BOOSTING THE GREEN FUTURE
VIA UNIVERSITY MICRO-CREDENTIALS
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DELIVERABLE № 2.2 International Report

Analysis and specification of areas for upskilling and reskilling in management, environmental, and green standards

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INTRODUCTION

After the desc research conducted in the first research phase, all partners specified the scientific domains and directions for the development of micro-credential courses relevant for the specialties and learners' profiles at their universities. The national frameworks, priorities, and trends in greening the HE curricula via provision of university micro-credential courses in sustainability, green and environmental standards are taken into consideration. The standardization bodies suggested relevant standards for every identified scientific domain and course direction.

The results and discoveries from the first stage of the WP2. Research was the solid fundament for the research activities carried out in this second research stage when the partners conducted field research among the university students and lecturers as well as among the domain experts from their countries.

This report outlines the findings of the second stage of this WP, which aimed to identify areas for upskilling and retraining in environmental and green standards for the key target groups in the partner countries. To achieve this goal at the national level partners conducted research activities based on both quantitative and qualitative research methods. The methodology applied for the field research among university students and lecturers is based on a survey conducted through the distribution of online questionnaires which were proposed by BFU and mutually approved by the partnership. Apart from that, in every country the field research findings were validated by conducted interviews with experts in the relevant sectors and domains who provided valuable insights into the skills and knowledge needed to promote sustainability and environmental responsibility. The experts were interviewed and the structure and guiding questions for the interviews were proposed by BFU and discussed and approved by the partnership. Based on this, each university made an adaptation of the proposed scheme so that it maximally corresponds to the specific situation and concrete educational context.

This report presents the results of the comparative analysis and synthesis of the research results among representatives of the key target groups documented in the national reports provided by the project partners, which should be considered as a complementary and integral part of the document. In addition, this document presents a systematic and structured summary of the feedback, suggestions, and recommendations provided by the experts involved in the second research stage of the project. The final section outlines the micro-credential courses that we intend to develop and provides a comprehensive list of the standards that will be covered by each training program. By doing so, we aim to ensure that our courses provide practical and relevant knowledge and skills to participants, enabling them to make a positive impact in the field of sustainability and environmental responsibility.

Target group description

The aim of the project is to reach out to universities, their students, and lecturers. The universities involved in the project will work on developing new and creative practices related to micro-credentials that can fulfill the demands of the market.

University lecturers will be directly involved in designing and developing digital micro-credential courses in sustainable management, environmental and green standards. The universities will enrich their training offers including the developed micro-credential courses into their curricula. Students will participate in the piloting of the developed micro-credential courses with the help of their lecturers.

For the development of flexible and inclusive standards-related micro-credential university courses that contribute to the digital and green transition and are in line with the needs of the labor market is essential data about the current state regarding the provision of digital education in the partner universities, about the awareness and prior knowledge base of the target groups regarding the sustainable management and green standards as well as information for the attitudes, and preferences regarding e-learning provision of the lecturers and students to be collected and analyzed. For this purpose, among the lecturers and students from all partner

universities were distributed online questionnaires developed and mutually approved by B-Green-ED partnership.

The analysis results and findings from the surveys among lecturers and students (the main target groups), conducted at national level, that were the baseline for the selection of concrete green and management standards to be covered by the intended micro-credential courses at each partner university. These results were discussed with experts from the corresponding application domains and economic sectors so the initial selection of standards to be refined and finalized based on insights about labor market needs and industrial sectors' demands.

The selection process

An important consideration regarding the selection of participants in the survey conducted in the four partner countries - Bulgaria, Lithuania, Spain, and Romania was to be ensured that the online questionnaires would be distributed to the target groups' representatives with no discrimination based on age, gender, religion, origin, geographical location, socio-economic status, etc.

The students and lecturers involved in the online survey were selected only based on their university profiles (speciality and/or faculty), technical skills, qualifications, educational background and willingness to participate.

The total number of collected responses from the university lecturers is 38 while the total number of students' responses collected is 348.

The figure below presents the distribution of the respondents – lecturers and students, by country.

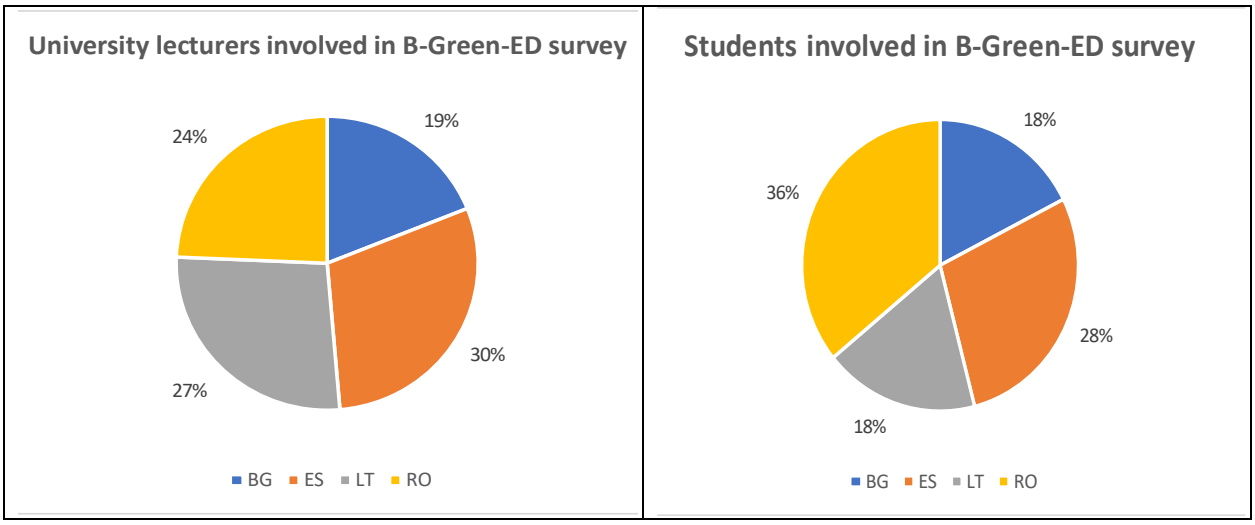


Figure 1 Distribution of respondents by country.

