How to Develop an eLearning Module In-House

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Introduction

This document provides guidance on the development of e-learning modules, with a focus to develop an e-learning module *in-house* [1].

Several modules have been developed by APLMF and APMP according to this scheme, for example:

- Pre-Packaged Goods
- Measuring Rice Moisture
- Verification of Truck Scales
- Calibrating Infusion Pumps
- Measurement Models
- Calibration of Liquid-In-Glass and Digital Thermometers
- Humidity Measurement and Thermohygrometer Calibration

All of these modules are available for free on the PTB e-learning platform https://www.qi-learning.ptb.de. To get access to the courses, please contact:

- For APLMF: policy@aplmf.org or secretariat@aplmf.org
- For APMP: apmp_secretariat@kriss.re.kr
- For PTB: rebecca.bahrmann@ptb.de

Developing an e-learning module: process, roles and skills

Both approaches – letting an e-learning module be implemented by an external consultancy and creating the e-learning module in-house – have their justification. Before we discuss the pros and cons as well as the implications, let's take a quick look at the stages in the development process of an e-learning module (see Fig. 1), and the roles that are involved (see Fig. 2).

In the beginning of each e-learning module, there's the idea: why should be develop an e-learning module? Developing an e-learning module is quite resource-consuming, so you should make sure that effort justifies the investment. The result of the process is a ready-to-use e-learning module, or – as it is called in Fig. 1 – WBT (which stands for „Web-Based Training).

[1] There is another guideline available (Guideline 8: „How to develop an eLearning Module"), which describes the procedure for e-learning modules developed *by an external provider*.

Download Guideline 8 (external production) here.

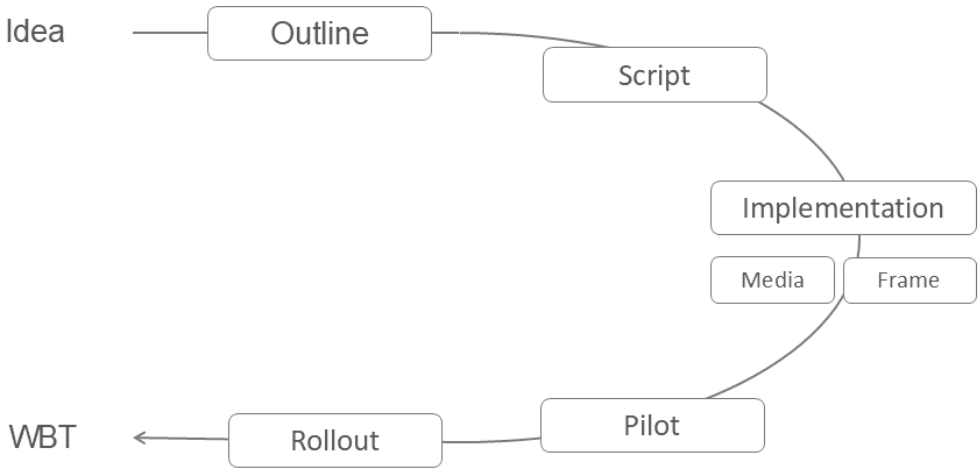


Fig. 1:The process of developing an e-learning module

The development process comprises the following stages:

1. **The outline**

   In the outline (or concept, or exposé … there are several terms used in different projects). In the outline, you will at least specify:

   - The learning targets
   - The target group
   - A rough structure of your module

   You can specify further aspects, like the pedagogical approach (linear, adaptive …), the kind of media you'd like to include, available material, design samples etc.

2. **The script**

   In the script, the e-learning contents are described in detail. You'd formulate the learning texts, describe/scribble the illustrations, develop the storyboard of videos or animations, create the questions, answers and feedback of quizzes and so on.

   The script is the basis for the next step, the implementation, which is why the main part of guideline 8 (which focusses on the implementation by an external provider) mainly refers to this scripting stage and provides the appropriate templates.

3. **The implementation**

   In the implementation stage, the e-learning module is actually produced by means of a special software called „authoring tool". With the authoring tool, you'll create the module pages (or screens, or whatever you want to call it), including the contents. Contents can be simple formats like text and images, but also more advanced formats like animations, different kinds of exerices (e.g. multiple choice, drag&drop, free text input …), and other interactive elements (e.g. hotspot images, flashcards …). Which elements are available depends on the authoring tool.

   Another part of implementation is the creation of multimedia elements. For example, to create videos or images, ususally you'd use specialized editing software.

