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Report from conducted courses for EQF level 6-7

Deliverable 4.3

of the FIT-TO-NZEB project, financed under grant agreement No 754059 of the HORIZON 2020 Programme of the EU

Led by:

University of Zagreb, Faculty of Civil Engineering (UniZG)

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Executive Summary

1. Introduction

This deliverable reports the conduction of high education training programs. The training programs have been conducted in three countries Bulgaria, Croatia and Czech Republic, in the following universities: University of Architecture, Civil Engineering and Geodesy in Sofia (UACEG), University of Zagreb, Faculty of Civil Engineering (UniZG) and Faculty of Civil Engineering of the Czech Technical University in Prague (TU Prague). To assure a good quality of the high education courses, following criteria for evaluation were set:

- **lecture's content and learning materials:** the training programmes should meet the learning outcomes objectives through a clear and precise communication. For this, the learning content, how is presented (layout, presentation and others) will be evaluated;
- **learning outcomes:** the effectiveness of the learning procedures, and therefore achievement of the expected learning outcomes. For this, the obtained knowledge and its future applicability will be evaluated.

To collect the necessary information, two different questionnaires were developed (see Appendices). The first aims to collect general information about the course, its content and structure, and were filled by the lecturer or administration person at the beginning of the course. The second questionnaire aims to receive participant's opinion about the course and were filled by the participants at the end of course.

Finally, this report suggests possible improvements identified from the surveys' assessment, also enabling experience exchange between the different training institutions and preparing the ground for follow up monitoring activities.

1.1. Institutions of high education training

Bulgaria

University of Architecture, Civil Engineering and Geodesy – Sofia

The University of Architecture, Civil Engineering and Geodesy (UACEG) has been part of the oldest technical university in Bulgaria; it has nowadays five faculties (Architecture, Structural Engineering, Hydraulic Engineering, Geodesy, and Transport Engineering) with overall 3700 students enrolled; 364 full-time and 212 part-time faculty academic staff. One of the essential aims of UACEG is to educate architects, civil engineers and surveyors capable of coping with technical infrastructure and construction projects in compliance with the sustainable development requirements and the protection of the built and natural environment. The Faculty of Structural Engineering offers in a number of areas, among them Energy Efficiency in Construction (Msc); provides training to post-graduate and doctoral students; coordinates research projects. The Master's programme in Architecture is accredited by RIBA and BSc programme in Urbanism recently received certificate of AESOP Quality Recognition. The Department of Urban Planning is one of the 8 departments at the Faculty of Architecture with a leading role in the Program in Urbanism and in the courses in regional



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planning, landscape planning urban planning and urban design for architects. Its academic staff is also involved in regional, landscape and urban planning and research, building design, investigations in support of public authorities, institutional and corporate investment policy.

Croatia

University of Zagreb, Faculty of Civil Engineering

FCE is one of 33 faculties at the University of Zagreb. It was established in 1919 and is today the largest civil engineering faculty in Croatia. The Faculty consists today of nine departments, which provide teaching, scientific, research and vocational knowledge-based activities. FCE is one of the region's leading high education and research institution in the field of civil engineering and is well established and recognized among scientific and professional community. Scientific-research work is being carried out within the framework of numerous national and international scientific projects. During the last decade, FCE coordinated and/or participated in several EU funded projects (e.g. Horizon, CIP, IEE, FP7; FP6, LIFE, Eureka, COST). Researchers at FCE have significant results in new material systems and technologies in the field of civil engineering. Good co-operation with the civil engineering industry in various professional and developmental projects has been a long tradition of the FCE, especially in terms of energy efficiency in buildings where, among other, they developed innovative products (i.e. ECO-SANDWICH®). Experts from FCE Department for Materials were engaged as trainers and expert contributors to the creation and piloting of a training program for practitioners in construction sector within the European project INTENSE. Additionally, FCE has been coordinating IEE project BUILD UP Skills Croatia (CROSKILLS) defining the National roadmap for a lifelong education of construction workers in the field of energy efficiency, as well as CROSKILLS II project which is developing educational materials for blue collar workers in the field of energy efficiency. FCE also participated in the project SEEDPass - South East Europe strategic partnership in vocational education and training in Passive House Design for nearly zero energy buildings development.

Additionally, FCE employs two Level II thermographers with the specialization in building thermography, and experience in blower door testing of buildings and passive houses in Croatia as well as organizing training courses for licensed thermographers. FCE was one of nine institutions which are organizing training courses for energy auditors in Croatia, where we developed comprehensive training materials. Employees of FCE are members of Croatian Standards Institute, Technical Committees TC570 (Energy management systems) and TC163 (Thermal insulation), together with their work in different committees at the Ministry of Construction and Physical Planning, all concerning energy efficiency regulations in Croatia. Among other projects, FCE also participates in the project CA EPBD IV - Concerted Action EPBD IV.

Directive 2010/31/EU (EPBD II) sets out the definition for a building with nearly zero energy consumption (nZEB) at the European level. On the basis of this definition, the EU Member States have created a definition for nZEB at the national level, which takes into account the given country's economic and climatic conditions. This chapter contains definition of nZEB in each target country to give an overview of requirements to energy performance of buildings and differences between them. This should give a basis to compare educational programmes in the field of nZEB level renovation.



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Czech Republic

Faculty of Civil Engineering of the Czech Technical University in Prague

Czech Technical University in Prague (CTU) is a leading technical research university with a long tradition and is the oldest non-military technical university in Europe, founded in 1707.

The original founding faculty was Faculty of Civil Engineering, nowadays the Faculty has constantly very good level with excellent rating - according QS World Universities Rankings 2016 Faculty is in 51st-100th interval continuously from 2013 to 2016.

The University's long tradition of cutting-edge science and engineering, together with high-quality technical education.

Currently about 22 000 students (2991 international) are enrolled at eight faculties and five institutes, covering a total of 132 accredited bachelor, master and PhD study programmes 482 fields of study within these programmes.

The University has built up strong bonds with its industrial partners, including important world-scale players, such as Toyota, Skanska, Bosch, Siemens, Honeywell, GE, Rockwell, ABB, McKinsey, DaimlerChrysler, and Skoda-Volkswagen.

2. Learning outcomes and training programme

Both learning outcomes and training programme were explored and defined in detail in previous project activities. Therefore, in this chapter a summary of the main information is presented, as detailed information can be found in the respective Deliverables.

The training courses followed the same structure as the TTT programme, which was defined in details in the deliverable D4.1 "*Training programme for EQF level 6-7*" (Table 1) and was in line with the Deliverable 2.3 "*Catalogue of Learning Outcomes*".



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Table 1 Summary from Deliverable D4.1 “Training programme for EQF level 6-7”

Module Nr	Module Name	FCE	CVUT	UACEG
1	Basics of building physics	x	partial	x
2	Optimal solar gains	x		x
3	Building Envelope	x	partial	x
4	NZEB Neighbourhoods		partial	partial
5	Airtightness, vapour and moisture movement, windtightness	x	partial	x
6	Building Services	x	partial	x
7	Conservation of historic building fabric	x		partial
8	RES in building renovation	x	partial	x
9	Cost effectiveness		x	x
10	Planning and design instruments	x	partial	x
11	Comfort, health and safety requirements in buildings, incl. indoor air quality	x		partial
12	Step-by-step retrofit plans	x		x
13	Energy efficiency and building renovation policies	x	x	x
14	Achieving measurable results	x	x	
15	Stakeholders' engagement			
16	Project management		x	x
17	Ecology and Sustainability	x	x	x



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3. Conducted courses

3.1. Bulgaria

The training programme in Bulgaria was offered as an elective course for students in the 5th year of the master program “Structural Engineering” and “Architecture”. The course programme consisted of 30 academic hours (30 hours of theoretical lectures), and was offered between 21st September 2018 and 21st December 2019. A group of 29 students specialising in civil engineering (17 students) and architecture (12 students) had undertaken the education course in Bulgaria within the framework of the project.

The training programme has integrated the developed presentations, the facilities for practical demonstration and training, and examination programmes to guarantee a successful implementation of the newly developed training. The materials developed under the Fit-to-nZEB project were translated into Bulgarian language and were used during the training.

