



ESCOLA

DIGITAL TEACHING TOOLS FOR ENGINEERING LABS

ESCOLA – Digital Teaching Tools for Engineering Labs

Trainers guide



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INTRODUCTION

More interactive learning experiences have been shown to increase student engagement and participation resulting in improved quality of learning and understanding of the topic. One of the issues faced in the engineering sector is that educators in Higher Education are often lacking the digital pedagogy skills. To tackle this skills deficit, ESCOLA will provide increased access to interactive learning tools for engineering lab classes within higher education institutions. To this end, ESCOLA will develop a new supportive learning environment for engineering classes that will help students to understand and evaluate engineering applications in practice. This learning environment will be introduced to teachers who use engineering labs for their courses, so that they can efficiently improve the quality of learning experience for students with the help of visual and interactive tools.

This trainers guide provides a detailed outline of the ESCOLA online training course '*ESCOLA – Digital Teaching Tools for Engineering Labs*'. The first part of this guide focuses on the following elements to describe the online training course:

- Title
- Introduction
- Short description
- Target group
- Overall objective
- Overall methodology
- Key learning outcomes
- Thematic modules
- Languages
- Assessment methods

The second part will give you a detailed overview of the units, objectives, learning outcomes, self-assessment quizzes, and estimated completion time per module.

TRAINING COURSE DESCRIPTION

Title

The title of the online training course is '*ESCOLA – Digital Teaching Tools for Engineering Labs*'.

Introduction

The training course '*ESCOLA – Digital Teaching Tools for Engineering Labs*' has been developed in the framework of the Erasmus+ project '*ESCOLA*'. The project targets teachers in higher education that include engineering laboratory training in their courses and seeks to boost their teaching capacities to access and effectively use digital interactive resources and/or to envisage how to include such technology into their traditional teaching strategies. The online training course is composed by partners from Turkey, Spain, Denmark, Poland, The Netherlands, Ireland and Bulgaria.

Short description

More interactive learning experiences have been shown to increase student engagement and participation resulting in improved quality of learning and understanding of the topic. One of the issues faced in the engineering sector is that educators in higher education are often lacking the digital pedagogy skills. To tackle this skills deficit, ESCOLA developed this online training course to provide increased access to interactive learning tools for engineering lab classes within higher education institutions. This online learning environment will be introduced to teachers who use engineering labs for their courses, so that they can efficiently improve the quality of learning experience for students with the help of visual and interactive tools.

Target group

Teachers in Higher Education that include engineering laboratory training to their courses.

Objective

The objective of the training course is to increase the abilities of teachers in Higher Education to pursue innovative teaching strategies supported by the intelligent use of digital learning platforms and tools.

Overall methodology

The '*ESCOLA – Digital Teaching Tools for Engineering Labs*' training course is a flexi-time course and is delivered through e-learning as a training delivery method. The course duration is approximately 30 hours. The course consists of 5 modules. All modules are structured in the same way. They start with a short introduction on the topic of the module including the objective and expected learning outcomes. Then the main part: the module content supported by practical examples. Every module is concluded with a summary and provides a self-assessment test.

Key learning outcomes

By the end of this training course, the participant will be able to:

- Recognize the key terms in digital education
- Tell the importance of use of digital tools and learning platforms in education
- Develop strategies to innovate their teaching strategies
- Explain/clarify the importance of digital inclusion
- Identify the technologies and methods useful for specific classes
- Define the benefits of distance learning
- Explain the benefits of video and simulation techniques for practical laboratory applications
- Understand the importance of using virtual learning platforms in current education system
- Implement digital tools and learning platforms for/in their courses

Thematic modules**MODULE 1** DIGITAL INCLUSION**MODULE 2** INNOVATIVE TEACHING**MODULE 3** DISTANCE LEARNING**MODULE 4** VIDEOS AND 3D SIMULATIONS FOR LABORATORY**MODULE 5** COLLABORATIVE LEARNING IN VIRTUAL ENVIRONMENTS**MODULE 6** RESOURCES FOR ENGINEERING EDUCATION INSTRUCTORS

More information about the modules, corresponding units, objectives, learning outcomes and duration is provided in the next chapter.

Languages

The training course is available in English, Dutch, Bulgarian, Turkish and Polish.

