**Strengthening Teaching Competences in Higher Education in Natural and Mathematical Sciences**

# Presentation of activities and results in WP4

## The formation of online learning environment

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# Activities in WP4:

- 4.1  The integration of online technologies into traditional courses

- 4.2  Developing systems for electronic testing

- 4.3  Forming online labs

- 4.4  Preliminary analysis of performance indicators

# Deliverables in WP4:

- 4.1 Pilot courses delivered

- 4.2 Systems for electronic testing developed

- 4.3 Online labs formed

- 4.4 Preliminary analysis of performance indicators realized

# How indicators will be measured WP4:

- Pilot projects launched

- Technology-enhanced courses based on suitable online platforms developed

- Database of questions created

- Inventory books (new equipment)

- Report based on the results of preliminary analysis

# Activities WP4
## The integration of online technologies into traditional courses
## Description

- The aim of this work package is to promote wider integration of ICT in teaching and learning at the PC HEIs through the launch of pilot projects which should demonstrate the benefits of using online technologies in teaching and learning and encourage a wider circle of teachers and teaching assistants to use these technologies themselves.
- Pilot projects that will be implemented within activity 4.1 will integrate online technologies into a certain number of traditional courses at the PC HEIs in all areas of natural and mathematical sciences.

- For that purpose, *several online learning platforms* will be developed by adopting some of the existing free platforms to the specific needs of courses to be designed, which will open up a wide range of opportunities for supporting and enhancing educational delivery and management and enable the transition from teacher-oriented towards student-oriented learning.

- Within the activity 4.2 systems for electronic testing will be developed which should help to overcome or mitigate the problems of objective assessment and equal treatment of all students, and difficulties that arise in examining large groups of students. This will include student evaluation with questions randomly chosen from the database, as well as a system for self-testing.

- The integration of online technologies in laboratory exercises and scientific experiments will be conducted in the framework of activity 4.3. Its main goal is to enable students to participate in experiments from remote locations, which could alleviate the problem of insufficient quality laboratory equipment at some PC HEIs.

# Activities WP4
# The integration of online technologies into traditional courses
# Description/4

- The aims of the last activity in WP4 is to define the methodology to be used in the analysis of *performance indicators* of innovative teaching and learning methods introduced within activities 4.1-4.3, and to conduct a preliminary analysis of performance indicators.
- The preliminary analysis will be the first step in the further analysis of performance indicators of the innovations introduced in the process of teaching and learning at the PC HEIs, which will be continued after the completion of the project cycle and whose results will be used for further improvement of the quality of teaching and learning at the PC HEIs.
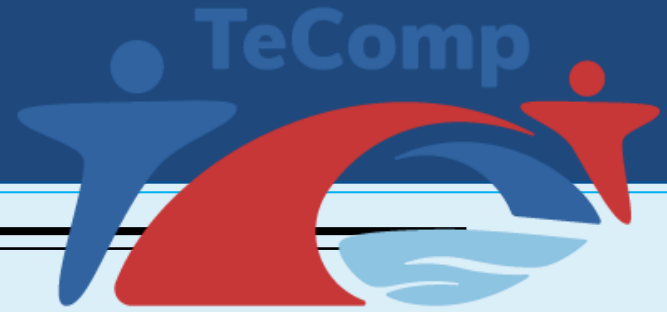
## 4.4. Preliminary analysis of performance indicators realised