The trainers attended the international and national TTT courses. During the EQF 6-7 training course, they used the training materials and training facilities (models) developed within the Fit-to-nZEB project and outlined in the deliverables D3.2 “*Models produced and installed in the participating training centers*” and D3.4 “*Training materials for Train-the-trainer (TTT) training programmes in all focus countries*”. The trainers used the presentations developed within the Fit-to-nZEB project, demonstration videos, demonstration models, samples of components and materials and infrared thermographic cameras. A blower door testing was organised.

At the end of the training programme, the students had undertaken the exam with printed test at the end of January 2019.

Several images from the EQF 6-7 training course in the UACEG follow below.





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3.2. Croatia

Training programme in Croatia has integrated all available and newly designed tools, facilities for practical demonstration and training, and examination programmes to guarantee a successful implementation of the newly developed training. The training materials developed under the Fit-to-nZEB project were translated into Croatian language and were used during training.

During the EQF 6-7 training course, trainers (who attended international and national TTT courses) used training materials and training facilities (models) developed within the Fit-to-nZEB project and outlined in the deliverables D3.2 *“Models produced and installed in the participating training centers”* and D3.4 *“Training materials for Train-the-trainer (TTT) training programmes in all focus countries”*. Handouts from the presentations (lectures and exercises) developed within the Fit-to-nZEB project, demonstration videos, demonstration models, samples of components and materials, infrared thermography cameras, blower door system, condetti creative system for learning about detailing (thermal bridges, airtightness, etc.) and additionally three site visits were organised (to the construction site of newbuild nZEB, deep energy renovation of cultural heritage building and a renovated family house which is self-sustained using RES sources).

The course programme consisted of 60 academic hours (30 hours of theoretical lectures and 30 hours of practical training), and was offered between 1st October 2018 and 25th January 2019. A group of 31 students specialising in civil engineering had undertaken the education course in Croatia within the framework of the project.

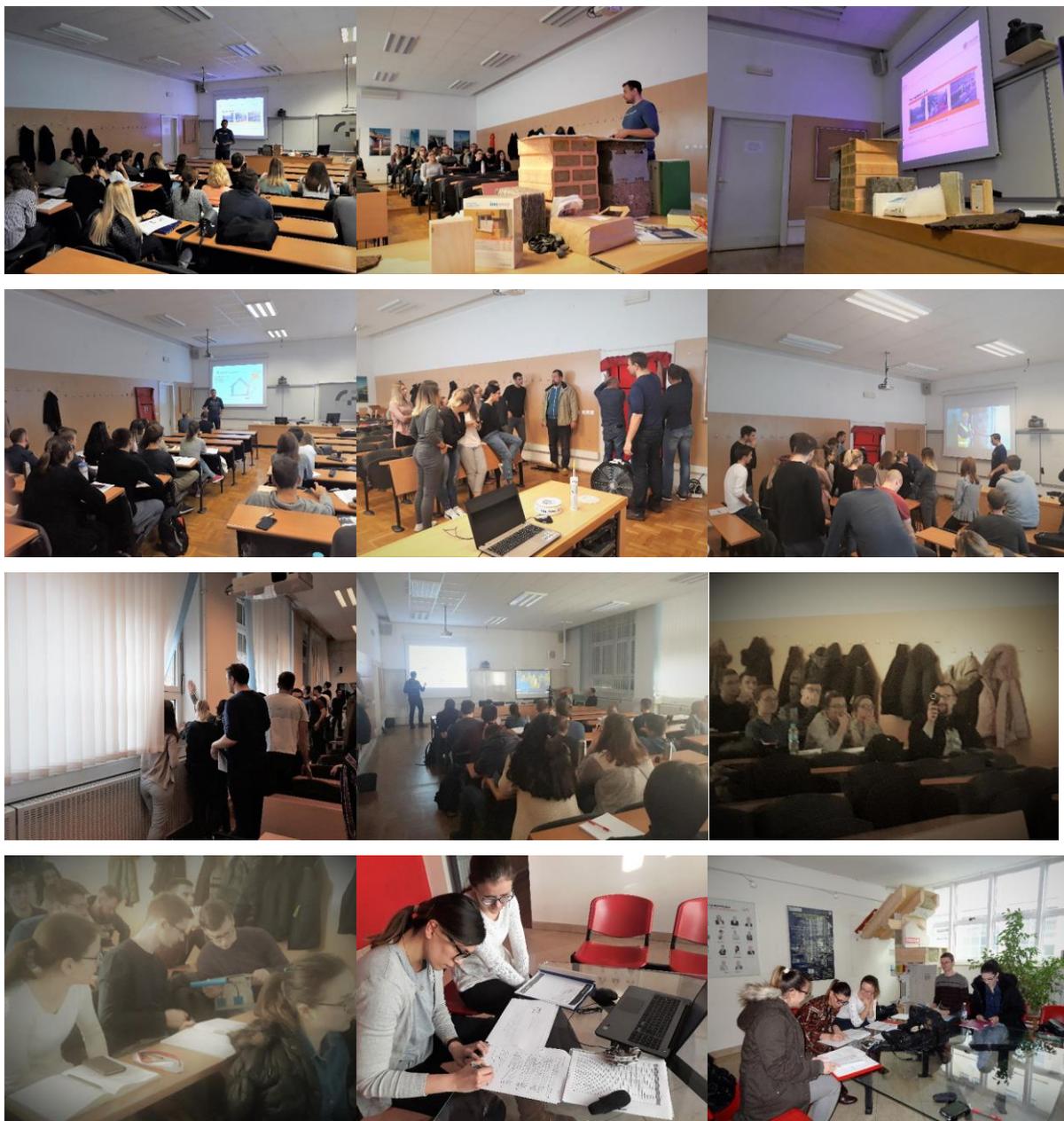


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During the training course, the students had to make a design of the NZEB building, specifically deep energy renovation, where they got drawings of existing buildings and had to suggest a solution for energy renovation, calculate the energy balance and design the details. Working on their design projects students were encouraged to discuss their solutions and work closely together with lecturers. Additionally, students had to make a short research and write a short paper on the topic they are interested in and make a short presentation to their peers on the topic. These presentations were then graded by their peers.

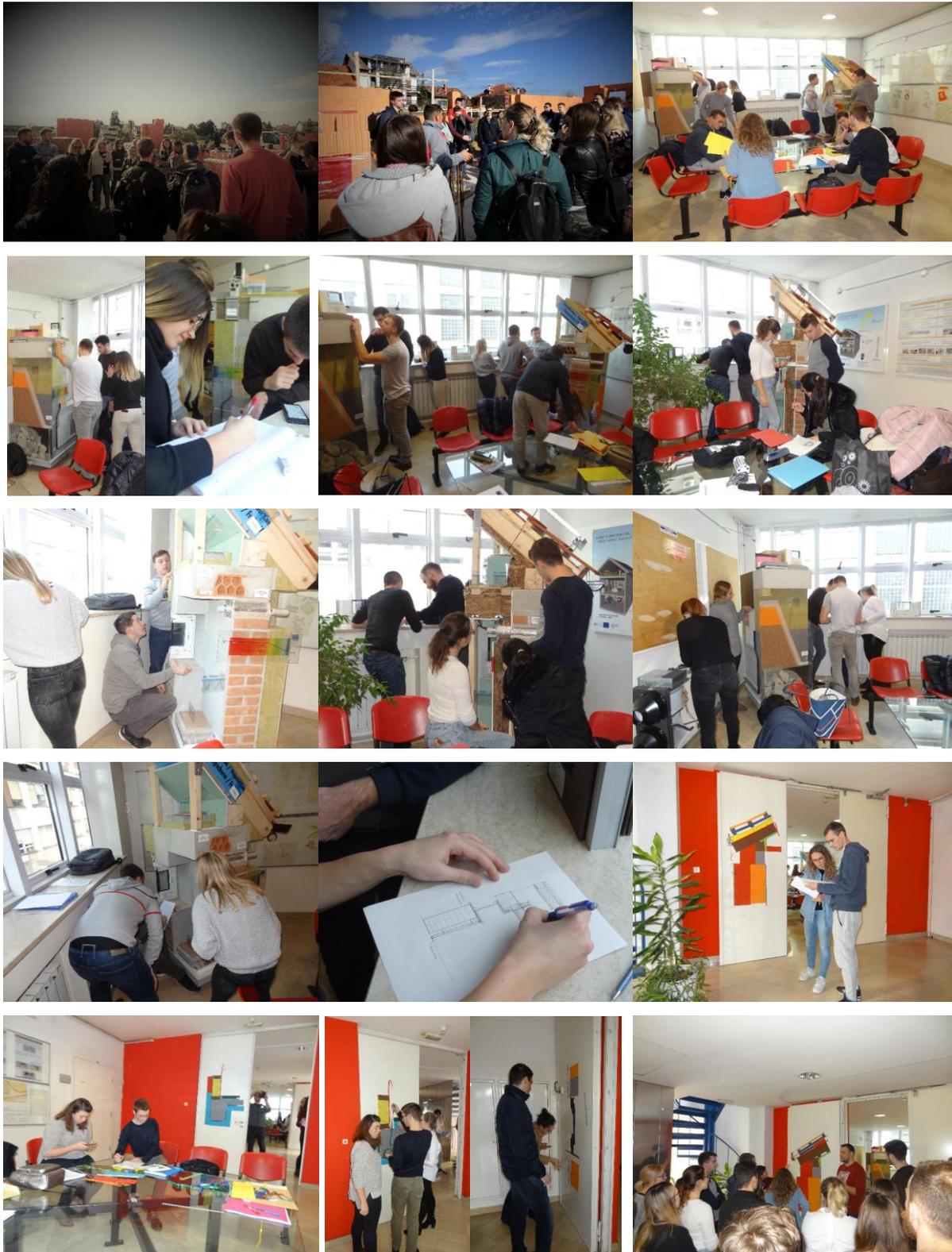
At the end of the training programme, the students had undertaken the exam and their practical work on the design project was graded.

