

# D. 2.5. Local Report: DIY Lab Specifications - Czech University

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Authors:

Miroslava Černochová, Tomáš Jeřábek

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<sup>1</sup> Processing the results and conclusions obtained from seminars and workshops with the academic staff of KCHDCH (Dr. Martin Rusek), KBIES (Dr. Petr Novotný), KVV (Dr. Jan Šmíd) and KITTV (Dr. Ondřej Neumajer, Dr. Josef Procházka, Mgr. Daniel Tocháček, Dr. Petra Vaňková, Ing. Irena Fialová).

## Introduction

Employees of four departments of the Pedagogical faculty UK in Prague (PedF) engaged to the preparations of DIYLab activities that are supposed to be realized as a part of the WP03 during the year 2015: IT & Technical Education Department (KITTV), Chemistry & Chemistry Didactics Department (KCHDCH, Fine Art Education Department (KVV) and Biology & Environmental Studies Department (KBIES). PedF focuses in its educational activities primarily on undergraduate training of teachers in various subjects for elementary and secondary schools. These departments do not provide only the didactic component but also the subject-specialisation component of teacher training of ICT, chemistry, arts and biology.

The representatives of the four above-mentioned departments met regularly during the period from October to December 2014 on seminars and workshops organized within the WP02. The aim was to clarify together the philosophical and pedagogical significance of the DIYLab idea as a part of the educational environment of the faculty; specify the form of the DIYLab on PedF in terms of the organization of teaching, the outputs of the students' learning outcomes and other didactic aspects; and to define the main frame for the preparation of the topics for the students' work and the form of the activities, which are going to be realized during 2015 with the students on PedF. These departments have never thought about and cooperated on things like this before. To the willingness and the interest to actively engage to the cooperation on DIYLab realization helped the fact that since 2013 all the departments of PedF have been participating in the university project PRVOUK. The aim of this project at the faculty is to promote an interdisciplinary cooperation of the departments within the support of a development of a subject didactics. The philosophy of the DIYLab project can be used as a medium for such cooperation in a pedagogical and scientific field.

This draft first sets the pedagogical specifications and bases for the DIYLab in the conditions of PedF; next it describes an organisational scheme in which it will be possible to implement the activities within the DIYLab. It specifies the technological needs and conditions of the DIYLab on PedF. It defines the form of possible outcomes so that they were publishable on a DIYLab Hub. It also defines instructions for a design of particular activities including defining evaluation methods for monitoring a progress in students' digital competencies.

## 1. Pedagogical specifications of DIYLab on PedF

The basis for thoughts how to draft DIYLab activities on PedF were six key requirements defined in WP01. At first sight, it seemed that the requirements were clear to all regardless the subject focus (biology, arts, ICT, chemistry, etc.). A group discussion showed the need for united agreement of how we will understand and fulfil these requirements within the DIYLab on PedF. By the analysis of specific examples of activities from a variety of fields we came to a conclusion that it is necessary at first to elaborate some of the mentioned requirements more precisely and then establish which of them will be key (main), which complementary and what will be their filling in activities within the DIYLab. Because it can't be managed that every activity designed for the DIYLab would fully fulfil all the six requirements.

Following requirements were established as the key ones. In some cases were more specified possible ways of their filling.