(Authoring tools come to a limit here, even though they increasingly provide editing features for these kinds of media as well).

This is why in Fig. 1, we split the implementation part into „Frame“ and „Media“, with „Frame“ referring to the implementation by means of the authoring tool, and „Media“ referring to the development by media with other tools.

4. **Piloting and roll-out**

   The subsequent steps after implementation are piloting (i.e. letting the e-learning module test by a group of users) and roll-out (i.e. making the module accessible to the target group).

What players are needed when developing an e-learning module? And which skills do they have to have? This is what Fig. 2 illustratres. It shows the roles involved in the process. (illustrated by the colored figures) and their relevance in the different stages of the development process (illustrated by the size of the figures. The bigger a figure is, the more relevant is it in the respective stage).

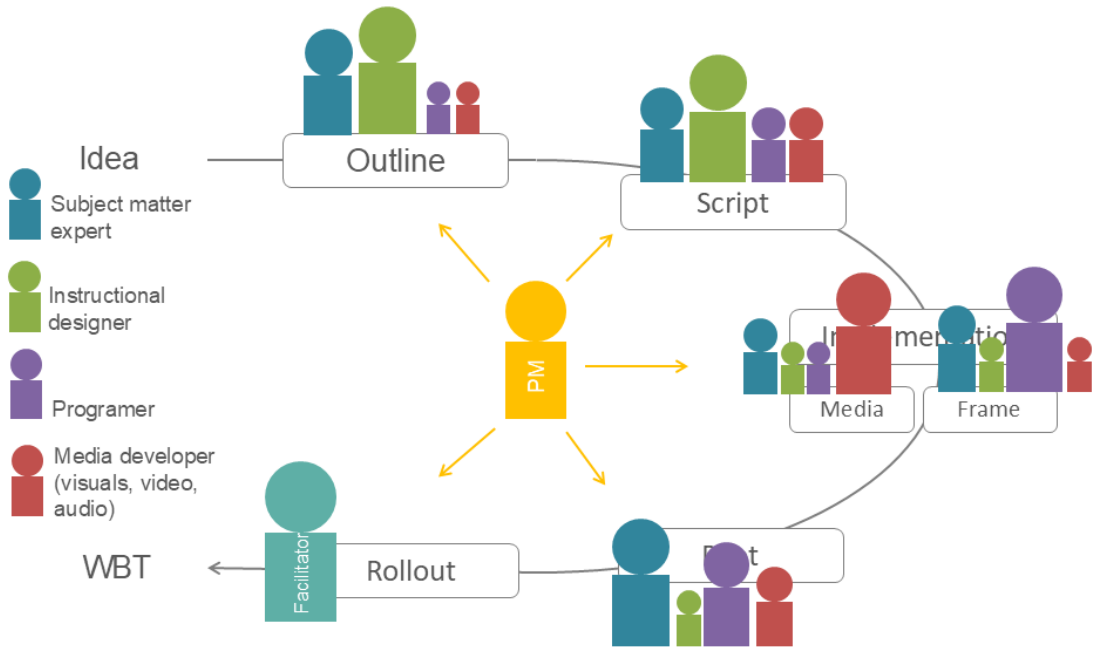


Fig. 2: Roles involved in the development process

1. **Subject-matter expert**

   The subject-matter expert is the one who knows about the content of a module. If it’s a module about measuring rice moisture, the subject-matter expert should be very experienced with the methods and practical application of rice moisture measurement. Very often, subject-matter experts are also trainers, teaching the subject in face-to-face trainings.

2. **Instructional designer**

   The instructional designer is an expert on the method of e-learning. He/she doesn’t necessarily have to be familiar with the subject of the module, but he/she has to know

about e-learning didactics, i.e. how to present contents online in a most comprehensive way. He/she should also have an idea of the technical possibilities and the effort involved.

3. **Progammer (= the implementing party)**

   The implementing party is sometimes also called the „programmer“, even though actual programming is usually not necessary any more when developing an e-learning module. The software used to create an e-learning module, the so-called „authoring tools“, are quite sophisticated and allow the realization of complex elements without having to use code. So the „implementing party“ basically needs to know how to use the authoring tool – which can be very easy, or very complex, depending on the tool.

4. **Media developer**

   The media developer/s, as it says in the name, develop the multimedia elements, which in e-learning modules are mainly images and videos, sometimes audio as well.

5. **Project manager (PM)**

   The project manager steers the entire process and coordinates the contributions of the different roles.