Analysis of the results from a survey among university lecturers and students regarding the e-Learning experience

This chapter of the report presents the results of the survey conducted among the university lecturers and students regarding their e-learning experience. The attitudes and considerations expressed by the respondents regarding the e-learning delivery and implementation are structured by countries and after that are provided some conclusions and recommendation.

Bulgaria

In the survey among the university lecturers in Bulgaria participated only habilitated lecturers – associate professors (90%) and professors (10%) with the following areas of expertise: Engineering; Electrical engineering, renewable energy; Computer systems and technologies; Electronics; IT and computer science; Marketing; Economics; Macroeconomics.

Regarding the participation of the students in the survey, 61 respondents from Bulgaria took part.

All lecturers involved in the survey had been practicing teaching activities for more than 10 years. All lecturers have courses with students from bachelor's degree, 86% teach masters' degree students, and 29% are engaged with courses addressed to PhD students.

The students involved in the survey are studying in two main directions: Business Studies as well as Computer Science and Engineering. 53% of the students are aged 21-25 years, 39% are 18-20 years old and the rest 8% are over 25 years.

The distribution of students participating in the study by domains and majors is shown in the next Figure.

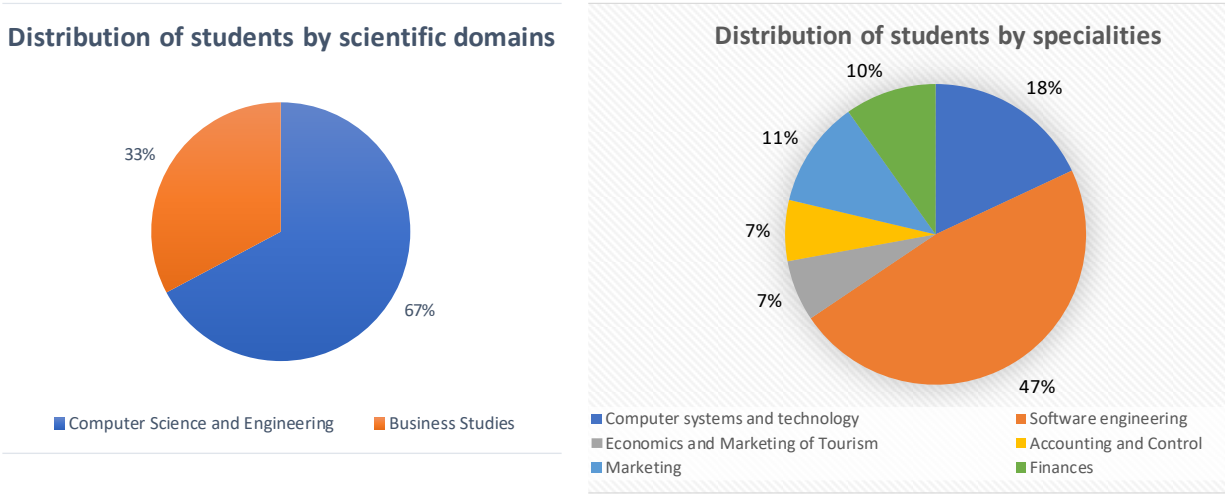


Figure 2 Distribution of students by domains and majors (BG)

The results from the survey show that the most of involved BG lecturers (71.4%) consider that they are using the university virtual learning environment to a very large extent, 14.3% - use the VLE to a large extent and only 14.3% are using the virtual environment to a moderate extent. Regarding the usage of university virtual learning environment during the learning activities 7% of the students declare that they use VLE to a very large extent, 54% stated that they use the e-platform and virtual environment to a large extent while at about 29,5 % share the opinion that they use digital educational facilities to a moderate extent, 7% have answered that they cannot decide (See next Figure).

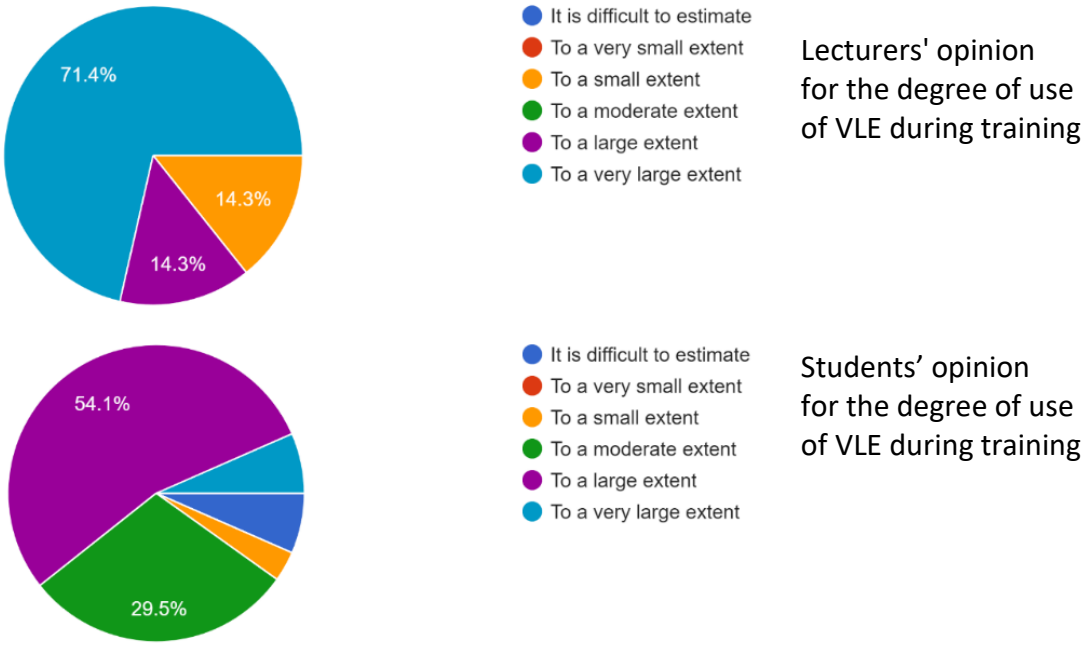


Figure 3 The usage of a virtual learning environment in educational process: feedback from the lecturers and students (BG)