Several images from the EQF 6-7 training course conducted by the UNIZG can be found bellow.



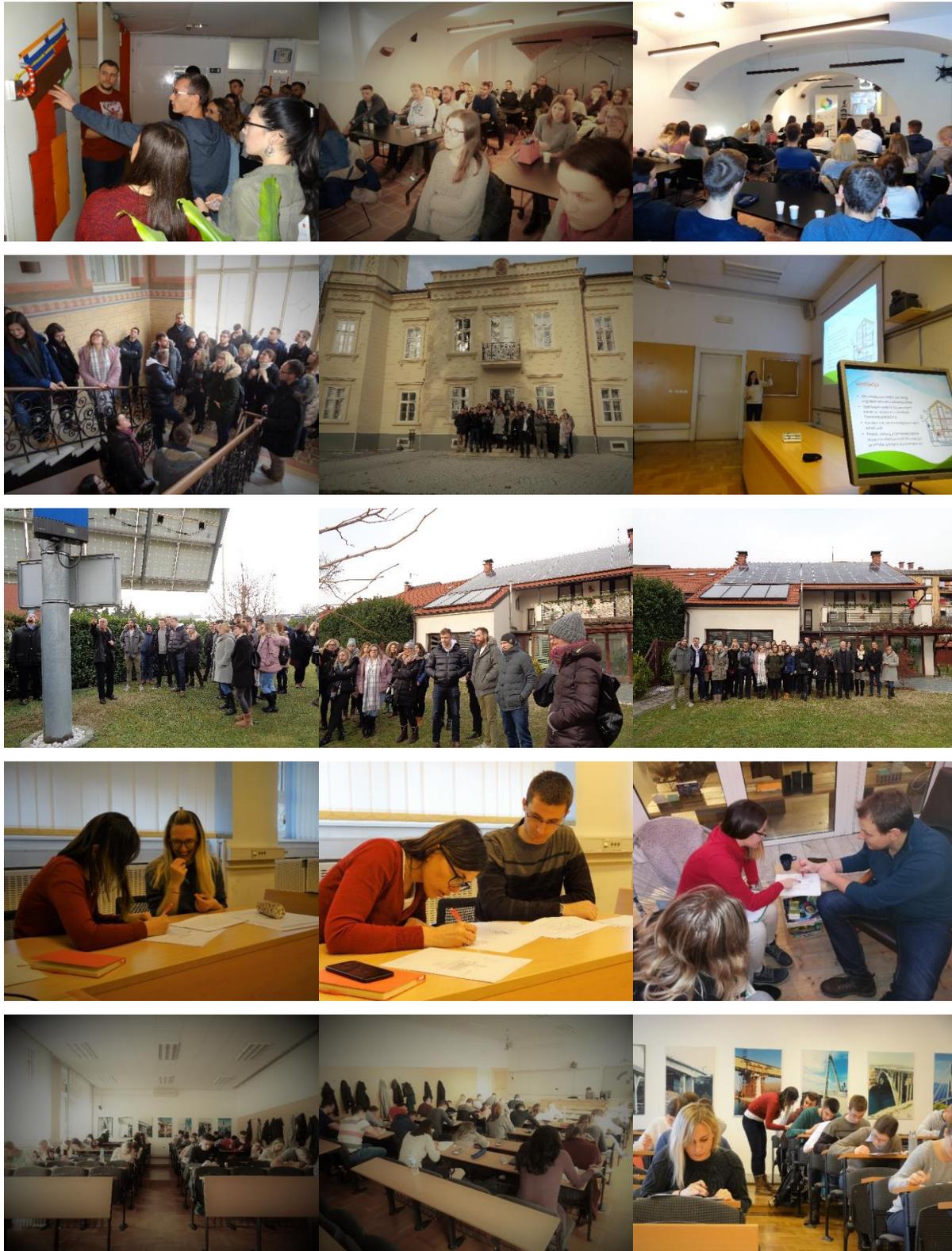


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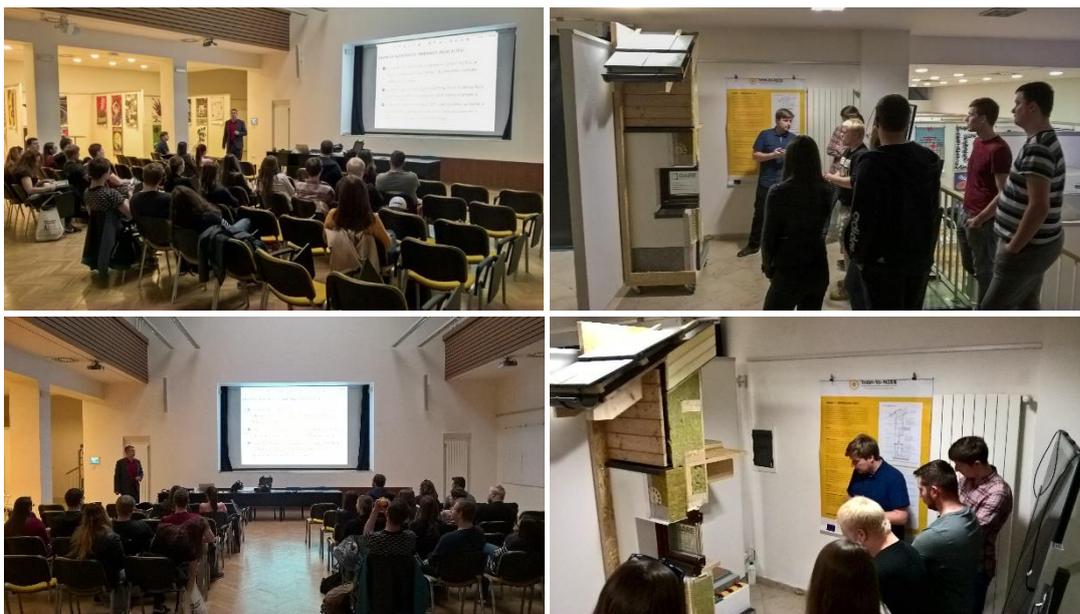
3.3. Czech Republic

The Training programme in Czech Republic was integrated to the course of energy management in buildings. The course guarantees a successful implementation of the newly developed training under the Fit-to-nZEB project, which was then translated into Czech language. The course on energy management in buildings consisted of 26 hours of theoretical lectures and 26 hours of practical lectures.