Does it require a different person for each role?
No. One person can take offer several roles. In the „in-house“ approach, for example, the subject-matter expert takes over the role of the instructional designer as well as the implementing party. In external agencies on the other hand, the roles are usually separated.

Can only one person fulfil one role?
Again no. Several persons can share the same role. For example, there can be more than one subject-matter experts contributing to the e-learning module.

In-house vs. external production

Depending on whether you choose the „in-house“ or „external production“ approach, the tasks of the different roles varies:

In both cases, it’s the **subject-matter expert** who provides the expertise.

- In an external production, he/she not only to provides the material, but he/she must also be available for the ongoing dialogue with the implementing party. The content is usually delivered in a specific format that the implementing party and the subject-matter expert agree on beforehand. (Guiddline 8 provides a variety of templates for that). There will also be regular feedback loops to ensure that the deliveries are „interpreted“ correctly by the implementing party. This can be a time-consuming and tedious process, being the more challening, the bigger the „feedback team“ is.
- In an in-house production, the subject-matter expert usually also takes over the role of the instructional designer and the implementing party. Therefore, there’s no communcation gap to bridge. In the projects mentioned above, we actually skipped the script stage, and moved on to the implementation directly. The time used for feedback can be neglected at that point. However, if it is the first time for the subject-matter expert to implement the course, it will take (even more) time to get familiar with the authoring tool. This time investment pays off especially if the subject-matter

expert plans to implement more than one course. With a growing routine, the time needed to develop an e-learning course, will significantly decrease.

In any case, you can keep in mind:

The subject-matter expert needs to invest quite a lot of time in the development of the e-learning module! The amount of time is very often under-estimated.

The **instructional designer** provides the methodological e-learning expertise.

- In an external production, the instructional designer is usually employed by the service provider/agency. Very often, he/she ist he contact person to the subject-matter expert/s in collaboration with whom he/she develops the script. In an e-learning agency, the instructional designer usually has an educational background, and is not identical with the „programmer“ (who has a technical background).
- In the „in-house“ approach, the instructional design is usually done by the subject-matter expert him/herself. To qualify for that role, he/she can receive a training, and - if he/she is a face-to-face training for the subject - the experience from these onsite trainings can also be very beneficial.

The **implementing party (or programmer)** cares for the technical realization of the e-learning module.

- External agencies usually use their own tools to implement a module, mostly commercial tools which comes with licence costs. This enables them to create very professionally looking modules, both in functionalities and in design. However, this implies that updates or changes in the module can only be made by the external provider.
- In in-house productions, the implementation is done by the subject-matter expert. The style might not be so professionally looking, for 1) the subject-matter expert is not a design expert, and 2) the authoring tool used is often not a costy commercial tool. For the projects mentioned above, for example, we used the free-of-cost open source authoring tool features provided by „Moodle“. With that, the subject-matter expert can always and without restrictions modify and update the content whenever necessary.

What differences are there concerning the **media developer**?

- External agencies usually employ professional medial developes, often specialized on one kind of media (e.g. video, images, animations). They would create the media required specifically for the e-learning modules, ensuring a consistent style.
- In in-house productions, if there are no professional media developers available, the subject-matter expert will create the media him/herself with common software like MS office tools; in the trainings mentioned above, we have used powerpoint presentations to create explanatory videos, for example. Or he/she will use media available in the internet, like embedded videos from Youtube or open source images[2]. That might give the course a more handmade look and feel.

[2] Copyright must be taken into account!

The table below shows the implications of the two approaches – external vs. in-house production – on a glance.

	External production	**In-house production**
Subject-matter expert	• Delivers content in a pre-defined format • Available for queries from the external agency • Available for regular feedback loops	• Collects material for the e-learning course
Instructional designer	• Develops the script (in cooperations with the subject-matter expert) • Usually a specialized employee of the external agency	• Subject-matter expert is also the instructional designer • Script stage can be skipped,
Programmer (implementing party)	• Implements the course by means of the authoring tool owned by the external agency • Usually a specialized employee of the external agency	• Subject matter expert implements modules him/herself • Usually by means of a free and open source authoring tool
Media developer	• Develop media by means of professional software • Usually a specialized employee of the external agency	• Subject-matter expert develops media, e.g. by means of open source tools, MS office tools … • Re-using of media (e.g. Youtube videos, Creative commons pictures …)
General implications	• Professional design • Dependence on service provider for updates/changes • Comes with high costs • WG members need time for communication with external agency	• Usually a more „hand-made“ style • Independence from service provider for updates/changes • Comes with low costs • WG members need time to acquire e-learning specific skills

Table 1: Differences in tasks depending on production approach

Content to use for an e-learning module

A huge benefit of e-learning is that individual learning styles can be adressed.

