

**KU LEUVEN**



# Implementation of Innovative ICT based Teaching & Learning Methods (related to WP3)



University  
of Cyprus

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Workshop and Management meeting: September 19-21 (2022).

Erasmus+: Development of practically-oriented student-centred education in the field of modelling of Cyber-Physical Systems (CybPhys)



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## **Basic goal**

ICT based tools

Virtual Learning Environments

Practical realisations

Pedagogical competences

Connecting WP3 and WP4



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# Basic goal

Teaching and preparing students:

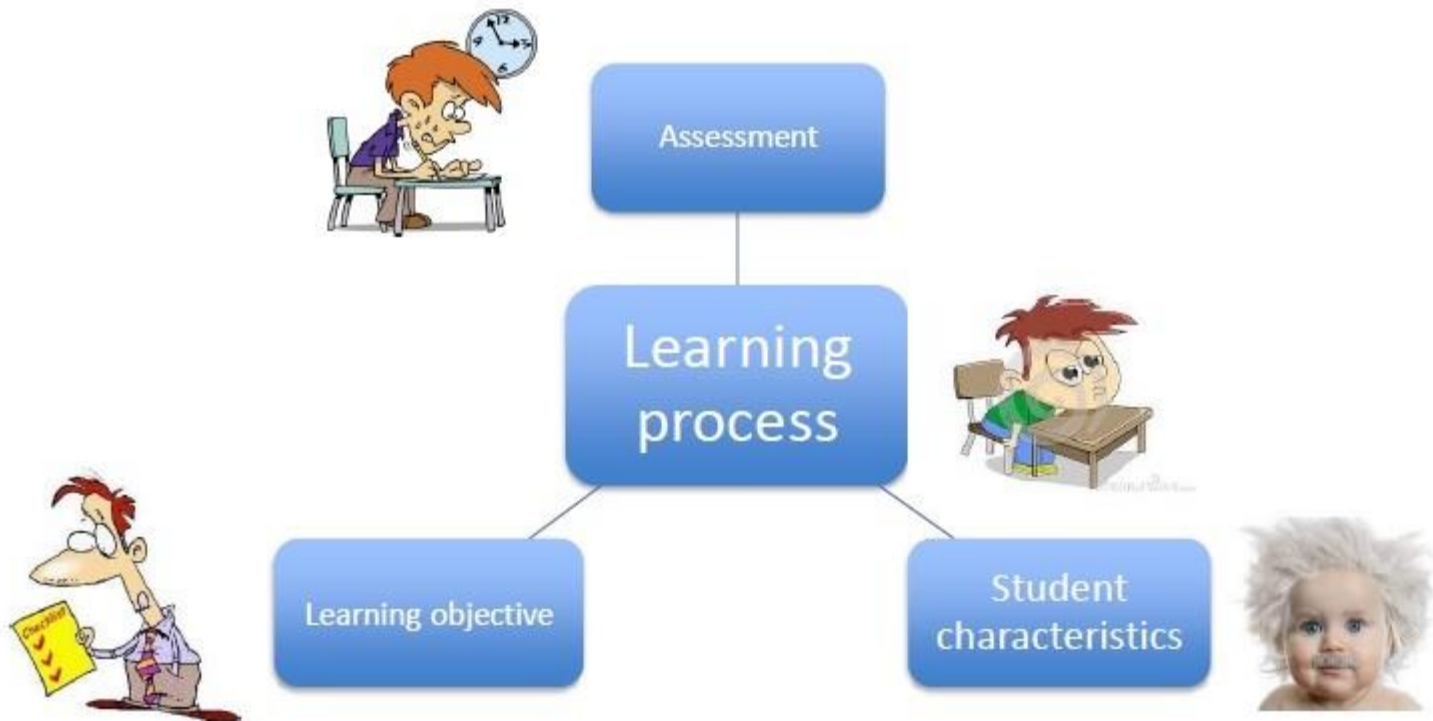
- to think and act as an academically skilled person,
- to realise an industry oriented career,
- to realise an academic and research oriented career.

A decent **learning process**, embedded in a learning environment, is needed to reach these basic goal(s).



# Basic goal

The **learning environment** is often modelled as:



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# ICT based tools

The learning process and the content of the course is very important.

**Paper based course materials** remain important. But

- **digital content** is easy to adapt to new circumstances,
- **digital content** is easy to structure,
- **digital content** provides new possibilities.

This is very important from the point of view of the teacher/professor.