- (1) ***Inquiry-based***: it doesn't need to be always strictly an exploratory approach, problem-focused activity of students can be accepted. A degree of fulfilling this requirement is set individually depending on a specific activity.
- (2) ***Overlapping into practice***: the activities stress the use of acquired knowledge or developing abilities outside the school or their usefulness in practice or in common life. Therefore, the activity shouldn't end in itself and be used just for the school purposes, but it should be purposeful for any situations in common life of the students outside the classroom.
- (3) ***Requiring self-regulated learning***: student/group/team work independently, they decide on the procedure and pace on their own. They decide on the processing method and they are also responsible for the quality of their outcome and the timeliness of submission. The degree of fulfilling this requirement depends on how much the students work individually, whether they work also outside the classroom and what the role of the teacher is. In the DIYLab activity is the teacher a leader, so can function as a consultant, motivator, contract authority or as a manager of the activity. The DIYLab counts with a high portion of work of the students outside the classroom, or outside the university.
- (4) ***Using freely available HW and SW***: maximum effort to meet this requirement. HW or SW shouldn't be a barrier for a realization of the activity. The students will fulfil the activities not only within their courses at the faculty, but especially outside them, so their work shouldn't depend on commercial or licenced SW and HW that they could normally use at the faculty.
- (5) ***Requiring cooperation***: the cooperation during the activity usually appears between the students in couples or in small groups. Some activities may require cooperation among the teachers. The cooperation among the students at the faculty may be exercised on three levels:
  - a. within one course
  - b. among courses within one field
  - c. among fields (departments).
- (6) ***Supporting the development of digital literacy of students***: the development of digital literacy or the effort for its development is provided by using digital technologies in dealing with the activity. It can be done directly, where the technologies are implemented to the process of dealing with the activity as a necessary, or indirectly, where the students don't need to use the technologies for the activity itself, but they use it for creating an outcome for the DIY Hub (documenting the activity, digitalizing the outcome etc.).

The complementary requirements, those that don't need to be absorbed within each activity, are considered:

- ***Including topics from out-of-school activities*** and hobbies of students to the teaching. This is not about whatever topics, but the topics that are closely related to the curriculum or to the students' study.
- ***Support of cross-curricular relationships*** (interdisciplinary overlap). None of the courses of a university study programme is taught in isolation. Nevertheless, from the reasons of

organisational, temporal and content demands it is often not possible to realize this requirement fully on PedF.

## **2. Organization scheme of DIYLab**

The DIYLab activities are going to be dealt with the students on PedF within compulsory or optional courses provided by the departments. The activities are going to be a part of these courses; students can work on them not only at the faculty, but also outside. Students are supposed to work on the activities mainly outside the classroom. The outcomes will be parts of assessed tasks, in most cases necessary for successful completion of the course. Some activities may be solved also within various compulsory or optional excursions organized by the departments.

DIYLab activities are going to be dealt with within one-semester courses; it means they shouldn't exceed one semester. In the form of a week or two-weeks excursions the time allocation may be much smaller.

Solving each activity will always require a cooperation of students (at least a team of two) whereas the distribution of roles and responsibilities will be let primarily to the students themselves.

The DIYLab activities will be parts of students' assessment. Therefore, it is necessary to deal with it, by whom and how the work will be evaluated. No general framework for students' works assessment can be established; it will depend always on a single activity. The assessment can come from the teacher, or in case of an interdisciplinary cooperation from more teachers; in some cases the assessment can come from the side of the students themselves.

A great attention will be paid to a contribution rate of the activity to improve digital literacy of students. We will use several methods including a questionnaire for monitoring and exploring the level of digital literacy achieved by the students.

## **3. Technological support of DIYLab at the Faculty of Education**

Within the DIYLab mostly standard and generally available SW and HW will be used. The HW equipment will be the commonly used one or there should be an adequate alternative (e.g. camera and tablet with camera). Specific cases count with special equipment (e.g. use of digital microscope); nevertheless, it can be assumed that this equipment is available in other universities or workplaces. Within SW it counts with Freeware or Shareware licences, or trial versions – it means a SW with a zero cost.

Even though, KITTV has computer classrooms with professional SW equipment for various ICT use, the stress will be paid on finding adequate alternative SW satisfying necessary needs of the students.

Within HW it is expected to use other devices – not only the typical ones (scanner, data projector etc.) if the department in the project owns at least one piece of this equipment: digital camcorder, digital camera, (stereo) microphone, dictaphone, tablets (iOS, Android), digital microscope, BAT detector.

As a support of a collaborative approach to learning and the students' cooperation itself can serve a Moodle that has been used on PedF recently as a support of full-time and distant form of study.