During the course, the students used the training materials primary for the theoretical part of the course. The presentations developed during the project Fit-to-nZEB were presented by the lecturer within the theoretical lectures. In the practical part, the students were introduced to the practical equipment that were developed within the Train-to-nZEB and Fit-to-nZEB projects. Course was attendant by 39 students of program civil engineering at Faculty of civil engineering.

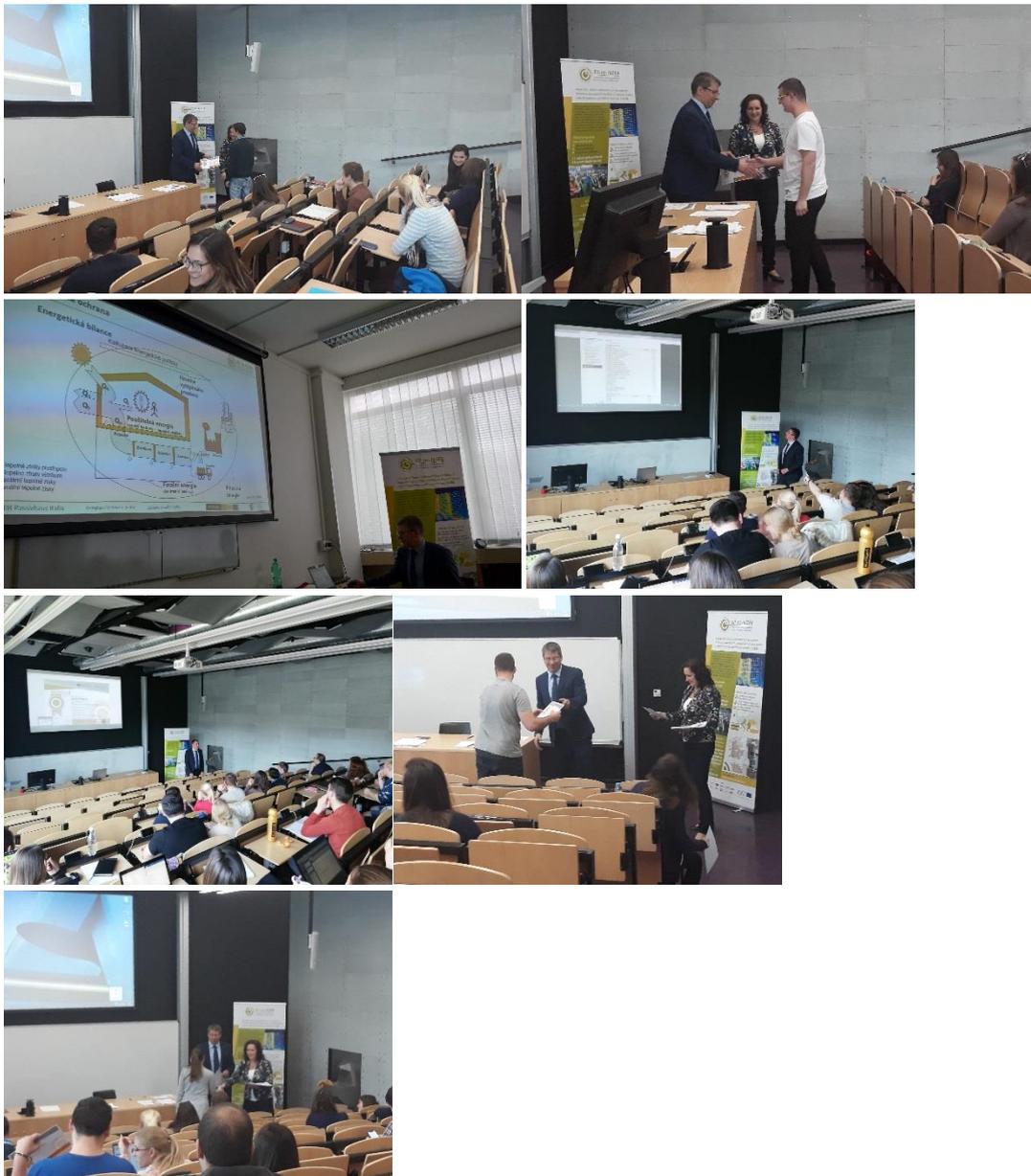
After completing theoretical and practical lectures, the students had to pass the exam for the positive completion of the course.

Several images from theoretical and practical lectures of the course energy management of buildings:





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4. Evaluation of conducted courses

4.1. Bulgaria

A feedback survey was conducted among the students after the entire training programme was conducted. Majority (27) of 29 trained students of UACEG gave their feedback about the training course on the January 30st, 2019.

Figure 5 shows that students attending Fit-to-nZEB training course held by UACEG strongly agree (59%) and agree (37%) that the lectures were very praxis orientated and relevant. It was also found that 93% of students strongly agree or agree (30% and 63% respectively) that the structure of learning materials was very good. Additionally, 96 % of students think (37% strongly agree and 59% agree) the layout of learning materials was very good, and 85% of students agree that the content of learning materials was in accordance with the contents of the course (Figure 5).

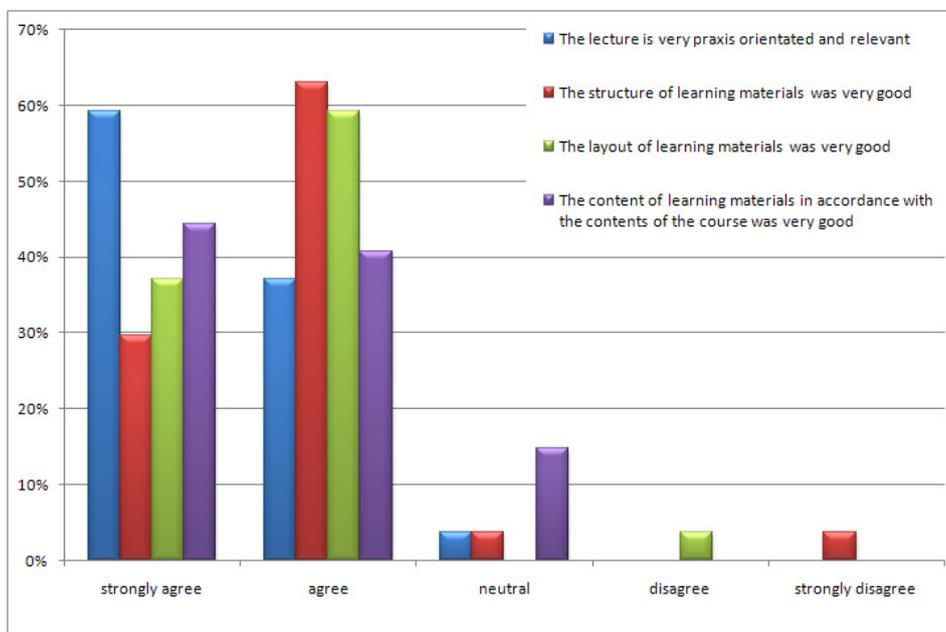


Figure 1 Feedback of students on the structure, layout, content of learning materials and the practicality of training course

Figure 6 shows that students attending the Fit-to-nZEB training course held by UACEG strongly agree (26%) and agree (67%) that their knowledge and competence about the topic significantly increased after the course and they feel comfortable to apply the knowledge obtained during the course (26% strongly agree and 63% agree while 7% remained neutral). Furthermore, 52% of students strongly agree and 37% agree that they could learn much from the practical work and practical exercises while 7% of students remained neutral. Figure 6 shows that students strongly disagree (26%) or disagree (48%) with the statement that they prefer more theoretical approach of the learning material, without practical work.