Assessment methods

Our self-assessment instrument consists of multiple-choice tests (self-assessment quizzes). This will help the course participants to consolidate their newly obtained knowledge and feel more confident about their skills.

COURSE CONTENT OVERVIEW

The online training course 'ESCOLA – *Digital Teaching Tools for Engineering Labs*' includes a comprehensive set of resources:

- 6 x Modules covering 32 units in total (PowerPoint presentations)
- 5 x Self-assessment quizzes
- Additional resources per module

Below you will find a clear description and overview of units, objectives, expected learning outcomes, additional resources, self-assessment quizzes and estimated completion time per module.

| MODULE 1 | DIGITAL INCLUSION |
|----------------------------|---|
| Introduction and units | <p>Most people enjoy the spoils that come with technology, but its growing prevalence is an increasing disadvantage for the most vulnerable in our community. Digital inclusion is critical to stopping this trend. Simply put, digital inclusion is using technology as a means to create social inclusion. To build a digitally inclusive community, we need everyone to:</p> <ul style="list-style-type: none"> - have access to affordable broadband and devices (digital access) - have the right skills and confidence to use the internet (digital literacy) - be able to use technology to improve their quality of life and get out of poverty (digital enablement). <p>Module 1 is divided into the following 5 units:</p> <ol style="list-style-type: none"> 1. Aspects of digital inclusion 2. The route to digital inclusion 3. Key goals for digital inclusion 4. Digital Intelligence 5. Summary |
| Objective | The objective of this module is to get an introduction into new technologies that are developing in the world and how can we use those for promoting digital equality. |
| Expected learning outcomes | <ul style="list-style-type: none"> • Understand that digital inclusion is more than just access to the internet and the skills to use it • Explain the importance of digital inclusion • Clarify the concept of Digital Intelligence |
| Summary | Yes |
| Self-assessment | Yes |
| Additional resources | Yes |
| Estimated completion time | 6 hours |

| MODULE 2 | INNOVATIVE TEACHING |
|----------------------------|--|
| Introduction and units | <p>Innovation is the process of making lives better while Innovative Teaching is the process of making teaching and learning experiences better. There are many reasons why Innovative Teaching is required today – some of these are:</p> <ul style="list-style-type: none"> - Our society today needs people who are flexible, creative, and proactive – people who can solve problems, make decisions, think critically, communicate ideas effectively and work efficiently within teams and groups - Technological and pedagogical advances are changing the way we learn and consume knowledge <p>Module 2 is divided into the following 6 units:</p> <ol style="list-style-type: none"> 1. Trends in education 2. Innovative teaching methods 3. Characteristics of being an innovative educator 4. Innovative use of technology 5. Technology-enabled laboratory-based teaching and learning 6. Summary |
| Objective | The objective of this module is to get an introduction into innovative teaching methods and the new technologies that are developing in the world of learning in engineering and how teachers can use those for promoting educational equality. |
| Expected learning outcomes | <ul style="list-style-type: none"> • Get to know new teaching technologies and methods • Be inspired by new trends emerging in the world of education • Learn how to become in the mindset of an innovative educator • Gain insight into techniques and tools for educational innovation • Identify the technologies and methods useful for the specific classes |
| Summary | Yes |
| Self-assessment | Yes |
| Additional resources | Yes |
| Estimated completion time | 6 hours |

| MODULE 3 | DISTANCE LEARNING |
|----------------------------|---|
| Introduction and units | <p>Distance learning or distance education is a field of education that focuses on the pedagogy/andragogy, technology, and instructional system design that are effectively incorporated in delivering education to a student, where the teacher and the student can communicate asynchronously and synchronously. They are basically a learning / teaching methodology, an educational concept, very closely related to special learning materials and they have a differentiated role for the new teacher vs. the traditional one. In educational procedure, technology has a vital role, which intermediates in order to create a two-way communication between teachers and learners for the learning process of the learners.</p> <p>Module 3 is divided into the following 5 units:</p> <ol style="list-style-type: none"> 1. What is distance learning 2. Usage scenarios in distance learning 3. Forms of distance learning 4. Examples for distance learning 5. Summary |
| Objective | The objective of the third module is to introduce the term of distance learning, meaning how you can learn on the move, with or without handheld technology. |
| Expected learning outcomes | <ul style="list-style-type: none"> • Identify the benefits of distance learning • Interpret/tell the modern use of electronic educational technology facilitates distance learning and independent learning by the extensive use of ICTs' • Select the right ICT tools that can be used in everyday classroom practices for transforming teaching and learning |
| Summary | Yes |
| Self-assessment | Yes |
| Additional resources | Yes |
| Estimated completion time | 6 hours |