Regarding the digital competences related to the development of educational resources 71.4% of the lecturers declare that they have the necessary capacity and experience in online tutoring. As to the planning and designing of virtual activities and online courses' administering the positive answers are given from 57.1% of the lecturers (Figure 4)

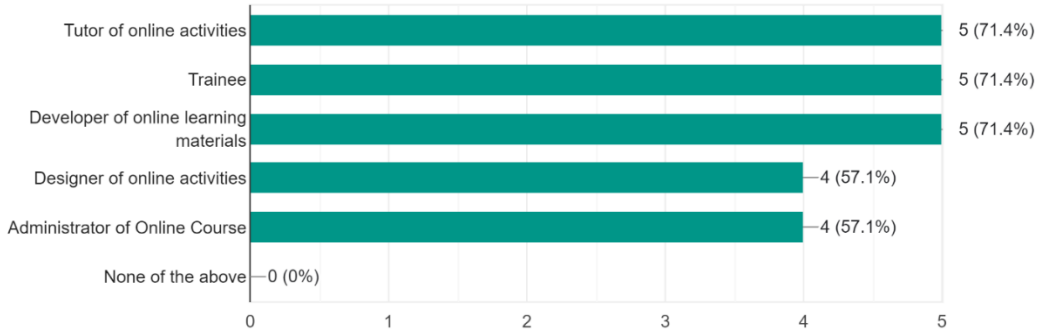


Figure 4 Participation of lecturers in e-learning activities (BG)

The next figure presents in more detail the information regarding the proficiency of the lecturers to carry out educational activities in digital environments using modern tools and approaches. (Figure 5)

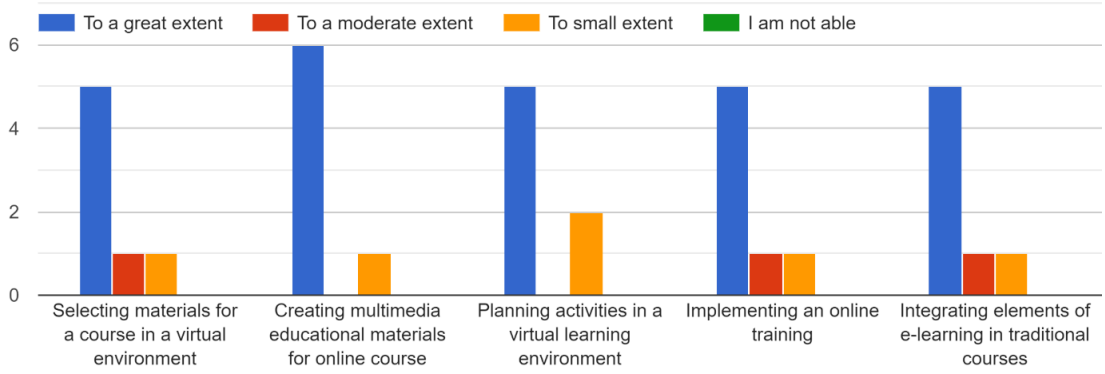


Figure 5 Capacity of lecturers to conduct virtual learning activities (BG)

Concerning the structure of the micro-credential online course, the lecturers share the common opinion that a short introduction related to standards and standardization is necessary.

Moreover, 87% stated that the micro-credential courses should cover topics that are complementary to those included in the traditional courses. 57% of the respondents consider that the theoretical formulations should not be prioritized and that the students have to be able

to proceed to the next stage of the training based on the achieved mastery level and procedural fluency than on the test score. 86% shared the opinion that e-cooperation, virtual contact with the lecturer and team-based activities contribute to the learning outcomes improvement and facilitate personalized learning.

Students were asked to point out the preferred training delivery method. Only 14% have answered that they prefer traditional face-to-face courses. 38% prefer pure online courses while 48% have answered that they like the most blended learning courses.

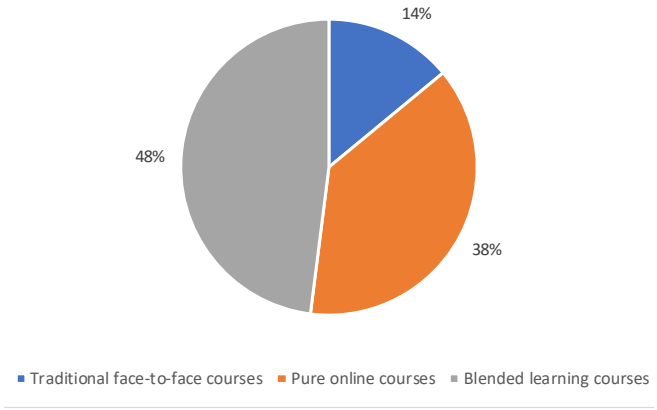


Figure 6 Training delivery methods preferred by the students (BG)

97% of the students prefer to have free access to all digital educational materials for all topics during the entire course. Regarding the channels and methods for communication with other participants in the training, the most preferred are chat and online forum followed by audio and video conferencing and e-mail as is shown in Figure 7.

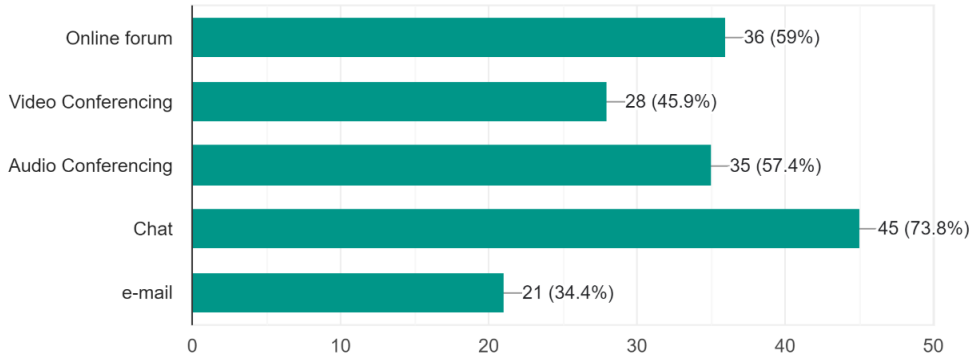


Figure 7 Students' preferences regarding the communication channels and methods (BG)

