Continuing Professional Development in Vocational Education and Training

Unconventional Machining Methods

Inspiration for online teaching

COVET

In the COVET project, we have collected many great examples of teaching that have been transformed from the classic off-line version into a modern online learning method.

These sample lessons have been created by VET teachers from different EU countries. We present them to you as inspiration for your work.

The lessons are particularly suitable for vocational teachers, but can also serve as a training tool for teachers, trainers and lecturers in other educational settings.

All sample lessons, training materials as well as all information about the project are available at:
https://www.covet-project.eu/

Co-funded by the
Erasmus+ Programme
of the European Union

Unconventional Machining Methods

(Fully online lesson for long-time closure of schools)

1st year of a two-year post-apprenticeship Operational Technology course

Off-line version of the preparation:

Goal: Students will understand the reason for the development of unconventional machining methods. They will understand and be able to explain their division, advantages and disadvantages. They will be able to explain the principle of each of the unconventional methods discussed. They will be aware of their possible applications.

Note: This subject is taught in two-year follow-up courses. The students have already been introduced to this topic during their three-year apprenticeship programme. Therefore only six lessons are dedicated to this difficult topic.

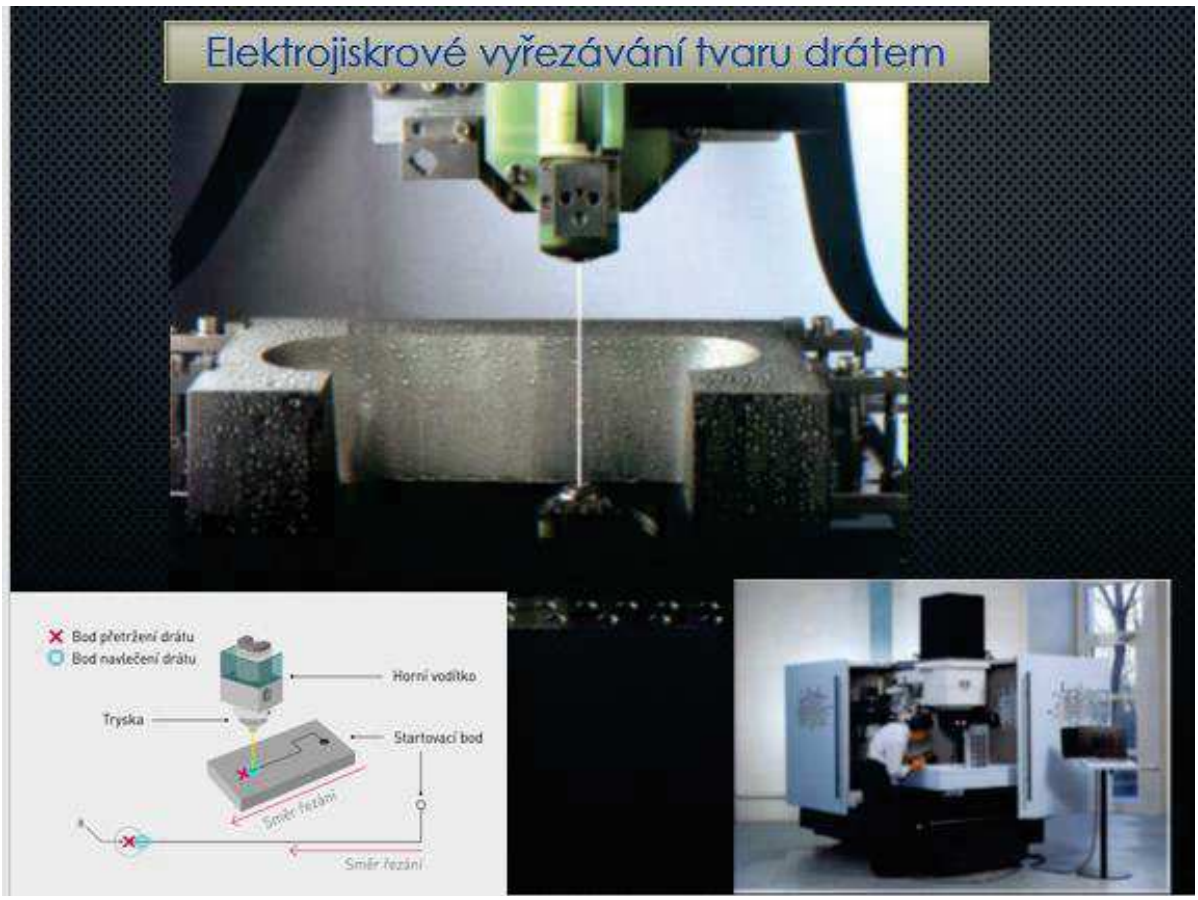
Teaching methods: explanation, demonstration of tools, watching and analysing videos