Within the DIYLab on PedF it is being considered that each activity will be recorded for documenting its process. These records, except publishing on the DIYLab Hub, can be used for the overall assessment of the DIYLab on PedF.

#### **4. Characteristics of outcomes**

The students' activity will lead to a creation of teaching / learning materials that will be published as a digital object on the DIYLab Hub, so that everybody interested in the particular issue have a free access to them. These outcomes may have a diverse form. Even though, the final restrictions will come from the side of the DIYLab Hub and its technological capabilities, we count with the following possible outcomes (those are just an inspirational examples):

- video record (e.g. video tutorial)
- set of photographs / graphics (e.g. art gallery)
- audio record (e.g. podcast)
- study or methodological text, manual
- lesson plan
- outcome of the SW (e.g. models, objects for IWB, created programs, meta files of applications)
- webpages, presentations (PPT, Prezi etc.)
- web applications
- an access to an experiment in a distant laboratory (e.g. stream from a camera, data from a GPS)
- database
- on-line course
- project documentation of a technological solution of a problem (e.g. a draft of an experiment for a distant laboratory)

#### **5. Instructions for an activity design and its structure (Guideline for authors)**

##### **I. Name of the activity (Czech, English)**

##### **II. Introduction**

Introducing the activity to students, gaining their interest in the issue. In this part of a description should be mentioned how to gain students' attention, how to raise their interest in solving the problem and realize the activity. Students should know what the problem looks like and why they are solving it. It is important to clearly set the task and formulate the main question of the activity.

**III. Target group**

A successful solving the task in time often assumes certain knowledge, experience and skill from diverse fields. The activity may not be suitable for everyone. It is necessary to mention the target group that the activity is suitable for (age, level of study, field of study, etc.).

**IV. Task**

A description of the activity contains a formulation of a task including an explanation of the aim. The task says what exact results the students should come to when solving it. If the students perform different roles within the activity, it is necessary to characterize these roles, describe the focus of each role, the responsibility of the actors and the way the results of their work will be linked, shared, submitted and evaluated. In case of full responsibility of the students while establishing the roles, it needs to be specified how the work of each student will be evaluated.

**V. Process**

The process describes main phases of solving the task. It may include a detailed schedule of work. A time allocation for the activity needs to be set.

**VI. Outcome**

In this part of the activity description are defined the outcomes, formal requirements of each outcome, their parameters, type and form in which they will be published on the DIYLab Hub. It can include criteria for an acceptance of outcomes as a solution of the activity.

**VII. Evaluation**

Here should be criteria for the evaluation of students' participation on the work and a quality of its outcomes. The student should understand the way of evaluation of the outcomes and procedures.

**VIII. Conclusion**

Here it is necessary to mention how the activity will be assessed, what to say to the students at the end of the activity, how to close it and include its results to the context of studied issues.

**IX. Credits**

How is the work of the students going to be marked?

**X. Specification of the activity focus according to the DIYLab requirements**

Definition by range: 0 – none, 5 – maximum:

Cooperation	Research focus	Cross-curricular relationship	Support of digital literacy	Relationship with the curriculum	Self-regulating the activity

## **6. Scheme of evaluation of the development of digital competencies**

For monitoring the development of digital competencies during the particular activities in the DIYLab on PedF were established following evaluation methods that focus on evaluating from the point of view of the members of the pedagogical process, or the activity. The students involved to the DIYLab on PedF are students of teaching, therefore, a considerable degree of self-reflective abilities is assumed. In this case it is a self-reflection on the development of digital competencies in theoretical and in practical field. That's why we suggest to use an online questionnaire distributed to all students as a key evaluation tool after finishing the activity. Next tool should be a questionnaire for teachers, or a short manual with questions for a reflection from the teacher's point of view including a comparison with the specification of the activity focus in the objective. An integral part of the evaluating tools is also evaluation of the quality of the outputs.

For the evaluation of development of digital competencies of the students more tools and methods will be used (method of observation, interview, video records documenting students' work, discussion with students, students' blogs, etc.).