Lithuania

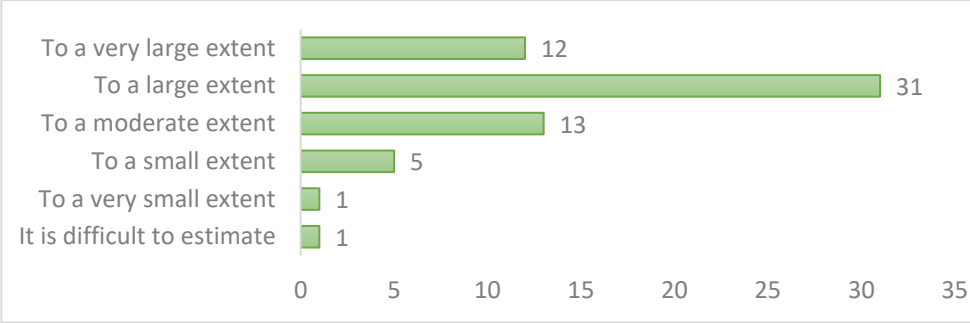
All lecturers involved in the survey (n. 12) are from the Institute of Humanities, Institute of Education and Social Work, Institute of Communication, Faculty of Human and Social Studies. The participants' fields of expertise are as follows: Education; Social work; Philology; Communication. The survey found that most respondents have been practising teaching for more than 10 years. Only one respondent has been practicing teaching for between 5 and 10 years.

Regarding the participation of the students – 63 responses have been collected a total. 50% of the students are studying for a bachelor's degree, 44% - a master's degree, and 6% are PhD students.

The majority of lecturers (83%) use virtual learning environments to a very large extent in their work. 8% of the lecturers pointed out that they use virtual learning environments to a large extent and 9% indicated a moderate use of the virtual learning environment. The survey aimed to find out students' views on the extent to which virtual learning environments (e.g. Moodle) are used in university teaching.

It was found that at about 49% indicated that virtual learning environments are used to a large extent, 19% - to very large extent in their learning. 20% indicated that virtual learning environments are used to a moderate extent. 7% of the students consider that virtual learning environments are used to a small extent. One respondent indicates that the VLE is used to a very small extent and another one faced difficulty to estimate.

Lecturers' opinion for the degree of use of VLE during training



Students' opinion for the degree of use of VLE during training

Figure 8 The usage of a virtual learning environment in educational process: feedback from the lecturers and students (LT)

The study aimed to find out in which capacity lecturers were involved in the e-learning process. Participants could choose more than one answer to the question. The analysis of the survey data revealed that lecturers' roles in e-learning include tutor of on-line activities (75%); trainee (50%); developer of online learning materials (92%); designer of online activities (25%); administrator of online course (25%3). One respondent chose the answer option 'none of the above (see next Figure).

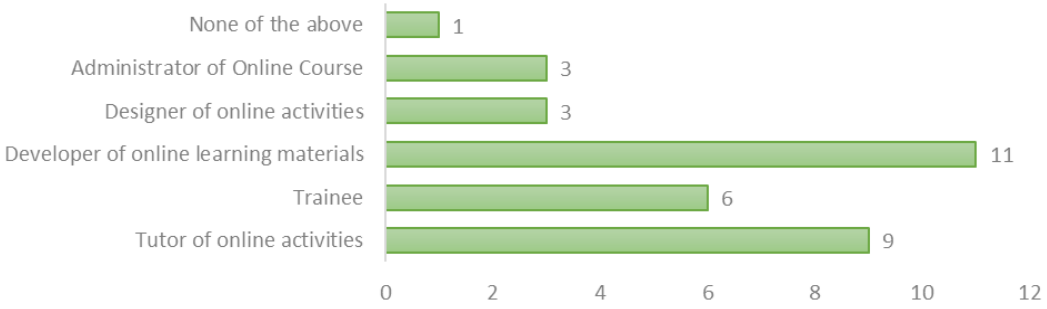


Figure 9 Participation of lecturers in e-learning activities (LT)

It was found that the majority of lecturers are able to conduct activities such as selecting material for a course in a virtual environment (92%), integrating e-learning elements into traditional courses (92%), and planning activities in a virtual learning environment (83%) to a large extent. Half of the respondents indicated that they could develop multimedia learning materials for an online course (50%) and implement online learning (58%) to a large extent.

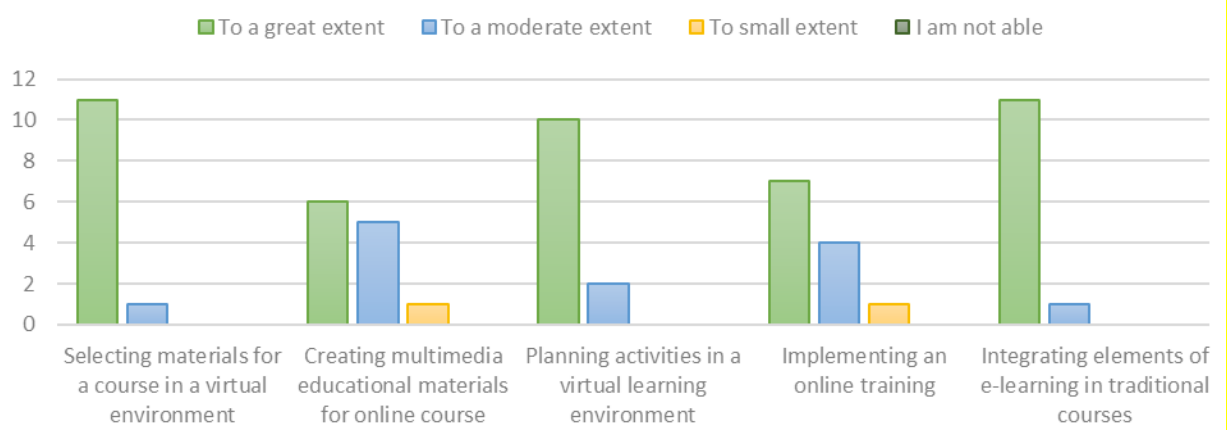


Figure 10 Capacity of lecturers to conduct virtual learning activities (LT)