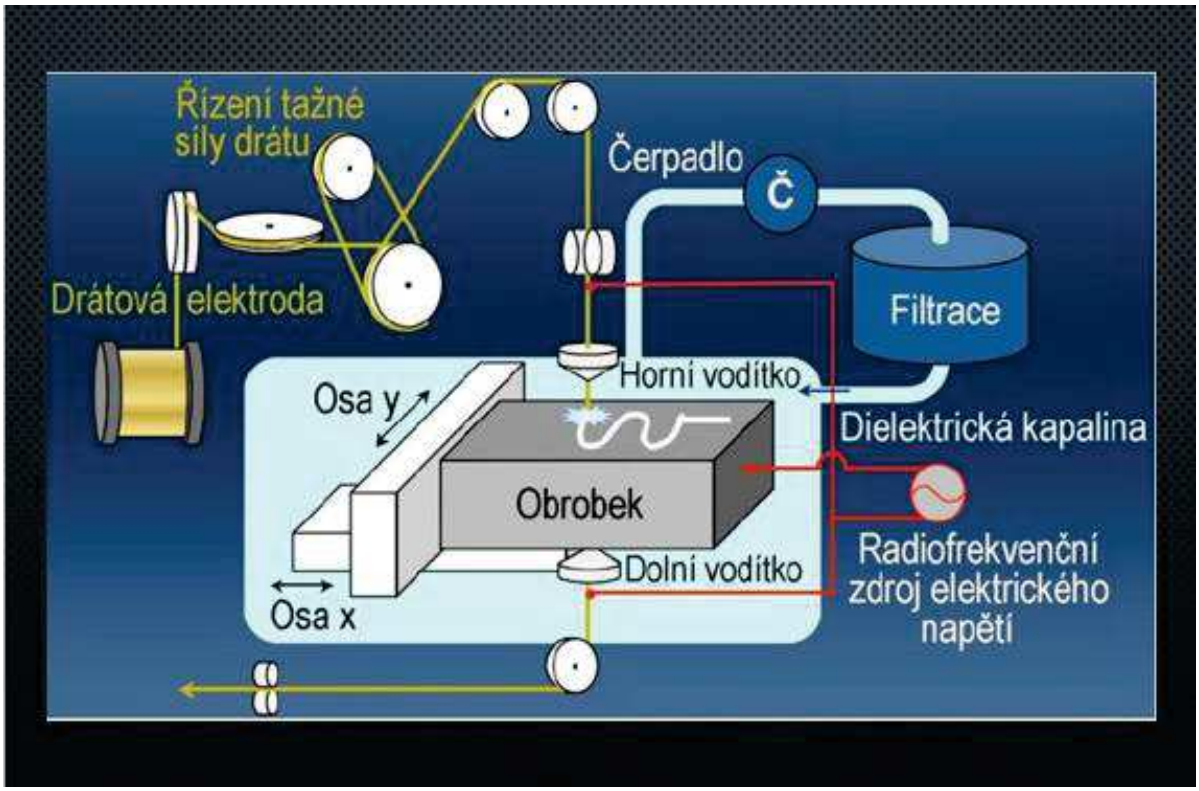
Aids: *Presentation* ***with slides of principles, photos of machines for unconventional machining, photos of the layout and functions of parts inside the machine, machines at work***

The course of activities in the lesson:

- Problem-based interview and gradual discovery of the reason for the development of non-conventional machining methods (NMO)
- Problem-based discussion and explanation of the individual principles of UMM, **Concepts:** dielectric, current pulse, electrodes, electrolyte, ultrasound, laser, pressure units MPa, bar, energy absorption, plasma
- Writing down and drawing the principles in their notebooks
- Comparison of the advantages of individual UMMs for specific machining of a specific material
- During the 6 lessons, review of knowledge from previous lessons with assessment of students' performance with grades
- This is a very difficult topic, however highly important as the students will need such information in their everyday working life. There is no way to avoid it. They have to learn it. The answer is in setting reachable gradual goals and provide the students with sufficient feedback.

