

Deliverable 3.7.5/T.2.7.5

STUDY ENVIRONMENT DEVELOPMENT PLAN

Leading partner:

TTK / Tallinna Tehnikakõrgkool /TTK University of Applied Sciences



Project partners:

KRAO / Kouvola Rautatie ja Aikuiskoulutus OY



**TSI/TTI / Transporta un Sakaru Instituts / Transport and
Telecommunication Institute**



HAMK / Hämeen ammattikorkeakoulu /Häme University of Applied Sciences



RTU / Rigas Tehniska Universitate /Riga Technical University



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1. Introduction

The study materials and papers prepared in the frames of the EDU-RAIL project are available both in e-form as traditional text fails (printable if necessary), or through e-learning platforms. E-learning platforms are software packages that help to create multifunctional online courses.

Project partners use different e-learning platforms, which in practice means that the e-learning materials are based on the existing platforms of partners. To proceed, each partner will continue to work out study materials for the subjects of EDU-RAIL study modules which are not yet covered in the existing teaching and learning materials in any form. Dissemination of these materials among partners of EDU-RAIL is a necessary future activity. Updating of existing study materials is a continuing activity and each partner is responsible for updating their own study materials.

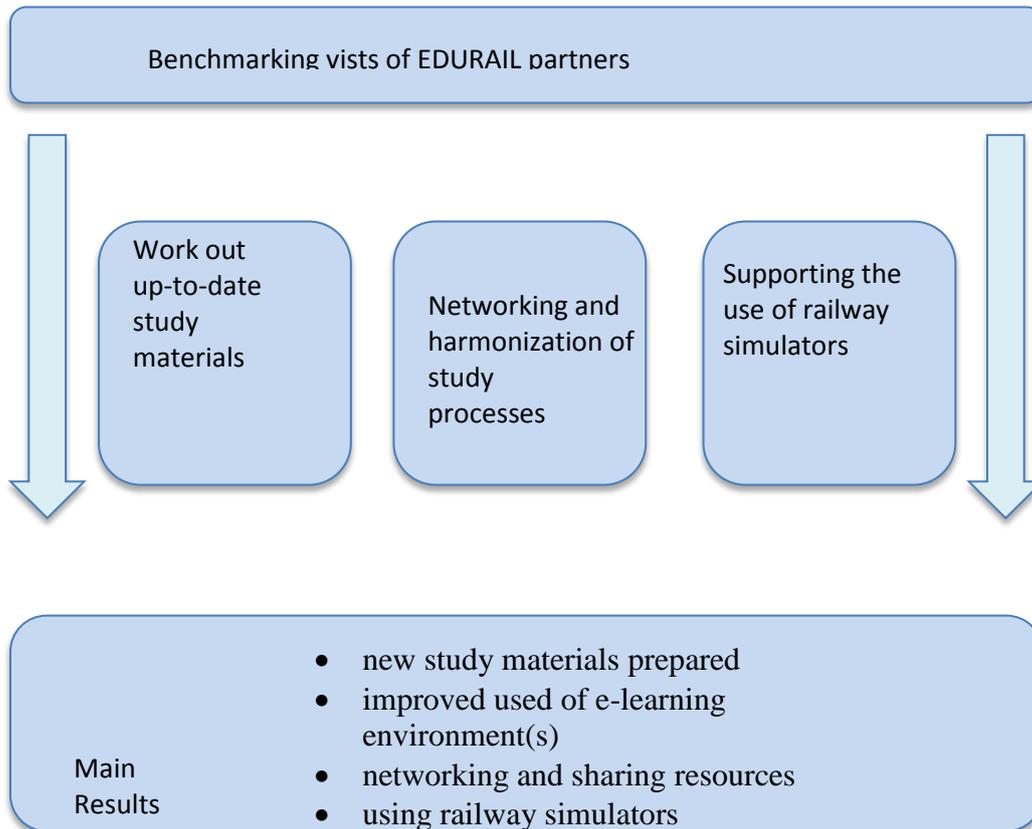
E-learning is a system or form of learning that relies heavily on electronic resources. E-learning can be used to complement classroom methods (lectures, in-class problem solving, face-to-face discussions, etc.), or it can be the primary mode of delivery, where all contact is limited to interaction with online services (a learning environment or various online tools), and where direct contact with instructors or other learners may or may not be foreseen. When e-learning is the primary mode of delivery, it provides the learner with a lot more control over his or her learning process. The individual learner can decide by oneself when to learn and how much time to spend on learning (being engaged with some element of the online resources). If there is no active instructor or facilitator, learning can be entirely self-paced (with automatic feedback).