The study aimed to find out what lecturers would need if they were to develop an e-learning course in a VLE (using Moodle for example). It was found that all lecturers would need a short introduction to the course objectives, duration, requirements, etc. at the very beginning (100%) and that learners would find it useful and effective to collaborate in groups, using a limited online collaborative environment, to work together on common tasks (100%). The majority of lecturers indicated that: team activities help to improve learning outcomes (92%); the e-course is very important to support the development of e-collaboration (92%); an e-course on micro-credit should include topics that complement those included in traditional courses (92%); they enjoy interacting with learners in a virtual classroom (92%); providing learners with additional material helps to increase their current engagement with the topics presented (83%); theoretical formulations should be given priority in the teaching materials for online courses (75%); an online course that properly integrates digital teaching methodologies enables learners to have a more flexible and personalised learning experience than traditional classroom learning (75%); providing learners with gamified learning components helps to increase their current engagement with the topics presented (75%). Just over half of the lecturers (58%) disagreed that review questions should be compulsory for the learner to progress to the next stage of the training.

Regarding the delivery method of the training only 19% of the students have answered that they prefer traditional face-to-face courses. 27% prefer pure online courses while 54% have answered that they like the most blended learning courses.

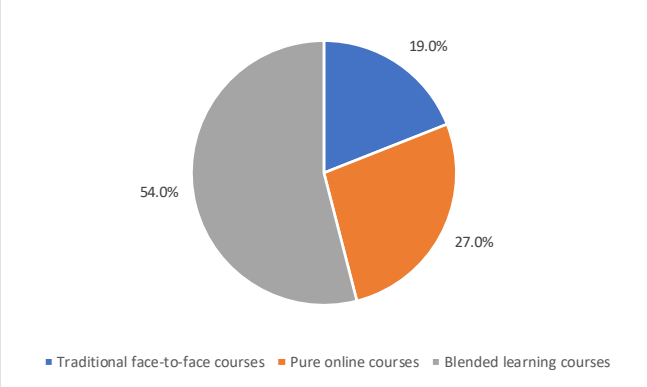


Figure 11 Training delivery methods preferred by the students (LT)

When asked what kind of communication they would like to have with other course participants, the majority of respondents indicated that they would prefer video conferencing (68%). Just under half of the respondents indicated a preference for email communication (44%). Just over a third indicated online forums (38%) and chats (41%). 27% indicated an audio-conference format (see Figure 12)

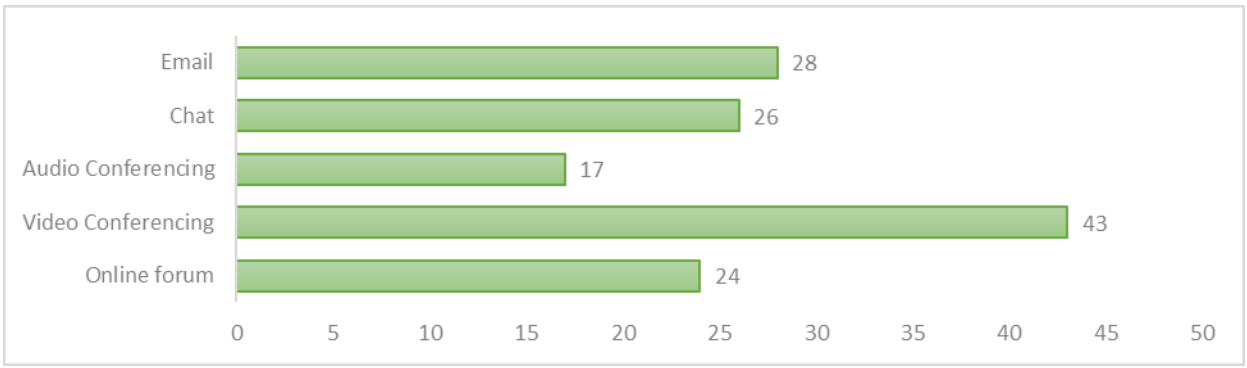


Figure 12 Students' preferences regarding the communication channels and methods (LT)

Spain

In Spain the online questionnaires were distributed between lecturers and students of the Universitat Politècnica de València (UPV). Lecturers and students who participated in the survey belonged to different technical schools located inside the UPV Campus de Vera (Valencia):

- School of Civil Engineering
- School of Design Engineering
- School of Geomatics and Topography

All the participants had a strong relationship with Green Standards, this being the main topic of the questionnaire. Students from the following Bachelor, MSc, and Doctoral programs were invited to participate in the survey:

- BSc in Geomatic Engineering and Topography
- MSc in Civil Engineering
- MSc in Hydraulic and Environmental Engineering

In the survey participated only habilitated lecturers – 10 from Spain and 1 from Columbia. The collected responses are from professors from the following Departments: Research Institute of Water Engineering and Environment (3); School of Civil Engineering (3); Department of Chemistry (1); Department of Applied Mathematics (1); Department of Applied Linguistics (1); Department of Environmental Engineering (1), and Department of Hydraulic Engineering and Environment (1). Regarding the academic position of the involved lecturers 45,5% are professors, 27,3% are associate professors, 18,2% are lecturers/instructors, and 9,1% are assistants.

The involved academic staff are educators with rich experience in teaching. Nearly 73% have working experience as educators for more than 10 years and the rest 27% have experience between 5 and 10 years. Most of the lecturers are teaching in BSc and MSc degrees (81,8 %). However, most of them (63,3 %) also teach in Ph.D.

As for the participation of the students in the survey, 99 students' responses a total have been received where the students are from different nationalities: Spain - 90 students, Chile - 2 students, and Germany, China, Argentina, Greece, Mexico: 1 student per each country. The involved students belonged to the following faculties/departments: School of Geodesic

Engineering, Cartography and Topography; School of Civil Engineering; Doctorate School; Department of Hydraulic Engineering and Environment; Geology Department.