A sample of a few slides from the 41 slides of the *PPT presentation*:





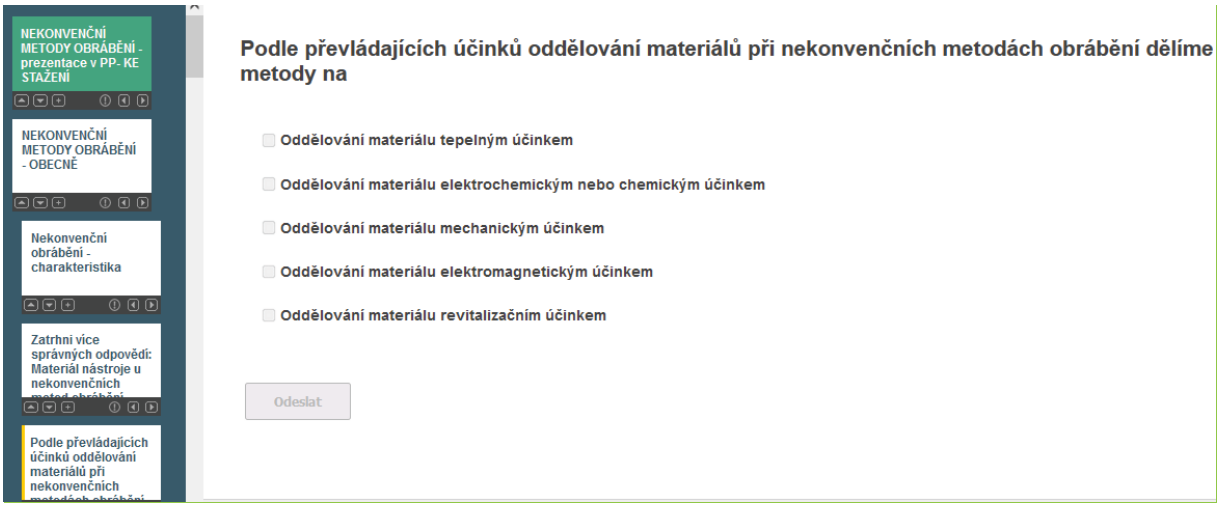

FANUC
04 12 2012

Online version of the preparation

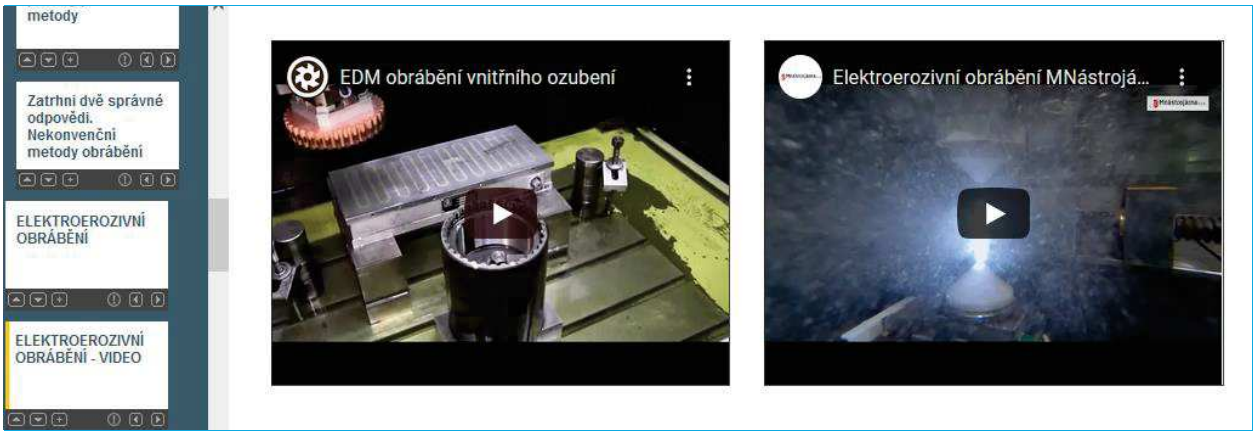
As it is a demanding subject, it was not possible to explain the subject only through Teams using presentations. Therefore, I decided to create an e-learning tutorial. The tutorial is divided into small individual parts - chapters. The topic of each chapter is explained and immediately after the explanation there is a series of simple questions on the explained material, which the student answers. The correct answer is immediately displayed and the student has the opportunity to change the answer. He can go back to the explanation page... **Immediate feedback** is very important for students, so they liked this way of teaching.