Moodle is a learning platform designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalized learning environments. (Source: <https://docs.moodle.org/33/en/>)

The Moodle open-source e-learning platform is used in TTK and is available for students and in-service learners and also to those foreign students who have a Moodle password for access.

Another part of the development of study environment is to encourage the use of simulators. In this case, it is important to work out real-life scenarios in a simulator environment and train the skills of implementing the right solutions. Scenarios can be created with simulators

without endangering environment, infrastructure and people. Different malfunctions and faults can be simulated on them that may occur very seldom in real life. Teaching with simulators can be applied to higher education students, in VET and for everyone who is interested in railway traffic, legislation and design.



2. Activities for Developing Study Materials and Learning Environment of Each Partner of the EDU-RAIL Project

2.1 Topics of Subjects Defined for Modules

Module 1 Single European Railway Area, responsible TSI Subjects of module 1:

- Subject 1 European Transport Policy
- Subject 2 Legislation of Single European Railway Area
- Subject 3 Single European Railway Area Content
- Subject 4 European Railway Governance
- Subject 5 Rail Research and Innovation in Europe

Module 2 General Professional Knowledge and Requirements, responsible KRAO

Subject 1 Driver's Work, the Work Environment, Driver's Role and Responsibility in the Process of Rail Operation, the Professional and Personal Demands of the Driver's Duties

Subject 2 Railway Technologies, Including Safety Principles Behind Operational Regulations

Subject 3 Basic Principles of Railway Infrastructure

Subject 4 Basic Principles of Operational Communication

Subject 5 Trains, Their Composition and the Technical Requirements for Traction Units, Wagons, Coaches and Other Rolling Stock

Subject 6 Hazards Involved in Railway Operations in General

Subject 7 Basic Principles of Physics

Module 3 Service Oriented and Intelligent Transport System in the Context of Opening Markets, responsible HAMK

Subject 1 Market - The Opening Railway Market

Subject 2 Infrastructure - The Needs of the Opening Railway Market

Subject 3 Customized Services, Intelligent Solutions

Subject 4 Case study¹

¹ In theme 4, the focus is on a case study. Students perform extensive assignments based on topics of their own choice. During the assignment, the objective is to learn one of the most important working methods required in positions of expertise in working life today, i.e. project work. More details in the Deliverable 3.1.1

Module 4 Control and Command Systems of Rail Traffic, responsible RTU

- Subject 1 Train Traffic Management Systems
- Subject 2 Policy and Regulations in the Rail Transport
- Subject 3 European Rail Traffic Management System ERTMS
- Subject 4 Technical Solutions for Interoperability with National and ERTMS Systems
- Subject 5 CTC and Real Time Control of Train Movement on Network

Module 5 Logistics management and operating of rail transport, responsible TTK

- Subject 1 Role of the Rail Transport in the Supply Chain
- Subject 2 Policy and regulations in the Rail Transport
- Subject 3 Railway Freight Operations and Management
- Subject 4 Railway Asset Management and Pricing
- Subject 5 Rail Environment and Crew Management

2.2 Development and Harmonization of Study Process Inside Partner Institutions and Launching of the Developed Teaching Materials

For the development of the study environment and harmonization of the railway related study process, project partners will continue joint exploitation of the outcome of the EDU-RAIL project. Partners have worked out learning materials for the EDU-RAIL study modules, which include traditional text files and e-learning materials.