| MODULE 4 | VIDEOS AND 3D SIMULATIONS FOR LABORATORY |
|----------------------------|---|
| Introduction and units | <p>Using technological tools such as animation, simulation, video and multimedia as a part of the learning environment have several benefits such as: visuality, student satisfaction/motivation, technological interaction, readiness to laboratory study, remote access, time saving, low cost in terms of consumables and technical equipment, improved lab safety, and possibility of trial and error.</p> <p>Module 4 is divided into the following 6 units:</p> <ol style="list-style-type: none"> 1. Digital Teaching Tools for Engineering Laboratories 2. Video and simulation technics for engineering teaching 3. Videos 4. Remote Labs 5. Simulations (Virtual Labs) 6. Summary |
| Objective | Integration of video and 3d simulations as learning materials for engineering laboratory teaching. |
| Expected learning outcomes | <ul style="list-style-type: none"> • Awareness on simulation and video techniques for engineering laboratory teaching • Understanding the benefits of video and simulation techniques for laboratory practical applications • Ability to select suitable simulation and video techniques for relevant laboratory course |
| Summary | Yes |
| Self-assessment | Yes |
| Additional resources | Yes |
| Estimated completion time | 6 hours |

| MODULE 5 | COLLABORATIVE LEARNING IN VIRTUAL ENVIRONMENTS |
|----------------------------|--|
| Introduction and units | <p>Collaborative learning is an educational approach to teaching and learning that involves groups of students working together to solve a problem, complete a task, or create a product. In the modern classroom, collaborative learning happens not only in the classroom but also in virtual learning environments that offer students and learners the opportunity to connect and learn outside of the class. Technology can encourage collaboration with students in the same classroom, same school and even with other classrooms around the world.</p> <p>Module 5 is divided into the following 6 units:</p> <ol style="list-style-type: none"> 1. Collaborative Learning Spaces 2. Key features of Virtual Learning Environments 3. Types of Virtual Learning Environments 4. Collaborative Learning in Virtual Environments 5. Creating a Collaborative Virtual Learning Environment 6. Summary |
| Objective | <p>This module aims to demonstrate that a big change of traditional learning environments has already started to happen with the help of ICTs, which are transforming those spaces into collaborative virtual spaces. New generations of students require more attention on/for the technological aspects of the educational spaces and this module will help the teachers to adapt to the new demand.</p> |
| Expected learning outcomes | <ul style="list-style-type: none"> • Discover different virtual learning platforms and its key features • Understand the importance of using virtual learning platforms in nowadays education system • Learn how to create an impactful virtual learning environment |
| Summary | Yes |
| Self-assessment | Yes |
| Additional resources | Yes |
| Estimated completion time | 6 hours |

| MODULE 6 | RESOURCES FOR ENGINEERING EDUCATION INSTRUCTORS |
|----------------------------|---|
| Introduction and units | <p>The resources for Engineering Education Instruction gives the instructors tools, articles and books that help them during their work as an educator. The tools offered in this module reach the goal educating in an interactive and dynamic way. Also the articles and books offer the teacher sufficient background knowledge to organize the lessons according to Engineering Education standards. Module 6 is the final module of this training.</p> <p>Module 6 is divided into the following 4 units:</p> <ol style="list-style-type: none"> 1. Tools 2. Articles 3. Books 4. Contact Us |
| Objective | <p>The objective of this module is to give teacher an introduction into innovative tools to use in the classroom and offer background knowledge for the teacher to organize the lessons with confidence in a modern way.</p> |
| Expected learning outcomes | <ul style="list-style-type: none"> • Discover different modern tools for teaching and its key features in Engineering Education • Learn how to create an interactive and dynamic learning environment • Understanding what lies behind a modern way of teaching |
| Summary | No |
| Self-assessment | No |
| Additional resources | Yes |
| Estimated completion time | 6 hours |