- There are learners that like to read – give them a PDF document.
- There are learners that like to watch – give them a video.
- There are learners who like to try out – let them explore something.

There are a lot of contents that you can use in an e-learning module.

If you develop an e-learning module with an external agency, it will be easy for you: the agency will create any kind of media for you (and for a financial consideration), be that images, animations, videos … they have the means to make it real.

For in-house productions, this can be more challenging. Unless your organization has a media department capable of creating all the media required for your e-learning module, you'll need to consider other options.

Powerpoint to video

First think of your own training material. You certainly have trained participants earlier on the subject, and you certainly have created some slides for that. Take these slides and convert them into a video!

Here are some tipps:

- Create you slides in an appealing way. Do not cover them with text, but use visual information like pictures, schemes, diagrams instead.
- Type down what you'd say when presenting these slides to an audience. These are your speaker notes that you can use when recording your presentation as a video.

In this tutorial, Mylene from the sixth grade shows you how you can record your powerpoint as a video: https://www.youtube.com/watch?v=Y5dgwwa5XRA
Try it out, and you will see that it's really easy – and that it also takes some time. But the result is great for e-learning.

Creative commons material

Another possibilty is to use material from the internet. There's plenty of material, however you need to consider some things if you want to make use of it:

- Take care of the copyright!
  You cannot download an image from a website, for example. To use an image legally, the creator of the image needs to permit its usage, e.g. by issueing a creative commons license. „Creative commons" is a licence often used for media content, and it means: „In general, you are free to use it". Usually, what you need to do is to mention the author. However, there are some restrictions. For example, if the creative commons license has the extension „non-commerical", you are now allowed to use the medium for commercial purposes. Or, if it says „No derivates", you are not allowed to change the medium. You can just take it exactly like it is. And so on. Find more information on the Creative Commons website.

Developing an e-learning module with Moodle

What is Moodle?

Moodle is an open-source learning platform, which not only offers to install and manage e-learning courses, but can also be used as an authoring tool. As such, it provides a variety of content elements that can be used.

The development of Moodle has started in the beginning of the21st century, and the Moodle community is quite huge. Therefore, you can find tutorials and documentation for almost everything that you can do with Moodle. In the following, we will present to you the main Moodle content elements, as well as referring additional information in the internet.

How to create a course on Moodle?

On Moodle, you can create a course room in a very short time. However, you must be authorized to do that. On the platform that PTB provides (https://www.qi-learning.ptb.de), only administrators are allowed to do this.

If you would like to develop a course on the PTB learning platform (https://www.qi-learning.ptb.de), please contact Rebecca Bahrmann (rebecca.bahrmann@ptb.de). She will arrange for a course room to be created for you.

Once the course room is created, you can start to add your content. The access level you need for that is „author“, which will be granted to you by PTB once you have had a training (or if you have experience in Moodle content editing obtained in another way).

Which content elements does Moodle provide?

In this chapter, we will briefly list the content elements that you can use on Moodle. The exact way how to implement them can be found in the internet. The Moodle community is huge, and you will find an answer on almost all of your questions.

Here are some tipps:

The most profound source of Moodle information is certainly the official **Moodle documentation** site: https://docs.moodle.org/. On this site, you will find instructions. from the very basic steps to expert knowledge.

A more comfortable way to get acquainted with Moodle might be video tutorials. Again, there are thousands of videos. The official Moodle tutorials, you will find in the **Youtube channel „Moodle“**: https://www.youtube.com/@moodle

In that channel, you will find several playlists. The elements below can be found in the **playlist: „Moodle Teaching Basics“ (4.2)**: https://www.youtube.com/playlist?list=PLxcO_MFWQBDc_NPTwCLqvhAfA9eGNYSNT