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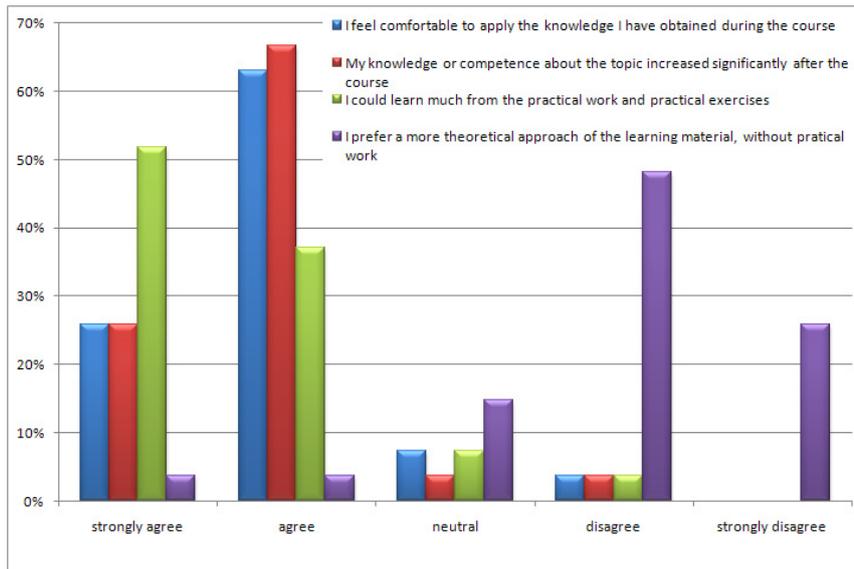


Figure 2 Feedback of students on their view on the progress they have made during the course (regarding competences) and preferences on the practical and theoretical approach

Figure 7 illustrates the students' opinion regarding discussion possibilities during the course regarding the course topic and methods where they strongly agree and agree (22% and 59% respectively) that the course stimulates discussion. In spite of this 19% of the students strongly agree and 63% agree that a distance course would also be satisfactory.

Regarding the time frame conditions 92% of students agree they were adequate, 7% of students remained neutral with the statement that the time frame was overall fitting.

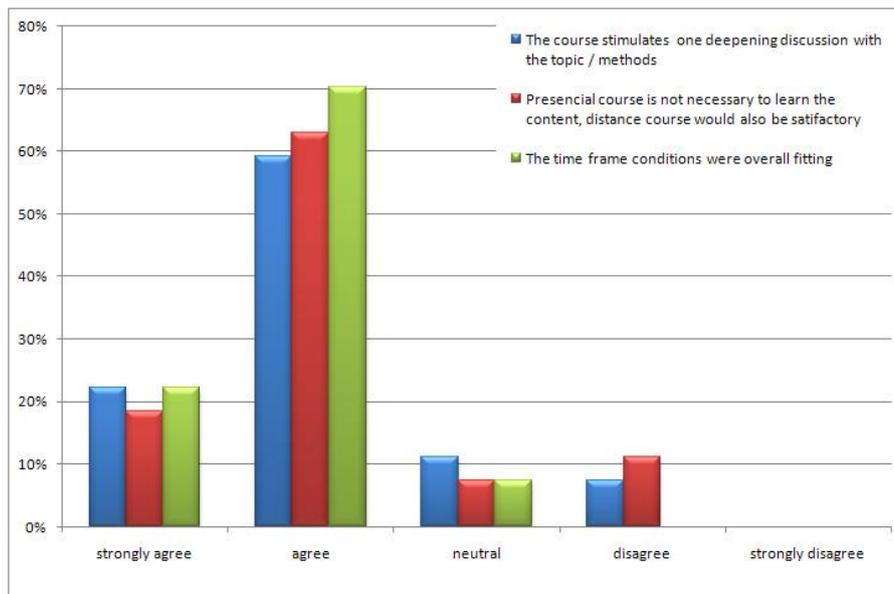


Figure 3 Feedback of students on their view regarding discussion possibilities with teachers and peers as well as suitability of time frame to the presented topics



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Figure 8 shows that students attending the Fit-to-nZEB training course held by UACEG that the training course is very good (strongly agree 48% and agree 48%) and additionally, students feel that comparing to other courses, this course presented new approaches (33% strongly agree and 48% agree).

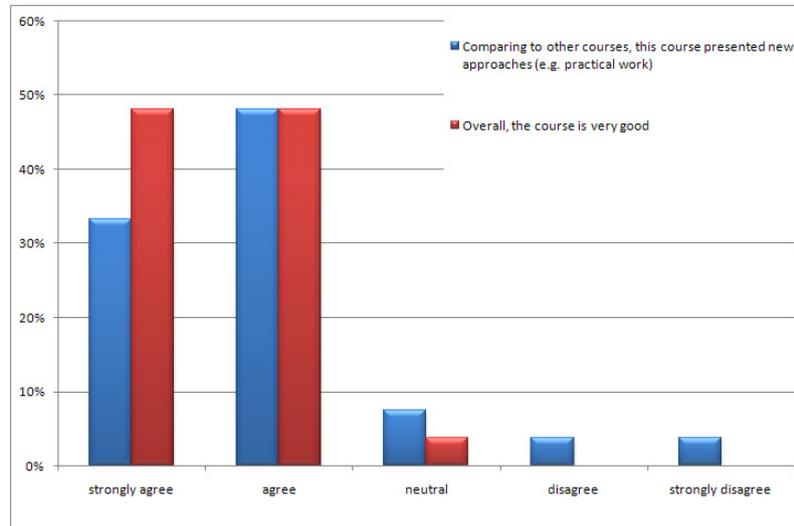


Figure 4 Feedback of students on their overall view of the training course

The students were also asked a question on improvements they could suggest to be implemented in future to the existing training course. There were 7 answers to this question:

- We need more practice. There are plenty of objects with energy-efficient construction.
- Test with closed-ended questions.
- More practical approaches.
- Practical work and visits to factories, test facilities and laboratories.
- More practice. Visiting an object. Contact with natural materials. Examination of sample air systems.
- More time for the course, sometimes running through the course material.
- We want discipline to become mandatory rather than optional.

The explanation for these comments is that the course was optional (elective) and more theoretical with only 30 hours. We hope that the course will be transferred into obligatory with 30 more hours for practical training.



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4.2. Croatia

Feedback survey was conducted among the training course participants (students) after the entire training programme was conducted. Majority of 31 students UNIZG trained gave their feedback about the training course on the January 21st, 2019. An interactive system VoxVote (freeware) was used to perform this survey.

Figure 5 shows that students attending Fit-to-nZEB training course held by UniZG strongly agree (67 %) and agree (33 %) that the lectures were very praxis orientated and relevant. It was also found that 89 % of students strongly agree or agree (59 % and 30 % respectively) that the structure of learning materials was very good. Additionally, 92 % of students think (48 % strongly agree and 44 % agree) the layout of learning materials was very good, and all students agree that the content of learning materials was in accordance with the contents of the course (Figure 5).

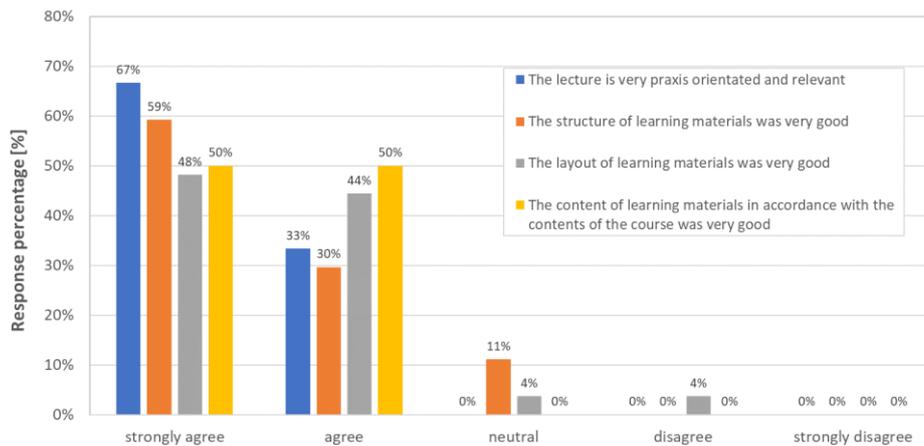


Figure 5 Feedback of students on the structure, layout, content of learning materials and the practicality of training course

Figure 6 shows that students attending the Fit-to-nZEB training course held by UniZG strongly agree (50 %) and agree (38 %) that their knowledge and competence about the topic significantly increased after the course and they feel comfortable to apply the knowledge obtained during the course (54 % strongly agree and 42 % agree while 4 % remained neutral). Furthermore, 65 % of students strongly agree and 31 % agree that they could learn much from the practical work and practical exercises while 4 % of students remained neutral. These results are in line with the “validation” question which was asked in order to check if respondents are speeding when filling out the survey and therefore cheat. Figure 6 shows that students strongly disagree (46 %) or disagree (38 %) with the statement that they prefer more theoretical approach of the learning material, without practical work.