Most of the students (45,5%) are between 21 -25 years old, 33,3% are between 18-20, and 21,2% are over 25 years old.

Most of the students were studying for MSc Degrees (48,5%) and BSc degrees (45,5%). Only 6% were studying for Ph.D. Programs.

According to the results of the survey, the vast majority of the lecturers (72,8 %) find that using a virtual learning environment (based on Moodle for example) in their work is possible to a moderate, large, or very large extent. Only 9,1 % % of the lecturers consider that using virtual learning environments in their work is possible to a very small extent. The majority of students (36,4%) consider that in a moderate way a virtual learning environment used in their university education (See next Figure 13).

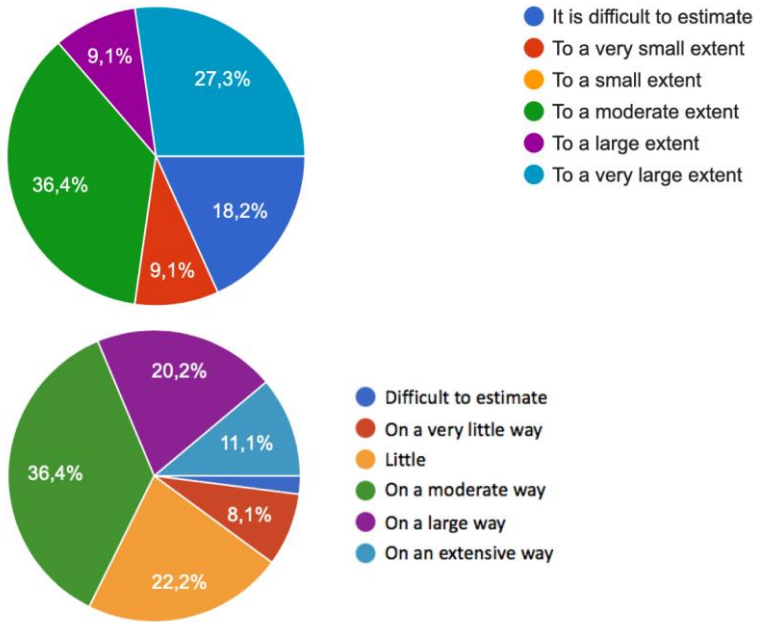


Figure 13 The usage of a virtual learning environment in educational process: feedback from the lecturers and students (ES)

Figure 14 shows that most of the involved lecturers (72,7 %) have tutored online activities or have developed online learning materials (63,6 %).

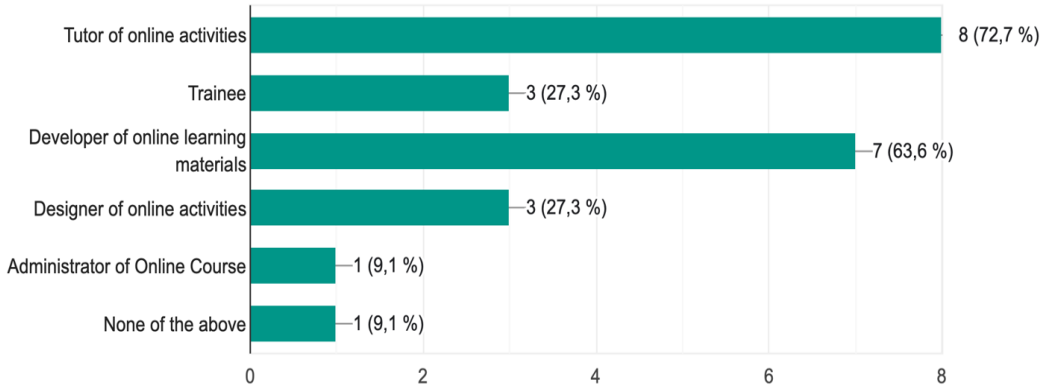


Figure 14 Participation of lecturers in e-learning activities (ES)

The next figure presents in more detail the information regarding the proficiency of the UPV lecturers to carry out educational activities in digital environments using modern tools and approaches. (Figure 15)

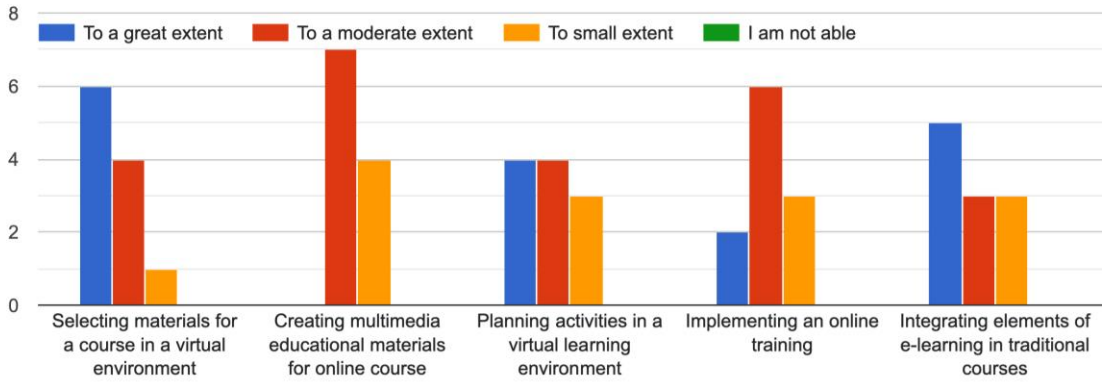


Figure 15 Capacity of lecturers to conduct virtual learning activities (ES)

Concerning the structure of the micro-credential online course, the lecturers share the common opinion that a very short introductory part is needed.

Asked about which type of education they would prefer, 54% of the students select traditional onsite methods, while 40,4% would prefer hybrid methodologies.