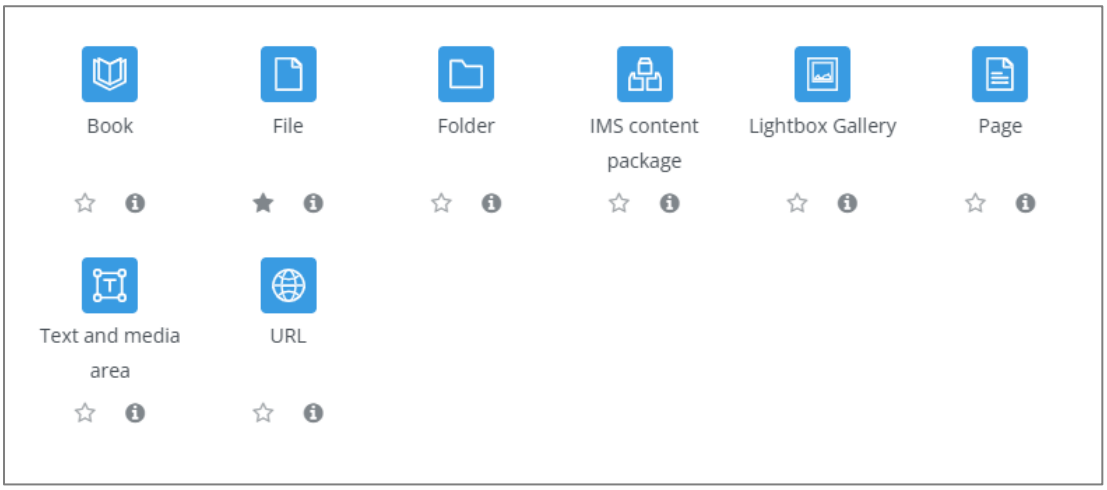
You can also see these elements „in action“ in the „Moodle Demo“ room on the PTB learning platform (Course: Demo: About Moodle | PTB International Cooperation).

Content elements

Standard elements in Moodle are elements that come with the core system. For those elements, no additional plug-in or module is needed.

The list below shows the main content elements on Moodle (version 4.2). They are split into two groups: Resources (which are „static“ contents, like text, links or images), and Activities (which is content that react on the users‘ input, like quizzes, surveys or communication tools).

Resources



- **Book:**
  If you want to connect pages to a kind of „chapter“, you can use the „Book“ element.

- **File:**
  With this element, you can inlcude a separate file. Users simply need to click on the link to open the file.

- **Folder:**
  The folder element enables a teacher to display a number of related files inside a single folder.

- **IMS content package:**
  An IMS content package is a collection of files which are packaged according to an agreed standard so they can be reused in different systems. The IMS content package element enables such content packages to be uploaded as a zip file and added to a course as a resource.

- **Lightbox Gallery:**
  The Lightbox Gallery enables participants to view a gallery of images.

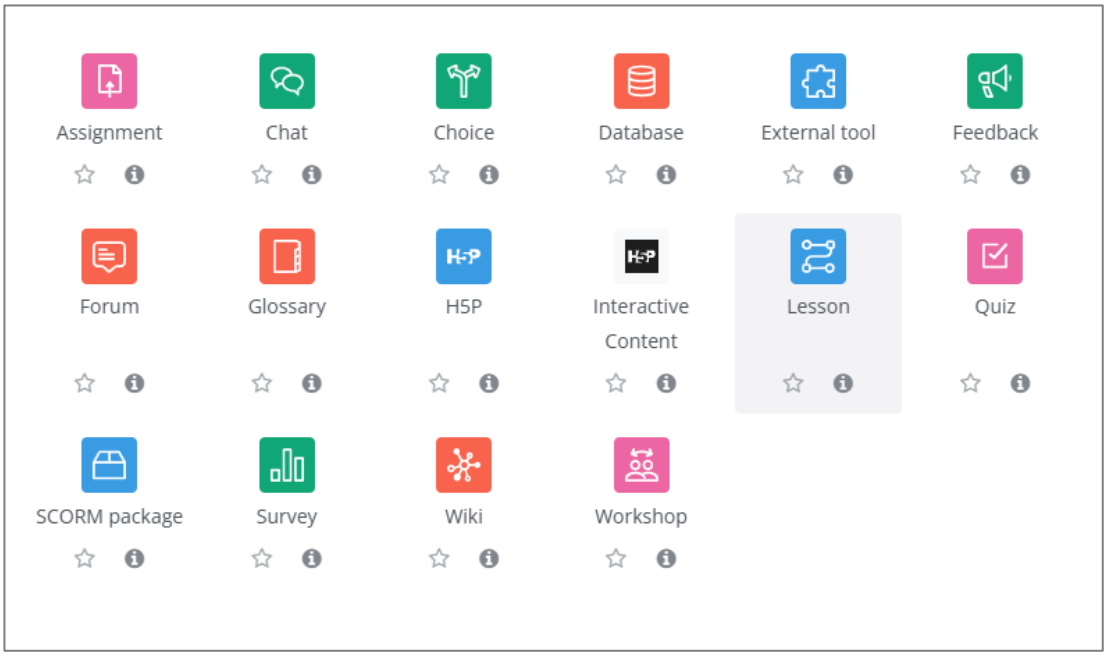
- **Page:**
  This element allows to include the same media as „Text“, however the contents are compiled on a sub-ordinate level. On the top course level, users will see a link that the need to click to access the content. So with pages, you can create a two-level

hierarchy.