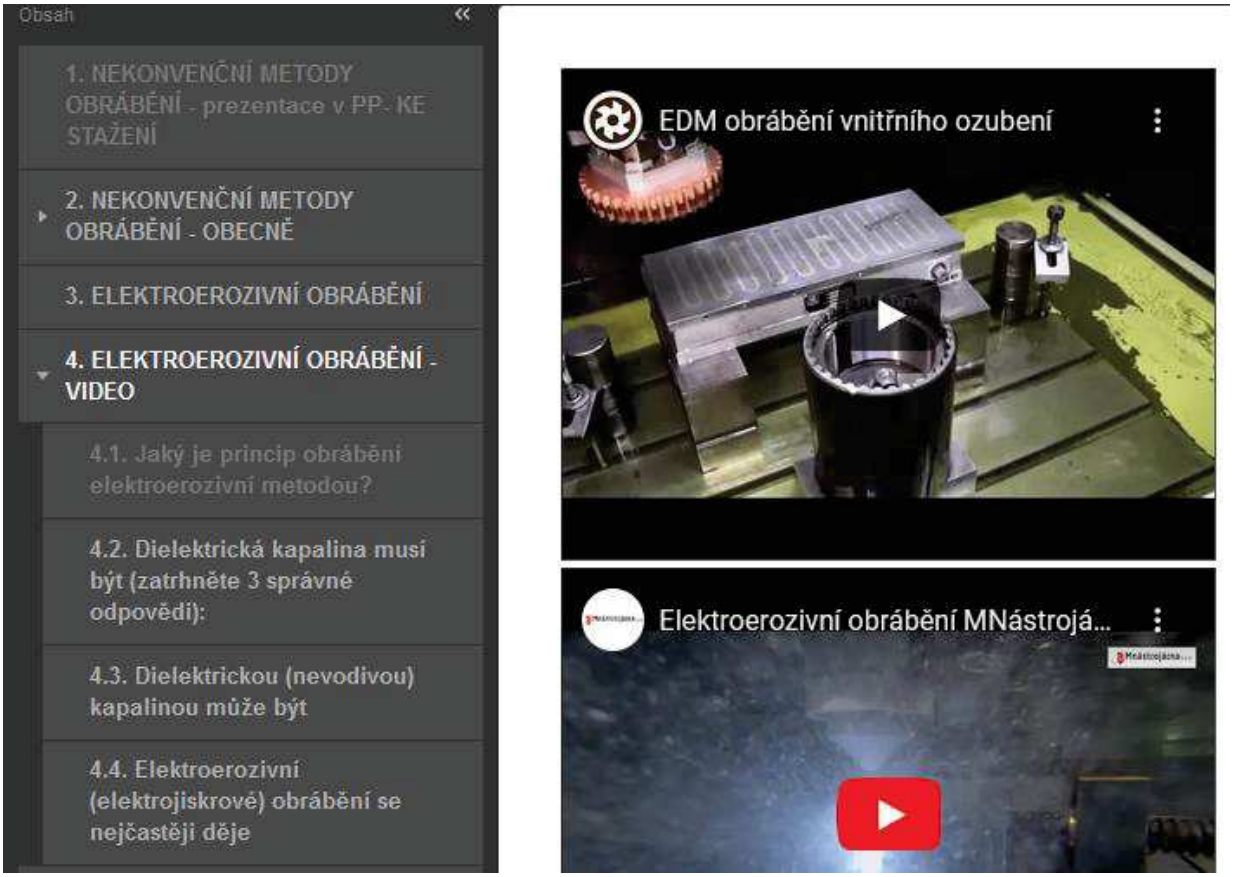
During the course of explanation of the topic, for example in this case the Unconventional Machining Methods, they could use the course as many times as they wanted and the time limit was pretty generous. After they had covered all the material, the course was open for them for one or two more days and the following day they wrote a graded test with the same questions they answered in the course. Because they also had a long time to write the test and could use all the information available to them, including the teaching texts I had put in Teams, the grading was pretty strict. Sufficient – passed grade started at 75% of the possible points met. The grading did not, of course, reflect their knowledge, but primarily whether they had studied everything they were presented with. Almost all of them wrote the tests and I did not have to remind them. Sometimes they forgot, and then immediately wrote to me to ask if I would make the test available again. The goal was to get them to learn because the oral explanation through Teams, even if it was clear, they forgot any information very quickly. Distance frontal teaching without contact with the students loses its effectiveness almost completely, which was unfortunately fully demonstrated this school year in the follow-up to the material they were supposed to know from other subjects.