# ICT based tools

Paper based or ICT based studying



Paper based or ICT based assessments

# ICT based tools

Digital content, ICT based tools are an important topic in the present Erasmus+ project CybPhys: **WP3**

- Creation of an **e-library**: we all together developed *e-books*

A **Virtual Learning Environment** is also an important tool.





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# Virtual Learning Environments

A **Virtual Learning Environment** allows teachers to

- provide students with study material of different types (for example e-books),
- interact with the students in real-time,
- follow the evolution of the learning process,
- know the performance of each student in specific tasks,
- ...

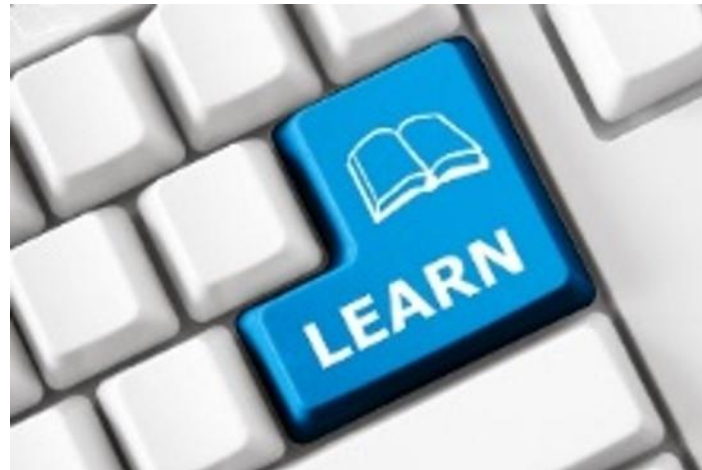


# Virtual Learning Environments

A **Virtual Learning Environment** is known to be especially useful when teaching 'science' and 'physics'.

Objects of many types of information can be used:

- Text documents
- Videos and mp3
- Scanned images
- Links to websites
- Animations
- Simulations
- ...



# Virtual Learning Environments

A **Virtual Learning Environment** provides useful tools

- uploading of course material i.e. course content
- questionnaires + quizzes
- (peer)assessment
- communication (including chat sessions and forums)
- wikis and blogs
- tracking tools
- providing feedback to the students
- administration of student groups
- ...

# Virtual Learning Environments

Virtual Learning Environments can be:

- Commercial software (e.g. Toledo, Blackboard)
- **Open source software** (e.g. Moodle)

In the present Erasmus+ project CybPhys, the decision has been taken to use **Moodle**.



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# Practical realisations

In combination with the **development of the e-book** on “cyber-physical systems for clean transportation” and other contributions to e-books:

- The KU Leuven has shown the possibilities of the use of a **Virtual Learning Environment** based on these course materials
    - This information has been useful during our **meetings.**
    - This information has been useful during the **teacher training organized in September 2021.**
- = development and use of “good practices”.

# Practical realisations

## Developping and using “good practices” with

- **Blackboard – Toledo: ‘Cyber-Physical Systems’**

The screenshot shows the Blackboard interface for the course 'Cyber-Physical Systems'. The left sidebar contains navigation options: Announcements, Information, Contacts, Documents, Tools, and a CONTROL PANEL with sub-items like Content Collection, Organisation Tools, Evaluation, Grade Centre, Users and Groups, Customisation, Packages and Utilities, and Help. The main content area is titled 'Information' and features a document icon for 'Development of practically-oriented student-centred education in the field of modelling of Cyber-Physical Systems'. The text below the document icon states: 'The present Toledo - Blackboard course illustrates the use of an electronic learning environment. This course fits in Work Package 3: development of innovative ICT based teaching and learning environment. A number of chapters have been selected from the e-books (Work Package 2) and these chapters have been extended by additional learning materials and learning tasks.' Below the text is a large graphic with the 'CYBPHYS' logo, which consists of a stylized blue and red geometric shape next to the text 'CYBPHYS'.

### Chapter 2: Dynamic modelling of linear systems

This folder contains course documents which provide the student information concerning the modelling of linear systems and typical mathematical tools like differential equations and Laplace transforms.

### Chapter 3: Dynamic modelling of nonlinear systems

This folder contains course documents which provide the student information concerning the use of linear and nonlinear systems. The use of Newtonian mechanics and Lagrangian equations has been illustrated.

### Chapter 4: EMC related aspects of Cyber-Physical Systems in cars

This folder contains course documents which provide the student an introduction to EMC (Electromagnetic Compatibility) and applies this knowledge to automotive electronics (including the CAN bus).

### EMC related aspects of Cyber-Physical Systems

This folder contains a number of movies explaining basic topics on Electro Magnetic Compatibility.