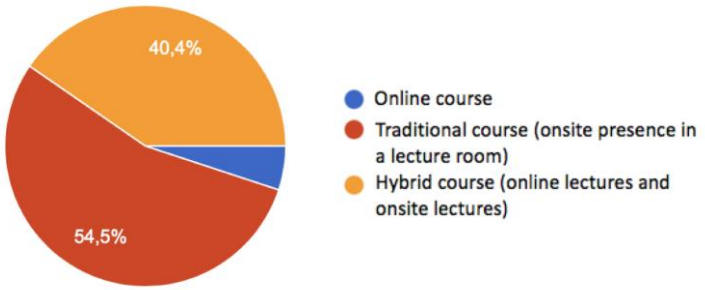


Figure 16 Training delivery methods preferred by the students (ES)

Most of the students prefer to communicate with other participants via chat (53,5%) and videoconference (47,5%). The use of emails (32,3%) and online forums (17,2%) are secondary. Only 9,1% of the students prefer to use audio conferences, as shown in Figure 17.

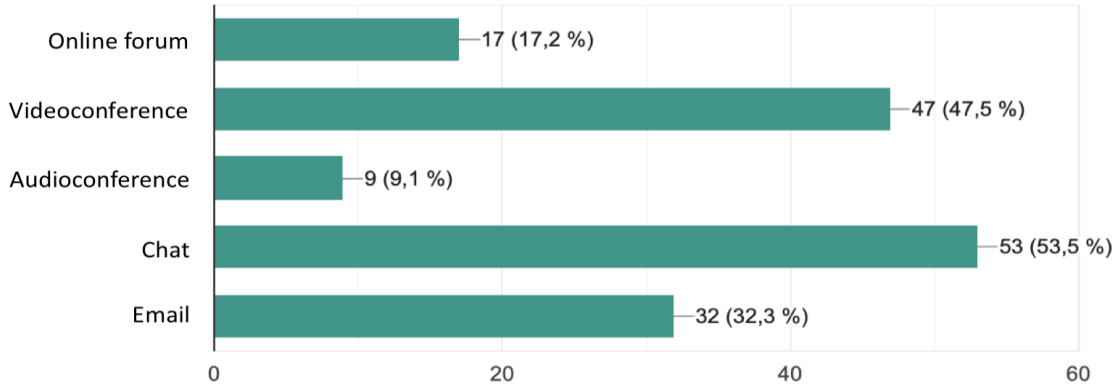


Figure 17 Students' preferences regarding the communication channels and methods (ES)

Romania

A total of 9 questionnaires were received in the study among university lecturers in Romania – 8 from the University of Life Sciences ``King Mihai I`` from Timisoara, Faculty of Engineering and Applied Sciences and 1 from University of Agronomic Sciences and Veterinary Medicine of Bucharest, Horticulture. All respondents are lecturers who have PhD or are Doctors in Sciences. Lecturers belonged to the following Areas of Expertise: Plant Biochemistry; Quality Management; Forestry; Horticulture; Biotechnology; Molecular genetics, cytogenetics; Food sciences; Microbiology, Veterinary hygiene; Molecular Biology.

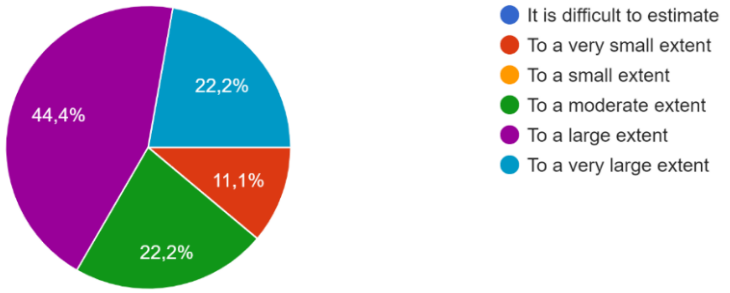
A total set of 125 questionnaires were received. 99,2% were Romanian students and 0,8% are Italians (students in English and French study programs of ULST).

All lecturers involved in the survey had rich professional experience. Nearly 89% had declared working experience of more than 10 years and the rest 11% of the respondents have declared a teaching experience between 5 and 10 years. Many of the lecturers are teaching in BSc degrees – 77,8% and many of them are teaching also in MSc degrees (55,6 %). Apart from that nearly 30% also teach in PhD programs.

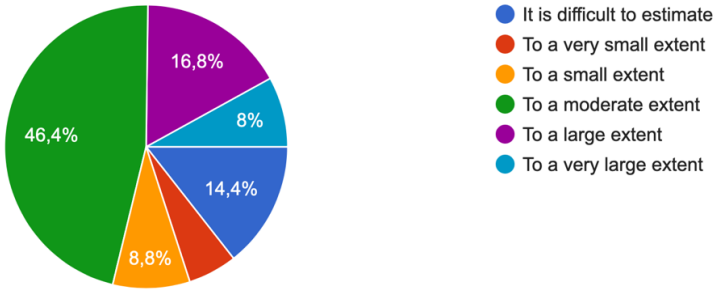
The majority (40%) of the 125 students involved in the survey were aged between 21 and 25 years while nearly 38% were aged over 25 years and only 22% were aged between 18-20 years.

Most of the students from the study were Bachelor students (55,2%). 30,4% of the total students were PhD students and 14,4% - Master students.

The results from the survey show that some of involved lecturers (44.4%) are using the university virtual learning environment to a large extent, 22.2% are declared that they use the VLE to a moderate extent, and 11,1% are using the virtual environment to a very small extent and 22,2% say it is difficult to estimate. According to the results of the questionnaire most of the students (46,4 %) find that using a virtual learning environment (based on Moodle for example) is possible to a moderate extent. Another 16,8% find it to a large extent. At diametrically opposite poles they are only 8,8% that find it to a very small extent and another 8% to a very large extent (See next Figure 18).



Lecturers' opinion for the degree of use of VLE during training



Students' opinion for the degree of use of VLE during training

Figure 18 The usage of a virtual learning environment in educational process: feedback from the lecturers and students (RO)

Regarding the digital competences related to the development of digital educational resources 77,8% of the involved lecturers declare that they have the necessary capacity and have the experience in online tutoring.