HAMK has proposed the following approach for exploitation of the results of EDU-RAIL for development and harmonization of study process:

Cooperation vision (an example²) proposed by HAMK:

- A group of students from partner organizations will select a subject covered by study materials prepared (for example) by one of the EDU-RAIL partners.
- They will learn it in their home institute, using the above mentioned study materials with the support of a teacher in their institute. By the end of the course, a contact day

² Presentation of Seppo Sotavalta (HAMK) on management meeting of EDU-RAIL 24.04.2017, Tallinn

or a virtual meeting will be organized with participation of students from other institutes, and assessment of the achieved knowledge will be done.

- All partners will accept the results and credit points. The process is illustrated by the figure below:

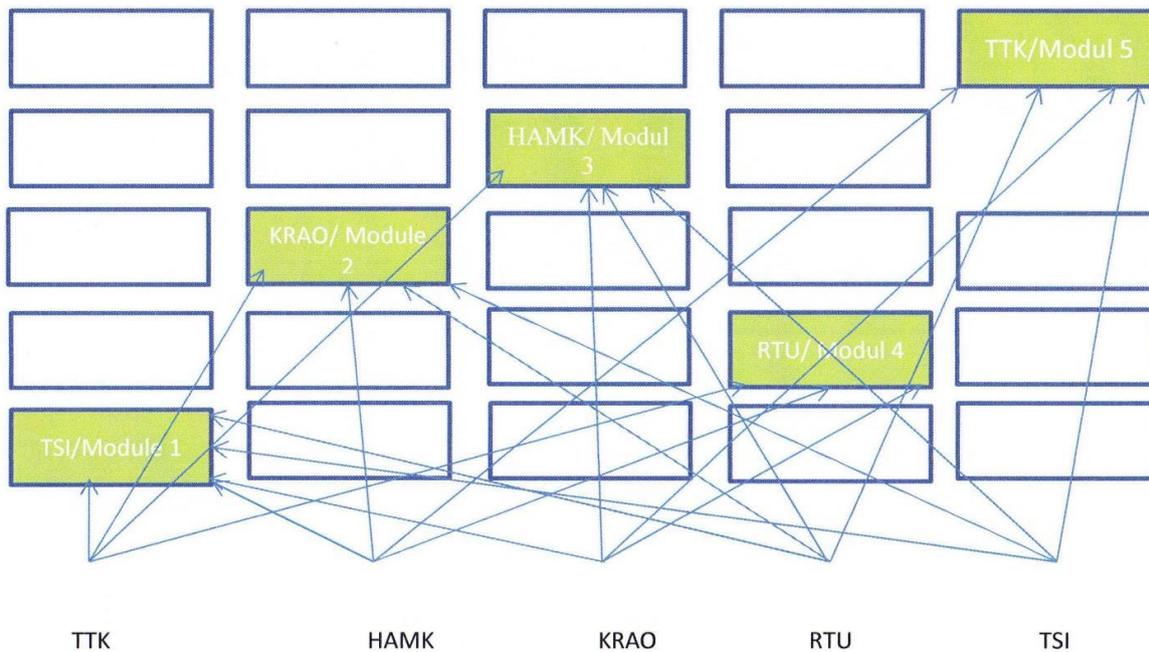


Fig.1. Vision of HAMK for partly harmonized study environment

Marked in green are the subjects of five study modules, which are covered by (printable files) and e-learning materials developed by partners. Blue arrows are other themes in modules, which are not covered by study materials. The subjects marked in colour are just for illustrational purposes and are not connected to real situation in the implementation process of the EDU-RAIL project. The goal is to demonstrate the possibility of harmonizing the study process. For actual implementation, further agreements and procedures between partners are needed.