### Roadmap

Enjoy "CybPhys" i.e. "Cyber-Physical Systems" and go for a full comprehension of the concepts outlined in Chapter 4. Here is the menu to follow in a chronological order:

- Take note of the learning outcomes before starting to study.
- Examine the pre-requisites to reveal any lack of foreknowledge.
- Study the presentation giving an introduction to EMC and EMI. The presentation itself and an MPH-file providing an explanation is available.
- Read carefully and try to understand the theoretical lecture "EMC related aspects of Cyber-Physical Systems in cars".
- Check your knowledge by answering the open-ended check questions.
- Evaluate yourself by performing the test with the closed-ended check questions (multiple choice questions).

### Learning outcomes

- Having insight in the basics on EMC and EMI.
- Understanding the importance of EMC when designing and manufacturing modern cars.
- Having an overview of the most common electronic components in a car.
- Understanding the use of a CAN bus and the EMC-related aspects.
- Understanding the difference between electrostatic and magnetic coupling and how EMI problems can be reduced.

### Pre-requisites

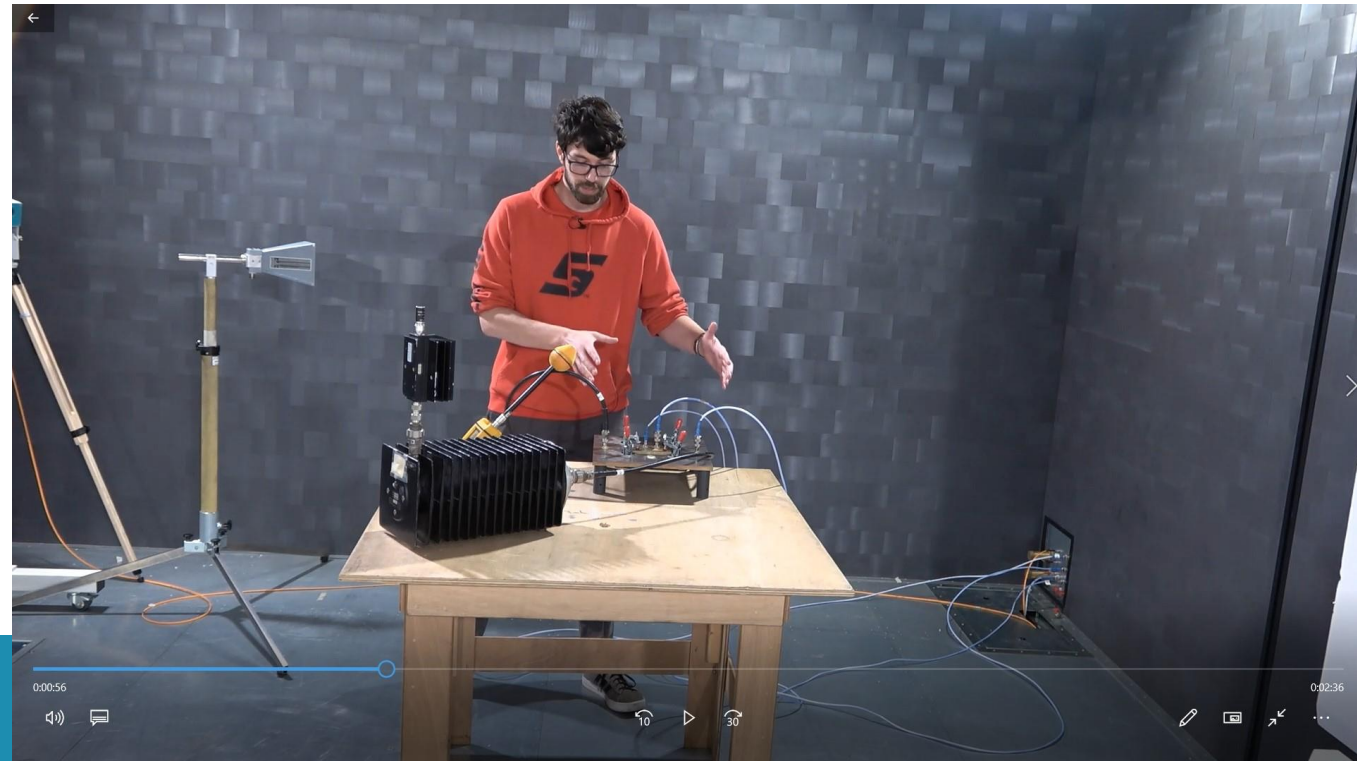


# Practical realisations

Developping and using “good practices” with

- **Blackboard - Toledo: ‘Cyber-Physical Systems’**

Integrating pedagogical movies (multimedia materials).