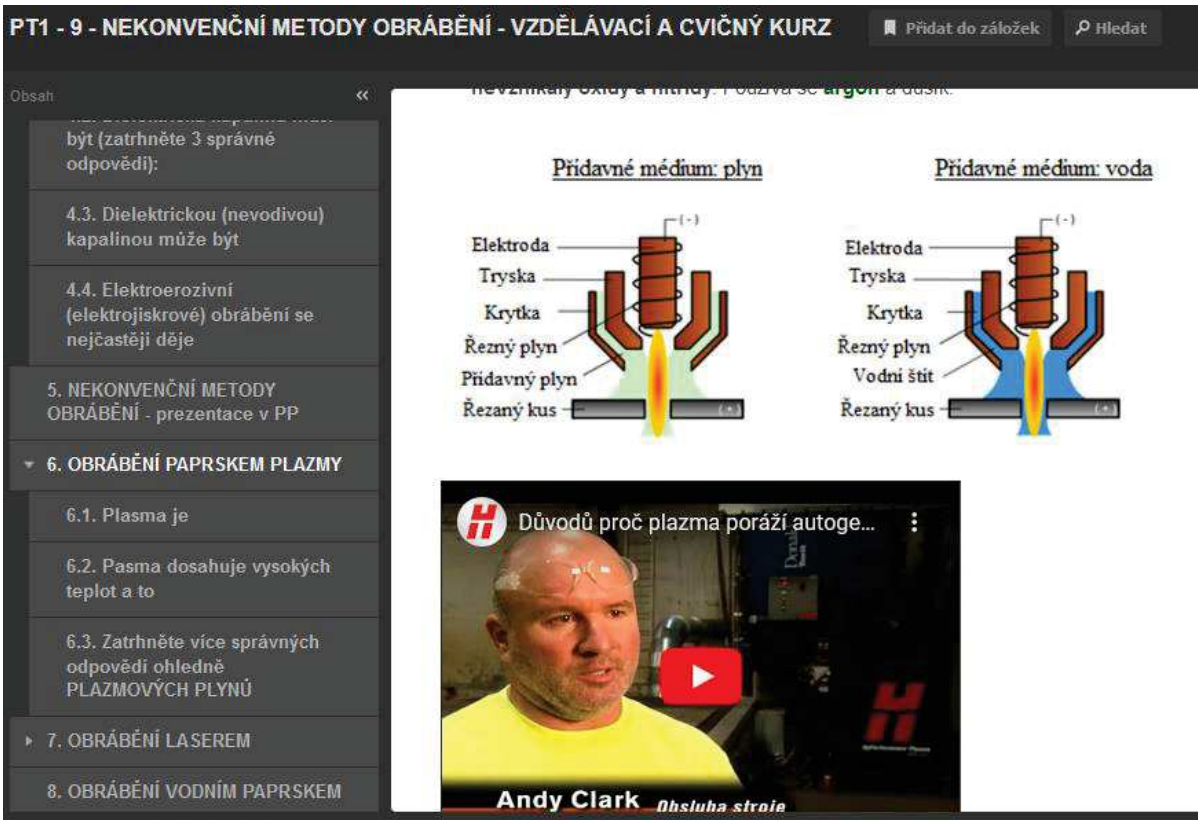
Course demo in iTrivia (editing mode):