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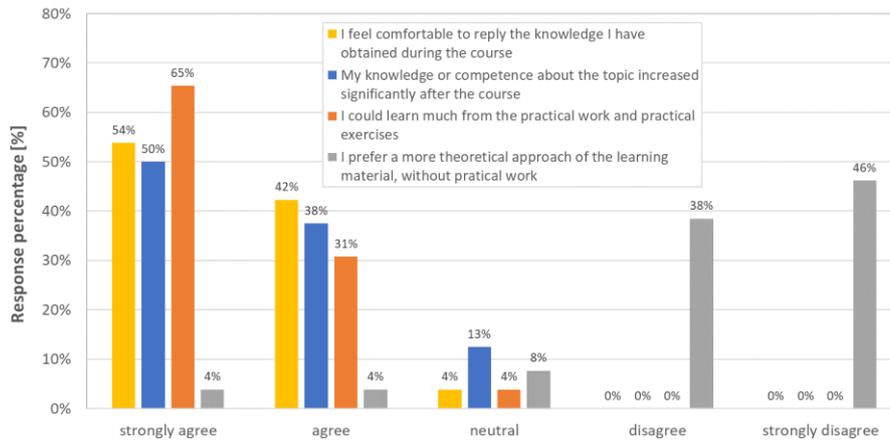


Figure 6 Feedback of students on their view on the progress they have made during the course (regarding competences) and preferences on the practical and theoretical approach

Figure 7 gives the feedback on students' view regarding discussion possibilities during the course regarding the course topic and methods where they strongly agree and agree (31 % and 58 % respectively) that the course stimulates discussion. This standpoint is confirmed by their strong disagreement (24 %) and disagreement (56 %) with the statement that attendance to the lectures is not necessary to learn the content and that the distance course would also be satisfactory. With the need of students to participate to the lectures and other training activities it is shown that they prefer the chance to discuss their problems during exercises, design work with their peers and also lecturers.

Regarding the time frame conditions 58 % of students agree they were adequate, 35 % of students remained neutral while 8 % of students disagree with the statement that the time frame was overall fitting. The reason for such a position of students could be that for some topics, there was too little time to give in depth overview on the topic. Also, the design work was pretty demanding timewise and this was due to the fact that majority of topics had to be lectured before they could implement the knowledge gained into their specific design which they had to finish before the semester end.

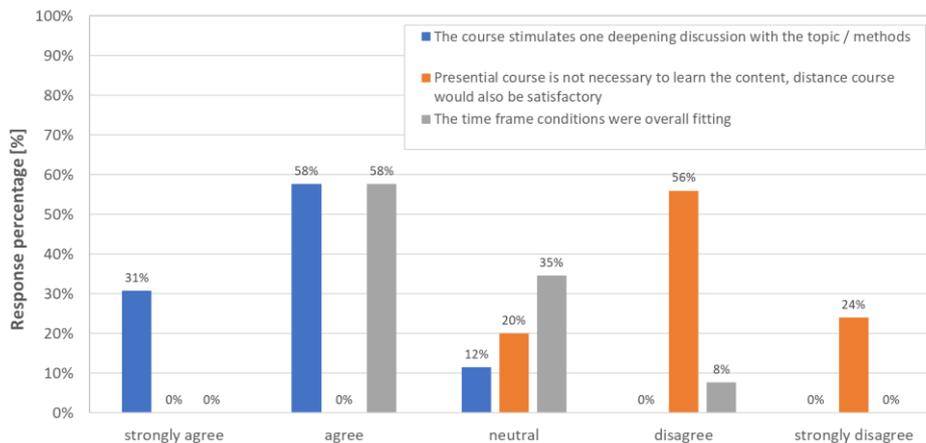


Figure 7 Feedback of students on their view regarding discussion possibilities with teachers and peers as well as suitability of time frame to the presented topics



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Figure 8 shows that students attending the Fit-to-nZEB training course held by UniZG that the training course is very good (strongly agree 62 % and agree 38 %) and additionally, students feel that comparing to other courses, this course presented new approaches (e.g. practical work) (75 % strongly agree and 25 % agree).

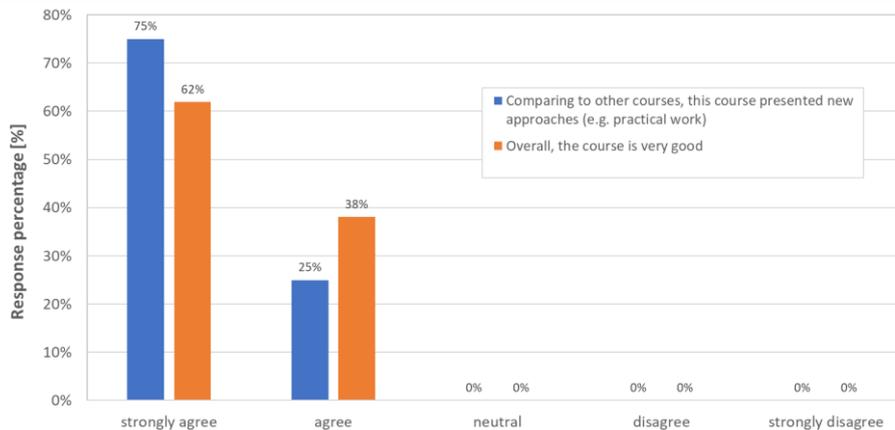


Figure 8 Feedback of students on their overall view of the training course

The students were also asked a question on improvements they could suggest to be implemented in future to the existing training course. There was only one answer to this question and the suggestion was for the lecturers to develop additional written (printed) training materials besides the handouts from the presentations, videos, demonstration models, samples of components and materials.

Student participating to the training course has sent a testimonial about the course. This student felt the urge to write down his thoughts despite his poor performance during the course and without us asking him to do so. His testimonial (in Croatian and English) is given below.

Croatian version (original)	English translation
<p>Poštovani profesore i poštovana asistentice</p> <p>Htio sam vam reći da sam odlučio ponovno upisati kolegij građevinsku fiziku zbog čega i nisam izašao na popravni kolokvij, ni predao program. Žao mi je što vam nisam ovaj mail ranije poslao i nadam se da niste puno razočarani.</p> <p>...</p> <p>Također sam vam htio reći da meni uopće nije žao što sam upisao građevinsku fiziku. Oduševljen sam predmetom i trudom koji ulažete da bi nam pružili kvalitetno obrazovanje:</p> <ul style="list-style-type: none"> - kvalitetna živa predavanja s aktualnim primjerima i videozapisima - donosite na predavanja uzorke i uređaje - izvodite nam pokuse - organizirate gostujuća predavanja i odlaske po gradilištima 	<p>Dear Professor and Respected Assistants</p> <p>I wanted to tell you that I decided to re-enrol my course in building physics for which I did not come up for a midterm exam or deliver the project work we had to do.</p> <p>I'm sorry I did not send you this mail earlier and I hope you're not too disappointed.</p> <p>...</p> <p>I also wanted to tell you that I'm not sorry to have enrolled building physics, in contrary... I am thrilled with the course and effort you invest to provide us with quality education:</p> <ul style="list-style-type: none"> - high quality live lectures with current examples and videos - Bring specimens and samples of the systems to lectures - organize live experiments and tests for us - organize guest lectures and technical visits



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<ul style="list-style-type: none"> - slušate mišljenje i kritike studenata - potičete ispravno pisanje i izlaganje seminara - model detalja u dvorišnoj zgradi mjerila 1:1 <p>Nastavite tako!</p>	<ul style="list-style-type: none"> - you listen to the students' thoughts and criticisms - you encourage the writing and presentation skills of us students through seminars and pitch presentations - developed models with the full scale (1:1) details which are installed in the yard building <p>Keep doing it!</p>
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4.3. Czech Republic

A feedback survey was conducted among the training course participants (students) after the entire training programme was completed. Most of the students attending the course were interested in expressing their opinion on the course (32 students). Students gave feedback to the training course on the May 7th, 2019.

