing the CPD User cases.

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#### **User case template**

User case is a series of CPD activities that focus on the solving of specific teaching and learning problems and aim to improve the quality of a course, a programme or a specific situation in the education in the local teaching practice. On Starfish template landing page for the collection includes following information:

##### Challenge and topic

Title of the User Case

Author(s) and affiliation (Faculty, University, Country)

Challenge and goals

Topic of the user case

In addition to landing page, Starfish template contain following four sub sections/tabs:

##### Context and Goals

Local context (specific)

Local CPD goals

- Local educational scope (science, technology, engineering, math, other)
- Pre-knowledge / Background of the participating local teaching staff
- List of local CPD goals

Needs defined in STEM-CPD Roadmap

##### CPD Activities

- CPD activities at the local university
- Teaching and learning materials
  - Interactive teaching and learning materials for lecturers for self-supportive learning (a microMOOC) and different other collaborative activities.
- Sustainable implementation

##### Evaluation

- Expected impact of the CPD User Case
- Plans for eventual continuation of the CPD within the same topic

##### CPD Scenario

- Competences, attitudes, and activities
- Learning environments used
- Implementation time for the User Case

##### Time to complete User Case

##### Learning environment User case

## List of statements about teaching competences

No	Statement about the teaching competence / being able to:
1	frame the course in the context of the study programme
2	define intended learning outcomes in every course they teach
3	choose an appropriate assessment method for their course
4	engage students and arouse interest for the discipline in the class
5	teach holistically by integrating social and art aspects teaching complex chemical concepts
6	cope with heterogeneous pre-knowledge of students
7	being able to bring out and correct misconceptions
8	develop critical thinking by students
9	give prompt feedback and support students during learning
10	support students in socializing (specifically e.g. during a pandemic)
11	stimulate discussion
12	design laboratory courses
13	teach about lab safety using digital tools/platform (where appropriate)
14	teach large groups of students
15	teach small groups of students (group's dynamics)
16	design interactive lectures
17	design online exams
18	design problem solving sessions
19	design active learning classes / sessions using digital technology
20	use digital tools in lab courses
21	use design thinking methods
22	use research based teaching methods
23	use project based teaching methods
24	use blended learning approach
25	use interactive online boards for teaching and learning
26	use voting in lectures to activate thinking and understanding of (e.g. chemistry) concepts
27	organize peer-assessment / peer-feedback in their courses
28	organize (online) collaborative learning
29	use advanced tools, based on AI, in supporting students in their learning process
30	make/produce short MOOCs



## **Pedagogical scales (clusters) of competences**

P1-1 Constructive alignment (q. 1, 2, 3, 6)

P1-2 Pedagogy, Interactive teaching

P1-2a Competence teaching (q. 9, 10, 14, 15)

P1-2b Competence design interactive teaching (q. 16, 19)

P1-3 Pedagogy, Learning facilitation

P1-3a Problem solving (design and teaching) (q. 18, 21, 22, 23)

P1-3b Engagement and motivation, facilitation discipline specific learning (q. 4, 12, 13)

P1-3c Deep learning (q. 5, 7, 8, 11)

P1-3d Organize peer-feedback, collaborative learning (q. 27, 28)

P1-4 Technology in facilitative teaching:

P1-4a Use of digital tools for a pedagogical goal (q. 17, 25, 26, 29, 30)

P1-4b Blended learning (q. 20, 24)

The statements in Part 1 are defined in the STEM-CPD@EUni project Roadmap, <https://ectn.eu/work-groups/stem-cpd/>

### List of statements about the lecturer's attitudes

No	Teaching attitude
1	be reflective teachers and reflect about their courses / lectures.
2	have high expectations for the students and themselves.
3	inspire a positive attitude in their class.
4	make students feel special, included, safe and secure.
5	be interested in their students' progress.
6	use students evaluations and the feedback of students to improve courses.
7	read literature about teaching and learning in higher education.
8	discuss teaching with their colleagues.
9	observe (some) lectures / teaching sessions of colleagues and give feedback.
10	record (some) own lectures / teaching sessions on the video to reflect on.
11	organize / attend meetings of their own teaching team to discuss / reflect on the teaching methods and on the effect of those on student's learning.
12	share experience and knowledge gained through continuous professional development (CPD) with lecturers from other institutions.
13	analyse the effect of teaching and introduce changes in an evidence based way.
14	set their own goals for professional development.
15	attend training for lecturers at the university.
16	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)
17	participate in conferences about teaching in higher education.

### Pedagogical scales (clusters) of attitudes

P2-1 Motivation and self-regulation for CPD (q. 2, 14, 15, 16)

P2-2 Pastoral interest (q. 3, 4, 5)

P2-3 Reflection (q. 1, 10, 11)

P2-4 Evidence informed approach (q. 6, 7, 13)

P2-5 Knowledge sharing (q. 8, 9, 12, 17)

The statements in Part 2 are defined in the STEM-CPD@EUni project Roadmap, <https://ectn.eu/work-groups/stem-cpd/>

### List of statements about the CPD activities

1	reading books / journal articles on teaching and learning in HE.
2	attending presentations about teaching approaches.
3	attending webinars about teaching and learning.
4	attending hands-on workshops on specific continuous professional development (CPD) topics.
5	following online courses / MOOC about teaching and learning.
6	attending conferences on teaching and learning in HE.
7	attending a summer school on teaching and learning.
8	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).
9	attending workshops that are organized specifically for STEM lecturers.
10	attending workshops that are organized generally for lecturers from different disciplines.
11	collaborating with a peer-lecturer on a redesign of a course.
12	getting peer-feedback on own teaching practice from a colleague.
13	collaborating on a teaching innovation project.
14	getting personal coaching / support by a pedagogical expert.
15	getting mentoring from an experienced colleague.
16	getting just-in-time support on a specific teaching and learning issue.
17	giving mentoring to a junior lecturer.
18	giving workshops to other lecturers.
19	participating in a teaching and learning network or a special interest group on teaching and learning in HE.

### Pedagogical scales (clusters) of CPD Activities

P3-1 Imparting information (trainer-centered) (q. 1, 2, 3)

P3-2 Learning facilitation (person-centered) (q. 4, 5, 7, 8, 9, 10)

P3-3 Collaboration (q. 11, 13)

P3-4 Mentor-mentee support (q. 12, 15, 17)

P3-5 (Personal/individual) expert support (q. 14, 16)

P3-6 Knowledge sharing (q. 6, 18, 19)

The statements in Part 3 are defined in the STEM-CPD@EUni project Roadmap, <https://ectn.eu/work-groups/stem-cpd/>

## User Case peer-evaluation form

1. Title of the User Case reviewed \*

2. Name of the evaluator \*

3. Introduction and challenge \*

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Main challenge/problem is well described.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connection of challenge to Roadmap questionnaire is clear.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Please give detailed remarks and comments about the introduction and challenge description.

5. Local context, goals and expected impact \*

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Challenge is connected to the local context.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Background of the participating local teaching staff is well described.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local CPD goals are realistic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expected impact of the CPD user case is realistic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Please give detailed remarks and comments about the context, goals and expected impact.

## 7. CPD Activities, materials and implementation \*

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Planned CPD activities are in alignment with the local culture and implemented in collaboration with their fellow lecturers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CPD activities planned take place in a blended learning environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planned CPD activities are closely related to teaching practice/work space learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Please give detailed remarks and comments about the CPD activities and implementation.

9. What were the strength(s) of this User Case? \*

10. Name 1-3 specific recommendations for improving this User Case? \*

11. This user case and STEM-CPD activities described could be used/applied for CPD in my home university.





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