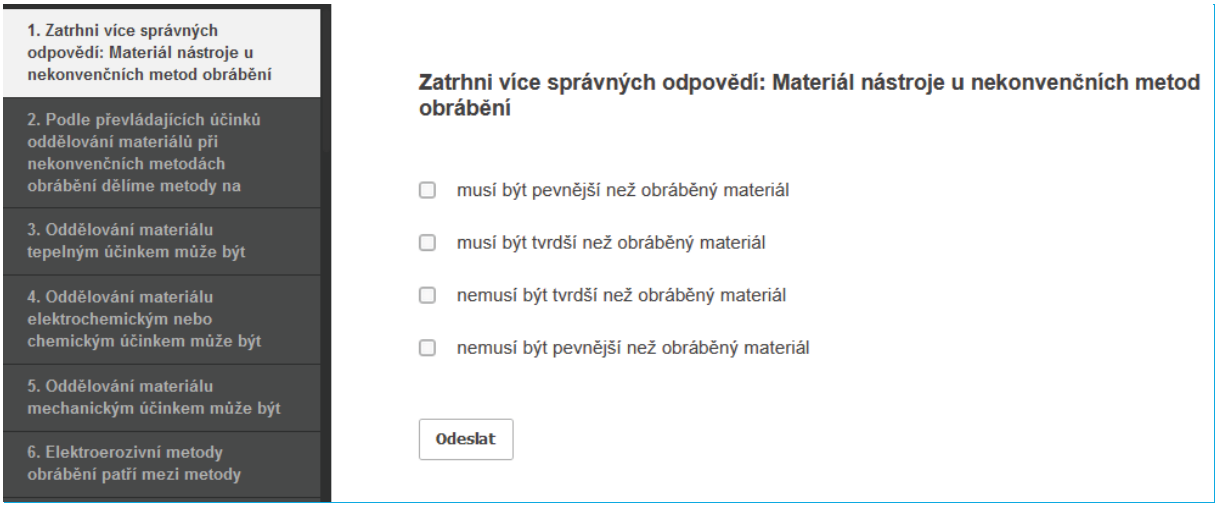
Option to embed videos into iTrivia:



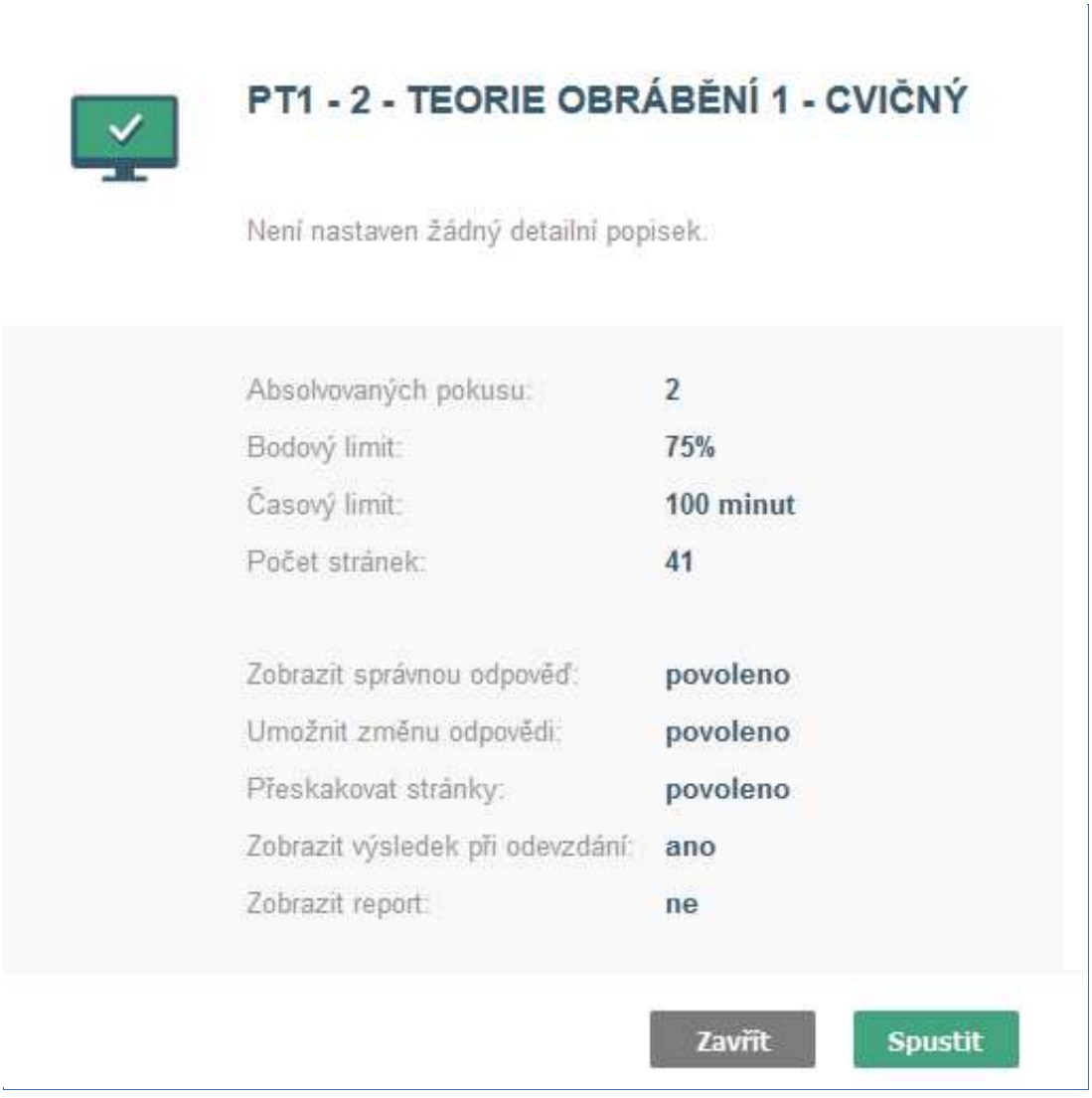




Sample of the test homepage and other pages of the graded test:



Sample pages from the mock test:



The course of teaching has therefore changed as follows:

- Explanation of the topic by means of a presentation (it was not possible to use the videos, most of the pupils had a slow video via Teams)
- Activation of pupils through chat responses (the oral response usually took a very long time before the pupil turned on the microphone...)
- I made the Unconventional machining methods course available for them
- Assignment of the graded test, evaluation of the test and recording of grades

Preparing a longer course in an e-learning presentation is very time-consuming (4 to 6 hours), because explaining, inserting pictures, links, etc. is much more difficult to make than in a PPT presentation. A simpler way has also worked well for me, where students were forced to follow the explanation and study from the teaching texts to complete a test I prepared for the explained material. The questions and answers in the test exactly matched the teaching texts and the explanation using the PP presentation.

In the first phase, the course was just a trial one for EXERCISING their knowledge. See pictures above. Students could run the test as many times as they wanted and for a very long time. The test was set up in such a way so that they were shown the correct answers and had the option to change the answer. The position of the correct answers changed with each trial. The PRACTISE EXERCISING test was open for one or sometimes two days. So they had the freedom to choose when to study. The following day, the same graded KNOWLEDGE TESTING test was open for 24 hours, only the **first full attempt** was valid (there were internet outages, I can see in iTrivia when the student started the test and how many sites they visited) and sufficient - passed grade started at 75% pass rate on the test.

Feedback on the lesson

After the school opened, I discussed effectiveness of this teaching with the students. In one class of the apprenticeship course with a high school diploma, every pupil in the class expressed his or her opinion. All of them agreed that without the iTrivium tests they would not have known anything at all, only the tests forced them to learn. Some of the pupils in the class who could follow the

explanation said that they did the tests according to what they remembered from my explanation. Some didn't manage to follow the explanation all the way through and they praised the teaching texts I wrote and put into Teams. **Thus, the combination of mock tests, graded tests, visual remote explanation, and teaching texts ensured at least some effectiveness of the distance learning.** Obviously, just a pure presentation with very limited possibility of activation of the class would not have provided any effectiveness.

COVET

Erasmus+
Continuing Professional Development
in Vocational Education and Training

2020-1-CZ01-KA226-VET-094350

https://www.covet-project.eu/

Co-funded by the
Erasmus+ Programme
of the European Union