Figure 1 shows that student attending Fit-to-nZEB training course held by Czech Technical University strongly agree (38 %) and agree (50 %) with the idea that the lecture is very praxis orientated and relevant. Students also think that the structure of learning materials was very good (32 % strongly agree and 62 % agree). It was also found that 91 % of students strongly agree or agree (43 % and 48 %) that the layout of learning materials was very good and 88 % students think that the content of learning materials in accordance with the contents of the course was very good (44 % strongly agree and 44 % agree).

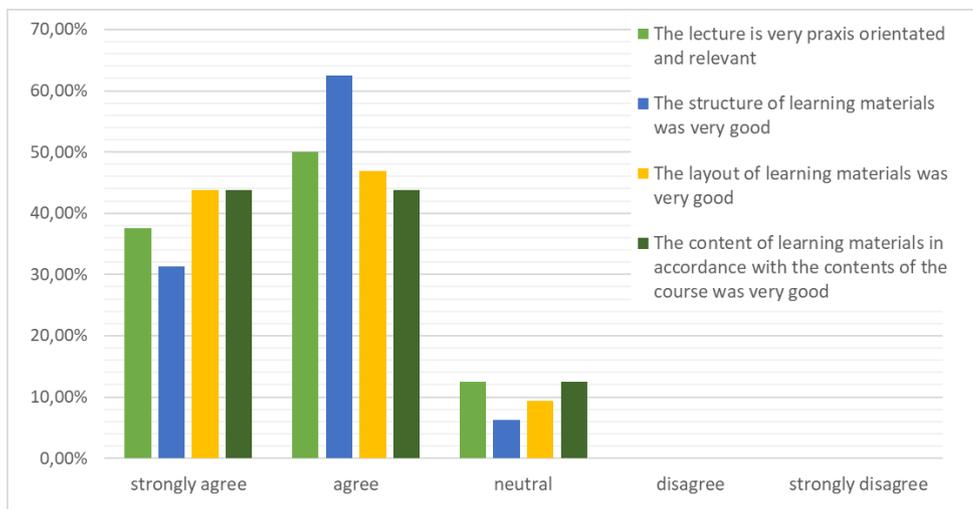


Figure 1 Feedback of students on the structure, layout, content of learning materials and the practicality of training course at Czech Technical University

Figure 2 shows that the students attending Fit-to-nZEB training course held by Czech Technical University strongly agree (28 %) and agree (53 %) with idea that they feel comfortable to reply the knowledge that they obtained during the course. Up to 88 % of students think that their knowledge or competence about the topic increased significantly after the course (50 % strongly



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agree and 38 % agree). Students also think that they could learn much from the practical work and practical exercises (62 %). Students don't prefer a more theoretical approach of the learning material, without practical work (72 %).

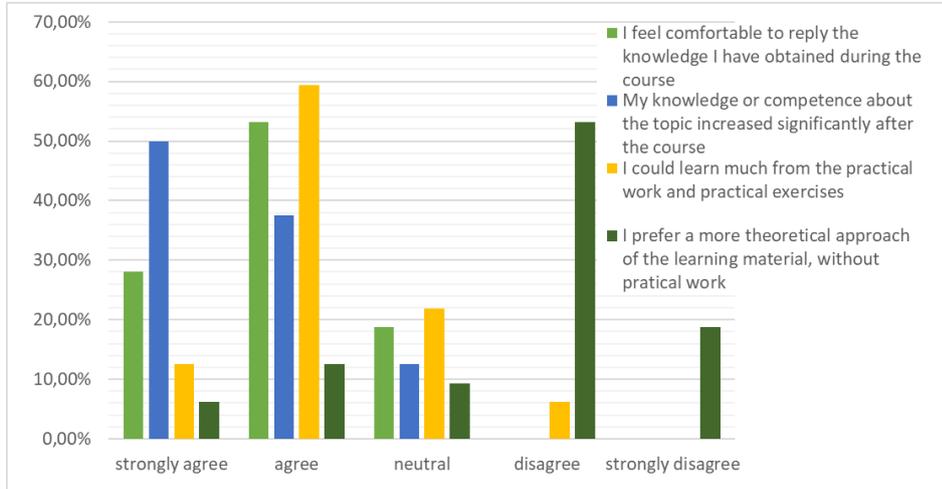


Figure 2 Feedback of students on their view on the progress of their knowledge during the training course at Czech Technical University

Figure 3 shows the students' opinion regarding discussion possibilities during the course (87 %). Students disagree with idea that the presential course is not necessary to learn the content, distance course would also be satisfactory (43 % disagree and 22 % strongly disagree). Students have different opinions about the time frame conditions: 53 % of student agreed that the time frame was fitted (19 % strongly agree and 34 % agree) and 38 % of student took a neutral stance and 9 % of students disagree.

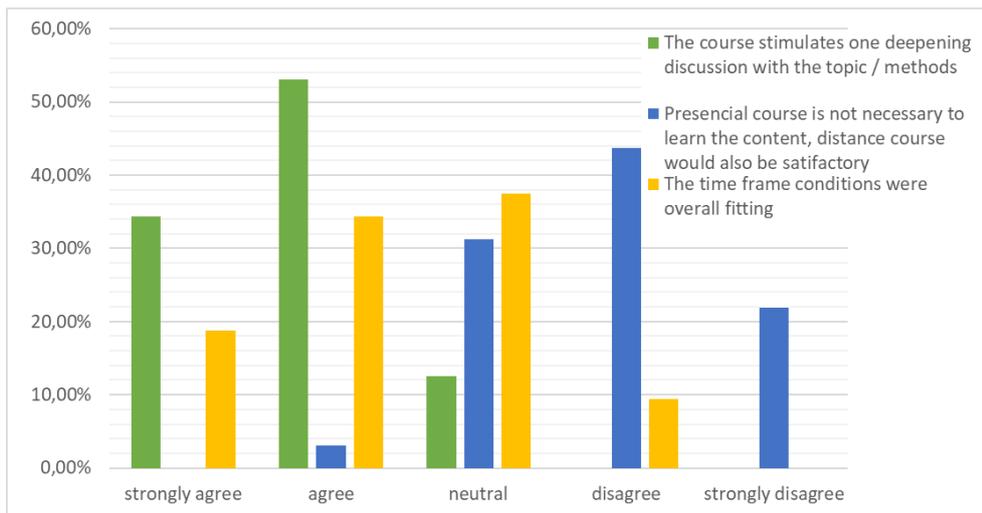


Figure 3 Feedback of students on their view regarding discussion possibilities with teachers and peers as well as suitability of time frame to the presented topics during course at Czech Technical University



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Figure 4 shows that 96 % of student think that course is very good (43 % strongly agree and 53 % agree). In comparing to other courses 69 % of the students agree with idea that this course presented new approaches (16 % strongly agree and 53 % agree).

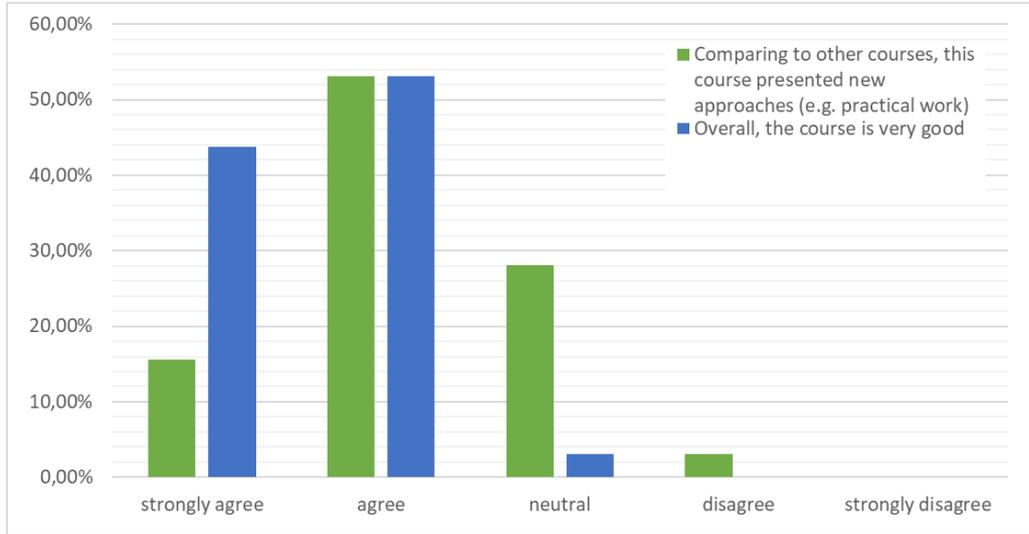


Figure 4 Feedback of students on their overall view of the training course at Czech Technical University



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5. Conclusions and suggested monitoring activities - relation with Los D2.3

5.1. Bulgaria

In General: very good acceptance and high interest from the students.