- **Text and media area:**
  This is a regular text-editor to include text, images, videos, links etc. These contents will be displayed on the top level of the course, i.e. users can see them right away.

- **URL:**
  You can add a link within a text element, however you can also place it more prominent as a „stand-alone“ link.

Activities



- **Assignment:**
  The assignment activity module enables a teacher to communicate tasks, collect work and provide grades and feedback. Students can submit any digital content (files), such as word-processed documents, spreadsheets, images, or audio and video clips. When reviewing assignments, teachers can leave feedback comments and upload files, such as marked-up student submissions, documents with comments or spoken audio feedback.

- **Chat:**
  The chat activity module enables participants to have text-based, real-time synchronous discussions.

- **Choice:**
  This is an element using multiple choice and free text-input questions to get a feedback from your users. The answers will not be evaluated, e.g. there is no right an wrong.

- **Database:**
  Database enables participants to create, maintain, and search a collection of entries. As a teacher, you can comment and rate entries. You can also allow students to rate

and comment on entries (peer evaluation).

- **External tool:**
  The external tool activity module enables students to interact with learning resources and activities on other web sites. For example, an external tool could provide access to a new activity type or learning materials from a publisher.

- **Feedback:**
  The feedback activity enables a teacher to create a custom survey for collecting feedback from participants using a variety of question types including multiple choice, yes/no or text input.

- **Forum:**
  The forum activity module enables participants to have asynchronous discussions i.e. discussions that take place over an extended period of time. There are several forum types to choose from, such as a standard forum where anyone can start a new discussion at any time; a forum where each student can post exactly one discussion; or a question and answer forum where students must first post before being able to view other students' posts.

- **Glossary:**
  The glossary activity module enables participants to create and maintain a list of definitions, like a dictionary, or to collect and organise resources or information.

- **Interactive content:**
  H5P is an abbreviation for HTML5 Package - interactive content such as presentations, videos and other multimedia, questions, quizzes, games and more. With „Interactive content“, you can *create* new H5P elements.
  You can find a variety of H5P elements implemented in the „Moodle Demo room“ on the PTB platform: https://www.qi-learning.ptb.de/course/view.php?id=36&section=5

- **H5P:**
  This enables you to *re-use* (i.e. upload and add) existing H5P elements to a course.

- **Lesson:**
  A lesson can be used to create a linear set of content pages or instructional activities that offer a variety of paths or options for the learner.

- **Quiz:**
  The quiz activity enables you to create quizzes comprising questions of various types, including multiple choice, matching, short-answer and numerical. A quiz can be attempted multiple times, with the questions shuffled or randomly selected from the question bank.

- **SCORM package:**
  A SCORM package is a collection of files which are packaged according to an agreed standard for learning objects. The SCORM activity module enables SCORM or AICC packages to be uploaded as a zip file and added to a course.

- **Survey:**
  The survey activity module provides a number of verified survey instruments that

have been found useful in assessing and stimulating learning in online environments.

- **Wiki:**
  The wiki activity module enables participants to add and edit a collection of web pages. A wiki can be collaborative, with everyone being able to edit it, or individual, where everyone has their own wiki which only they can edit.

- **Workshop:**
  The workshop activity module enables the collection, review and peer assessment of students' work. Students can submit any digital content (files), such as word-processed documents or spreadsheets and can also type text directly into a field using the text editor. Submissions are assessed using a multi-criteria assessment form defined by the moderator/trainer/teacher.

How to get started

If you want to try it out yourself, just send an email to Rebecca Bahrmann (rebecca.bahrmann@ptb.de) to get access to the Moodle platform.

Once you have an account on that platform, you can get access to the „Moodle Playground“. This is a room where you can create Moodle content in a „safe space“.

If you are interested to get in touch with people who have created e-learning courses or you are interested to create a course yourself with a training session please contact:

- For APMP: apmp_secretariat@kriss.re.kr
- For APLMF: policy@aplmf.org or secretariat@aplmf.org