# Practical realisations

## Developping and using “good practices” with

- **Moodle:** ‘Cyber-Physical Systems’

### DEMO COURSE: CHAPTER 15: THE IMPACT OF ELECTRICAL VEHICLES ON THE POWER GRID

This chapter contains course documents which provide the student insight in the way the use of electric vehicles (implying loading the batteries of the vehicles) has an impact on the electrical power grid.

 Roadmap chapter 15



Click on 'Roadmap' to see the information.

 Learning outcomes chapter 15




Click on 'learning outcomes' to see the information.

 Pre-requisites chapter 15



Click on 'pre-requisites' to see the information.

 Theoretical lecture "The impact of electrical vehicles on the power grid"



Read carefully the document en try to understand the theoretical lecture on "The impact of electrical vehicles on the power grid".

 Assignment: consulting scientific papers



Having studied the theoretical lecture on "The impact of electrical vehicles on the power grid", consider the three papers below which inspired to a large extent the theoretical lecture.

Have a closer look at these three papers and

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# Pedagogical competences

European and Ukrainian partners learn from each other.

## Exchanging knowledge and experience

Teacher training on September 9-10th (2021)

(MS TEAMS  
due to  
COVID-19  
pandemic)



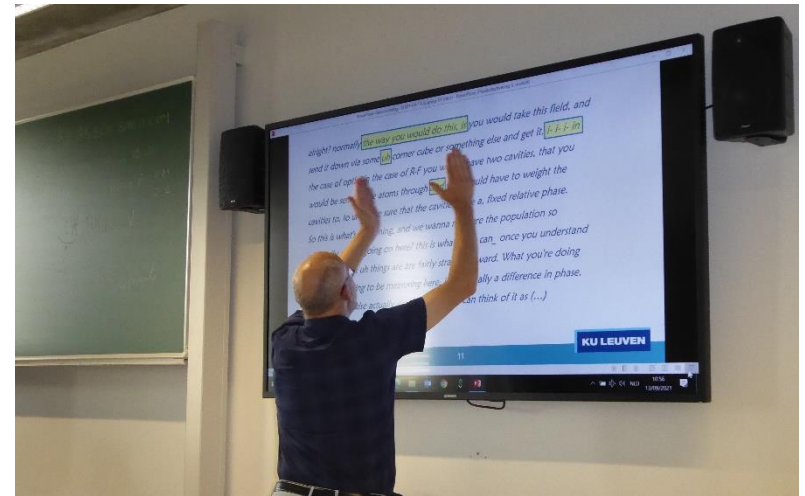
# Pedagogical competences

European and Ukrainian partners learn from each other.

## Exchanging knowledge and experience

Live English language training training

on September 13-17th (2021)  
(WP2)