1) Lectures' content and learning materials:

- Layout, content of learning materials and the practicality of training course – high satisfaction

2) Learning outcomes: the effectiveness of the learning procedures

- Students' opinion about learning progress and application of obtained knowledge – high satisfaction;
- Good acceptance the students, however with some remarks regarding the need of more practice;
- Possible improvements: increasing the number of hours for practical work, transforming the course from elective into obligatory with more hours.

5.2. Croatia

In General: very good acceptance and high interest from the students

1) **lecture's content and learning materials:**

layout, content of learning materials and the practicality of training course – high satisfaction

2) **learning outcomes:** the effectiveness of the learning procedures

Self-reflexing from the students about learning progress and application of obtained knowledge - high satisfaction

Innovative approach (practical work) good acceptance the students, however with some remarks regarding the time.

Possible improvements: increasing the number of hours, to deepen the lectures in some topics, which could not be lectured in details. And, optimizing timing between theoretical part with practical part of specific design, so that the students could applied more from the gained knowledge.

5.3. Czech Republic

In General: high interest from the students and their very good acceptance of the course.

3) **lecture's content and learning materials:**

layout, content of learning materials and the practicality of training course – high satisfaction

4) **learning outcomes:** the effectiveness of the learning procedures



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Students agree with idea that, after completing the course, they have deeper knowledge of nZEB problematics and achievement of learning progress and they can apply the information obtained.

The idea of practical teaching and practical demonstrations on models was highlighted by the students. They agree with the idea that practical training is very beneficial for understanding the topic of nZEB buildings.

Future improvements could include increasing the time duration of the course.



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Appendices

Questionnaire for the Universities Administration: General Information

Bulgaria

Name of the course (english)	Management of Energy-Efficient Renovation of Buildings
Name of the course/module (original language)	Управление на енергийно-ефективно обновяване на сгради
Type and name of title or degree upon conclusion	engineers and architects
Duration of the course/module (hours)	30
Semester(s) in which the module is taught	9
Number of credits (ECTS)	2
Teaching methodology (presencial classes; block seminars; online; etc)	presencial classes
Learning material	
Evaluation system	test
Name of the Institution	University of Architecture, Civil Engineering and Geodesy
Lecturer	Assoc. Prof. Stoyanka Ivanova, Prof. Fantina Rangelova, Prof. Plamen Chobanov
Country	Bulgaria
Contact person	Stoyanka Ivanova
E-mail	siva_fce@uacg.bg
Start of the course	september 2018
Number of participaints	27
Key words of the related topics	buildings physic, passive buildings, management
Relation to curriculum	Elective course
Recommended pre-requisites	
Which fit to nZEB traning materials module will be used?	1,2,3,5,6,8,9,10,12,13,16,17 and partly modules 4,7,11.
Module content (for each training module)	as defined in 4.1.
Objected knowledge and/or competence increase (for each training module)	as defined in 4.1.



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Croatia

Name of the course (english)	Building Physics
Name of the course/module (original language)	Građevinska fizika
Type and name of title or degree upon conclusion	M.Sc. Civil Engineering
Duration of the course/module (hours)	60 hours
Semester(s) in which the module is taught	1st obligatory for Construction materials programme; 3rd elective for other programmes (students from the "Theory and modelling of structures programme" are enrolled this year)
Number of credits (ECTS)	6 ECTS
Teaching methodology (presencial classes; block seminars; online; etc)	weekly presencal classes, excersises (auditory, design), hands on work, project, seminar, field visits, self study, discussions
Learning material	presentations, available literature
Evaluation system	midterm exam, final exam, project evaluation, seminar e
Name of the Institution	Faculty of Civil Engineering, University of Zagreb
Lecturer	Assist. prof. Bojan Milovanovic
Country	Croatia
Contact person	Bojan Milovanovic
E-mail	bmilovanovic@grad.hr
Start of the course	2018 W
Number of participaints	31
Key words of the related topics	nZEB, thermal balance, renewable energy sources, thermal bridges, cross crafting, water vapour diffusion, deep energy renovation
Relation to curriculum	Lectures and excersises in accordance with "Fit to nZEB" curriculum, hands on experiance in designing nZEBs (including thermal bridges, airtightness, water vapour diffusion), site visits on new nZEBs and deep energy renovation examples in Croatia as well as sites with implemented RES sources
Recommended pre-requisites	no pre requisites recommended
Which fit to nZEB traning materials module will be used?	<ol style="list-style-type: none"> 1. Basics of building physics 2. Optimal solar gains 3. Building Envelope 5. Airtightness, vapour and moisture movement, wind-tightness 6. Building Services 7. Conservation of historic building fabric 8. RES in building renovation 10. Planning and design instruments 11. Comfort, health and safety requirements in buildings, incl. indoor air quality 12. Step-by-step retrofit plans 13. Energy efficiency and building renovation policies 14. Achieving measurable results 17. Ecology and Sustainability
Module content (for each training module)	corresponds with the deliverable D4.1 for the respective training modules
Objected knowledge and/or competence increase (for each training module)	corresponds with the competences defined in the deliverable D2.3 for the respective training modules



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Czech Republic

Name of the course (english)	Energy management in buildings
Name of the course/module (original language)	Energetický management budov
Type and name of title or degree upon conclusion	M.Sc. Civil Engineering
Duration of the course/module (hours)	52 hours
Semester(s) in which the module is taught	2nd semester of master degree
Number of credits (ECTS)	4 ECTS
Teaching methodology (presencial classes; block seminars; online; etc)	weekly presencial courses, excursions, seminar, self-study, discussion
Learning material	presentations, available literature
Evaluation system	final exam, evaluation of exercises
Name of the Institution	Czech Technical University in Prague, Faculty of Civil Engineering
Lecturer	Ing. Jiří Karásek, Ph.D.; Ing. Jan Pojar
Country	Czech Republic
Contact person	Jan Pojar
E-mail	jan.pojar@fsv.cvut.cz
Start of the course	2019, summer semester
Number of participants	48
Key words of the related topics	energy, economics, cost analysis, energy perspectives, energy balance, renewable energy sources, energy efficiency measures
Relation to curriculum	Lectures and excersises in accordance with "Fit-to-nZEB" curriculum
Recommended pre-requisites	no pre-requisites recommended
Which fit to nZEB traning materials module will be used?	<ol style="list-style-type: none"> 1. Basics of building physics 2. Optimal solar gains 3. Building Envelope 5. Airtightness, vapour and moisture movement, windtightness 6. Building services 9. Cost Effectiveness 10. Planning and design instruments 11. Comfort, health and safety requirements in buildings, incl. indoor air quality 13. Energy efficiency and building renovation policies 14. Achieving measurable results 17. Ecology and Sustainability
Module content (for each training module)	corresponds with the deliverable D4.1 for the respective training modules
Objected knowledge and/or competence increase (for each training module)	corresponds with the competences defined in the deliverable D2.3 for the respective training modules



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Questionnaire for the students: Course Evaluation

Lecturer name:					
Course:					
	strongly agree	agree	neutral	disagree	strongly disagree
The lecturer was very qualified					
The lecturer had a very good knowledge about theory/methodology					
The lecturer interacted with participants					
The lecturer was helpfull and willing to answer to student's questions					
The lecture is very praxis orientated and relevant					
The structure of learning materials was very good					
The layout of learning materials was very good					
The content of learning materials in accordance with the contents of the course was very good					
The local conditions were overall fitting (room size, room equipment etc.)					
Students have been appropriately informed about goals, contents and methods					
Students have been appropriately informed about performance requirements and evaluation criteria informed					
My knowledge or competence about the topic increased significantly after the course					
The course stimulates one deepening discussion with the topic / methods					
The time frame conditions were overall fitting					
Overall the course is very good					
Additional observations:					
What improvements do you suggest?					