In the future, all the subjects of the defined EDU-RAIL study modules might be covered by printable files or e-learning materials. Wider usage of modern communication technologies will enable virtual activities (video seminars, dedicated lectures, other virtual contact activities, etc.) These activities will help to develop the students’ skills for international teamwork.

At present, the following study materials have been prepared in the frames of the EDU-RAIL project:

Module 1 Transport Policy Formulation and Implementation (leading partner TSI):

The prepared study material “Transport Policy Formulation and Implementation” is a submodule of project module 1 “Single European Railway Area”. The learning objective of this submodule is the acquisition of knowledge of transport policy formulation in the European Union. This module covers the following topics: Transport Policy Formulation, Implementation, Planning and Project management, Participation and Awareness Raising and Public Relations.

The students should gain basic knowledge of:

- the steps of policy formulation and implementation processes embedded in the planning processes on basis of structured charts, practical and concrete examples;
- the importance of formulating strategies and goals in transport policies;
- tools and instruments in the planning process;
- different measures in transport policies apt to influence the transport situation and traffic behaviour;
- participation processes in transport planning (policies) and awareness raising;
- scenario technique and the importance of prognoses;
- project management and evaluation of the grade of achievement of the goals.

Module 2 Study materials for subjects: Basic Principles of Railway Infrastructure; Basic Principles of Operational Communication and Technical Requirements for Trains (leading partner KRAO)

The aim of these three subjects is to provide knowledge and skills on the basic principles of railway infrastructure.

The Signalling and Train Control Systems are an integral part of the railway infrastructure.

Traffic operational communication is the provision of traffic safety alerts, permissions and instructions between different parties of railway transport system. The learning outcomes of this subject include the most important security messages using a definite format.

The aim of the third subject is to provide knowledge about train composition, taking into

account the safety and manageability of the train. The goal is to learn about basic train constraints such as length and brake system, and braking devices.

The study material for the first subject is compiled in English, the other study materials are available in Finnish.

Module 3 Market - The Opening Railway Market (leading partner HAMK)

The objective of this Module is to give an understanding of the business environment where the opening of the EU railway market is taking place as stated in the fourth railway packet of the European Union. The main focus of this Module is on passenger traffic; the overview of cargo traffic is given on a general level.

Topics covered include:

- Opening of the national railway market that has until now been based on a national monopoly to competition is a challenging task for each EU country, which calls for a long period for preparations.
- How to customize the market environment so that the opening of the markets is possible for more train operators?

Due to the EU Legislation and the Introduction of Railway Competition, the operational environment of the Finnish railway market has changed significantly within a twenty-year period. The changes in the Community legislation have been the most significant drivers of change. The harmonization of the EU legislation during the 2000s promoted the development of common European railway markets throughout the European Economic Area.

This module gives an overview of the 1st, 2nd, 3rd and 4th Railway Package, the rail passengers' rights and obligations, freight railway transport and The Railway Safety Directive.

Module 4 Policy and regulations in the Rail Transport (leading partner RTU):

At the beginning of the 1990s, the major problems in the area interoperability and safety of railway transport were formulated, as with their different control and command systems, each country operated its own national requirements on safety certification, using own systems of training and licensing of drivers. Five different traction energy systems were used.

The learning outcomes:

- the students know the basic international treaties in the field of international passenger transport (СМПС, КОТИФ/ЦИВ);
- the students know the basic parameters for the following subsystems: infrastructure (track and track facilities), rolling stock (locomotives and passenger wagons, motor-wagon rolling stock).
- the students know the basis for interoperability and technical specifications structure, their application features on the basis of contact group ОСЖД/ЕЖДА work in the interaction of railway system track 1520mm/1435mm;
- the students are able to navigate in the international organizations normative-technical documentation in the field of railway (ОСЖД, ОТИФ, МСЖД) and know basic tendencies of development.