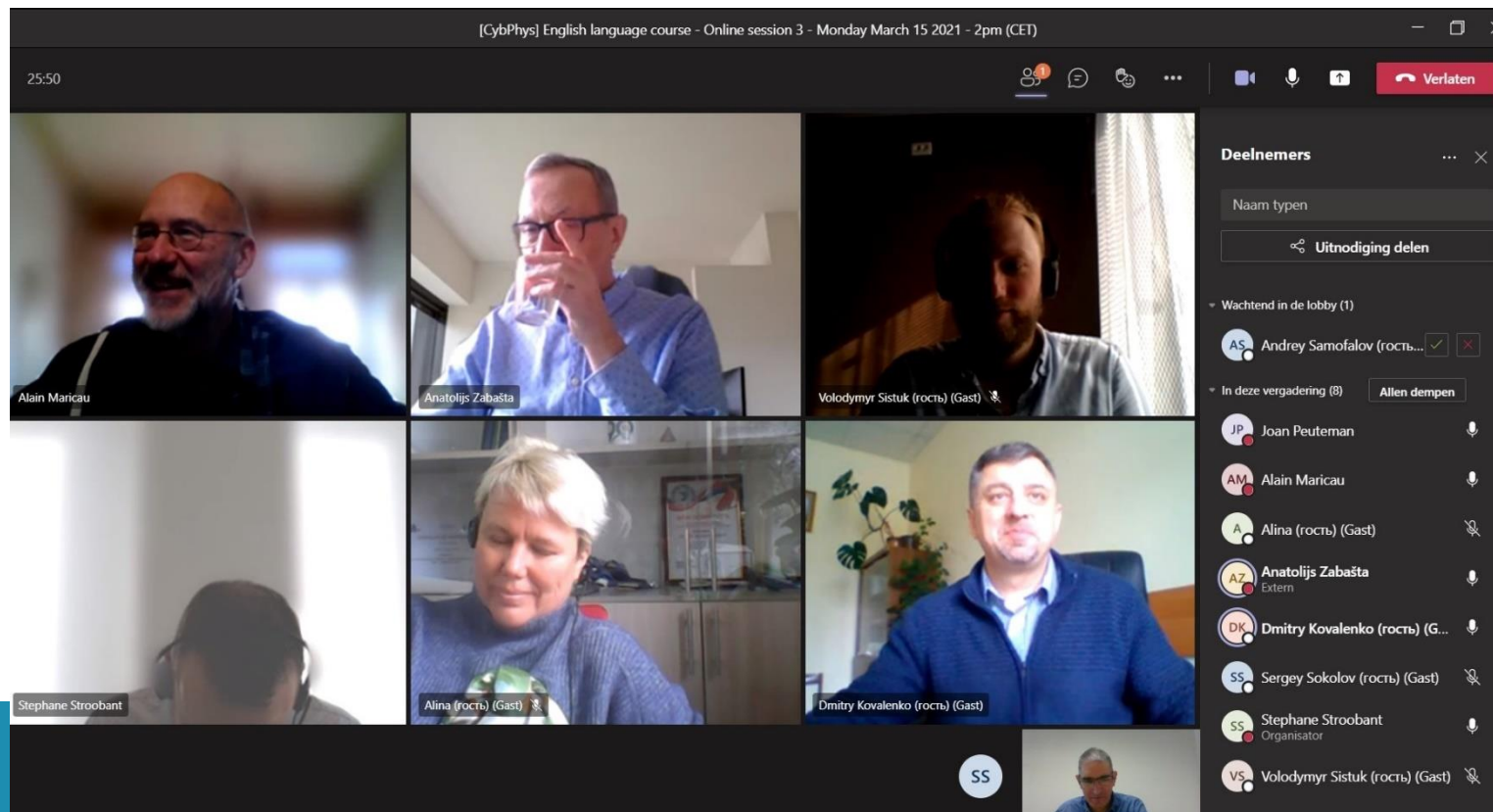




# Pedagogical competences

(WP2)

The live English language training training on September 13-17th (2021) has been prepared by online sessions in January, February and March 2021.



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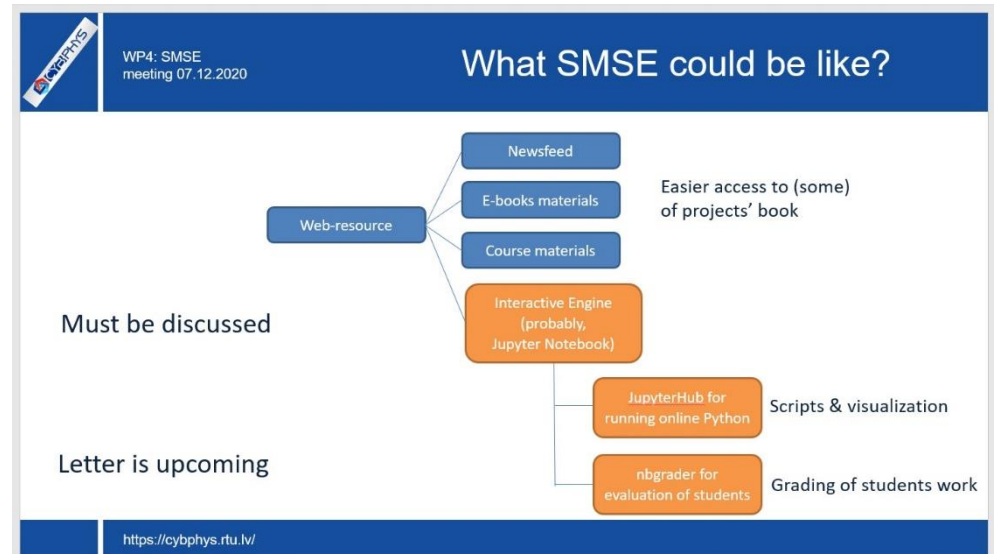


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# Connecting WP3 and WP4

We already discussed WP4:

## Developing the Sharing Modelling and Simulation Environment Platform: SMSE



Are there opportunities to connect WP3 and WP4?



Thank you for your attention!

Questions?



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