- The activity 4.4 will focus on defining the methodology that will be used in the analysis of performance indicators of new teaching and learning methods introduced within activities 4.1-4.3
- A preliminary analysis of performance indicators will be conducted and the results of the analysis will be published in the form of a report.
- The preliminary analysis will be the first step in the further analysis of performance indicators of the innovations introduced in the process of teaching and learning at the PC HEIs, which will be continued after the completion of the project cycle and whose results will be used to further improve the quality of teaching and learning at the PC HEIs.
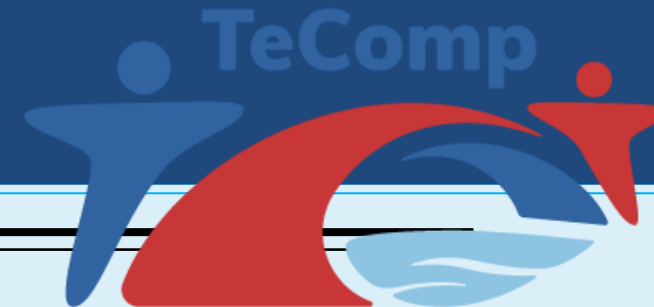
- Coordinator of WP4 is the University of Novi Sad

- All faculties sent the reports about activities 4.1-4.3:

- University of Kragujevac

- University of Novi Sad

- University of Belgrade

- University of Gjirokastra

- University of Niš

- University of Korce

- 4 faculties sent the reports about activity 4.4:

- University of Kragujevac

- University of Novi Sad

- University of Gjirokastra

- University of Niš


- **University of Korce and University of Belgrade reports are missing**

# Results

- Due to the Covid-19 pandemic, we did much more than planned

- In most universities, during periods of the highly active pandemic, all classes in all study programs were organized online.

- We really used the know-how that we gained during seminars organized by our EU colleagues in 2019 and 2020.

# Results 4.1

- Periods when the teaching was organized online:

- 2nd semester 2019/2020

- 1st and 2nd semester 2020/2021

- 1st and 2nd semester 2021/2022

# Results 4.1

Platforms:

- Microsoft Teams platform

- Moodle platform

- LearningKey platform

- In a smaller amount:

- Google Classroom, Google meet

- Zoom, Skype, Whatsapp, Viber

- The Big Blue Button

# Results 4.1

- At the beginning of the pandemic usually, there was not some strict rule on which platform or which way of communication with students to practice, the choice was to professors and students.

- Later, in some universities it was decided to use some specific platform (mostly Microsoft Teams and/or Moodle platform).

# Results 4.2

- Study programs at participating universities in Serbia are not accredited for distance learning

- Such accreditation would require special conditions and technical requirements related to secure identification of students being tested remotely, and preventing non-academic behavior during the remote testing process.

- For that reason, final exams cannot be performed by electronic distance testing.

- However, electronic testing is allowed to be used in some activities that are parts of pre-examination obligations, such as homework and colloquia.

- Many courses and additional periodic online evaluations were organized for students in order to raise their engagement and ensure reaching learning outcomes.

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# Results 4.2

- Sistems for electronic testing were developed in the Microsoft Teams and Moodle platform and also in the LearningKey platform.

- Database with questions for several courses

- This was organized mostly for student self-evaluation, although some colloquia and exams were also held during the pandemic.

# Results 4.3

- During the pandemic, it was difficult to organize good experimental work for students, but with additional effort, with smaller student groups and more classes held in laboratories, that was overcome.

- Also, some of those classes were organized online or recorded for students.

# Results 4.3

Remote access laboratories were organized at

1. University in Kragujevac (Physics, Chemistry, Informatics), 5

2. University of Novi Sad (Physics and Chemistry), 6

3. University of Niš (Chemistry), 3

4. University of Belgrade (Biology, Physics), 2

# Preliminary analysis of performance indicators

- Joint report   is prepared by University of Novi Sad

- The methodology used in the analysis of performance indicators of new teaching and learning methods introduced within activities 4.1-4.3 is created.

- A preliminary analysis of performance indicators was conducted and the results of the analysis was be published in the form of a report.

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# Preliminary analysis of performance indicators

Performance indicators: results of students' evaluations of the methodology of teaching.

Analysis of the performance indicators is done.

Based on the analysis of performance indicators, a new set of questions for student questionnaires for the evaluation of the new methodology of teaching is produced.

Annex C table for Project report of achieved

results for WP4 is produced

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