Module 5 Logistics Management and Operating of Rail Transport (leading partner ТТК)

Railway asset management and pricing is a subject of Module 5 “Logistics Management and Operation of Rail Transport”. The objective of the subject is to acquire knowledge of railway management and pricing. This training material also takes into account the professional standard of Railway Engineer (EQF level 6), in other words, the learning outcomes of the module comply with expectations of the world of work.

The volume of the course is 3 ECTS, of which 16 academic hours are contact education and 62 academic hours are independent work.

Expected learning outcomes of the subject “Railway asset management and pricing”:

- the student understands the railway undertaking’s business strategy, can purchase and use resources taking into account their life cycle costs, service quality and safety, and impact on the environment;
- the student knows pricing and calculation methods, is able to link the costs and revenues of the railway undertaking to assets and financing sources;
- the student understands the legal environment of railway business, including cross-border contracts, and is able to apply this knowledge to professional activities.

The study materials for Railway Asset Management and Pricing course are prepared in Estonian and in English; both versions are available in Moodle.

The given study material has been completed in Estonian, 78 pages (full version); and the shortened version that can be used by other project partners, is also available in English. The English version is also supported by the e-learning platform Moodle.

The teaching and learning materials of other subjects of Module 5 are completed mostly in Estonian and are available also in Moodle platform.

In addition, the following study materials were prepared in subject “Rail Environment and Crew Management”

- Cross-Border Resource Management in Rail Transport
- Rolling Stock Selection
- Training of Employees

All of these materials are available in Estonian and in English.

In the implementation process of the EDU-RAIL project, certain subjects for every study module (marked below) were prepared in the form of e-learning materials or printable files. In the future, it is possible and highly recommended to enlarge the coverage of modules with study materials.

TSI /Module 1 Subject 1	TSI /Module 1 Subject 2	TSI /Module 1 Subject 3	TSI /Module 1 Subject 4	TSI /Module 1 Subject 5
KRAO /Module 2 Subject 1	KRAO /Module 2 Subject 2	KRAO /Module 2 Subject 3	KRAO /Module 2 Subject 4	KRAO /Module 2 Subject 5
HAMK /Module 3 Subject 1	HAMK /Module 3 Subject 2	HAMK /Module 3 Subject 3	HAMK /Module 3 Subject 4	
RTU /Module 4 Subject 1	RTU /Module 4 Subject 2	RTU /Module 4 Subject 3	RTU /Module 4 Subject 4	RTU /Module 4 Subject 5
TTK /Module 5 Subject 1	TTK /Module 5 Subject 2	TTK /Module 5 Subject 3	TTK /Module 5 Subject 4	TTK /Module 5 Subject 5

The use of railway simulators will support the curricula and will give new opportunities for teaching process of professional higher education and VET. The methodology and practice of use railway simulators in TTK, KRAO and RTU is presented in the Internal Working Document 3.4.1 (Working out Methodology for Use of Railway Simulators) and in the final report 3.7.4 (Methodology for Use of Railway Simulators).

3. Development of the Study Environment Based on EDU-RAIL Partnership

During the EDU-RAIL project, every partner has prepared teaching and learning materials, including e-learning materials.

Further developments:

1. TTK, RTU, TSI, HAMK and KRAO, as partners of the EDU-RAIL project, will continue partnership based on the 5 developed study modules.
2. EDU-RAIL partners will negotiate how to use the project network after the lifetime of the project, with a goal to jointly develop and improve the study environment. For that:
 - joint use of prepared study materials will be enabled (necessary agreements, authorization and other necessary procedures will be developed). EDU-RAIL study materials will be stored in the server of TTK. The goal is to give the students of the partner institutions access to all the study materials.
 - the access to laboratory and library services of EDU-RAIL will be enabled to students
 - demonstration and use of the railway simulators will be open to partners
 - vision to harmonize the study process will be supported by joint distance learning (as was described above).
3. The EDU-RAIL network will be open for other interested partners in the region upon request. In case of favourable conditions, it is recommended to organise further joint seminars on agreed subjects for partners and other interested institutions.