As to the planning and designing of virtual activities and online courses' administering the positive answers are given only 22,2% of the lecturers (Figure 19)

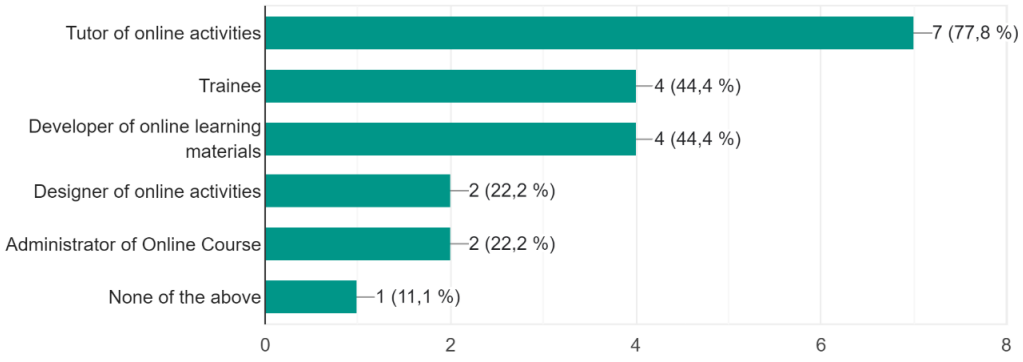


Figure 19 Participation of lecturers in e-learning activities (RO)

The next figure presents in more detail the information regarding the proficiency of the lecturers to carry out educational activities in digital environments using modern tools and approaches (Figure 20).

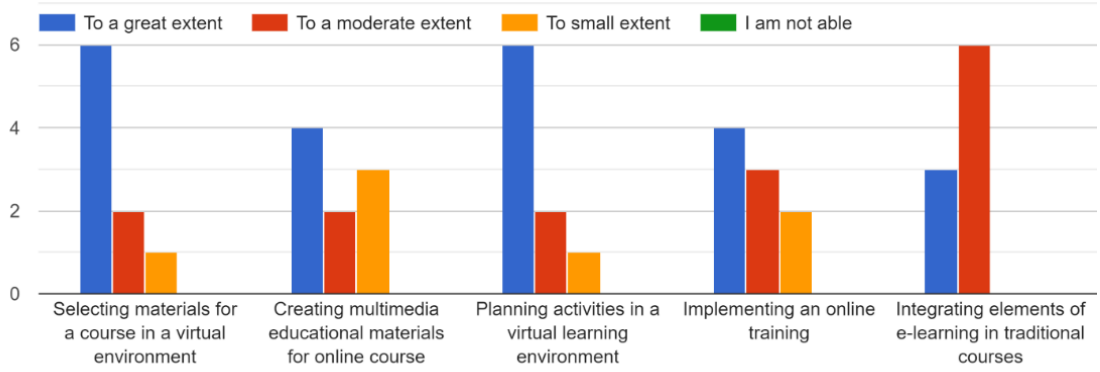


Figure 20 Capacity of lecturers to conduct virtual learning activities (RO)

Concerning the structure of the micro-credential online course, the lecturers share the common opinion that a short introduction related to standards and standardization is necessary.

Almost half of the survey students (49,6%) opted for blended training and another 36% of them for traditional training courses.

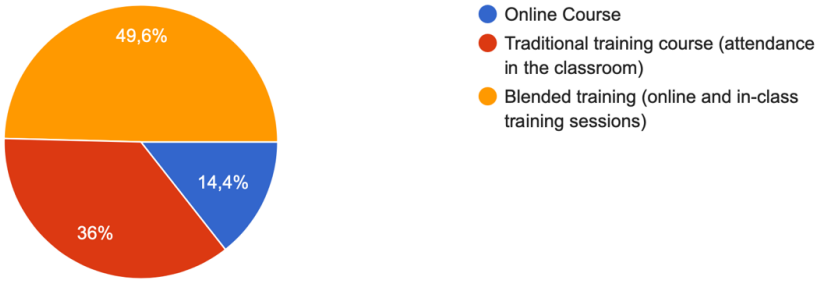


Figure 21 Training delivery methods preferred by the students (RO)

Most of the students (45,6%) answered that they prefer the video conferencing and online forum (44%) as a way of communicating with other participants in the courses as shown in Figure 22.

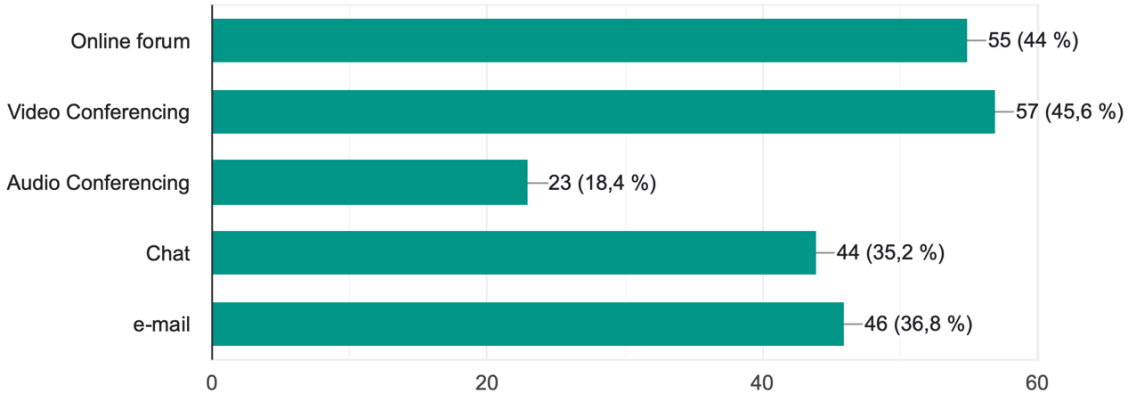


Figure 22 Students' preferences regarding the communication channels and methods (RO)

Conclusions and recommendations for provision of flexible e-learning

The analysis of the feedback received from university lecturers and students shows that in all universities involved in the survey activity, there is a well-established digital infrastructure.

The results also show that in all four countries, the lecturers consider that the extent of the virtual learning environment usage is higher than the extent specified by the students. This means that the expectations of the new generation of students regarding utilizing the new technologies in the training and learning are higher and the training offers proposed by the educational institutions should meet these expectations and needs.

Regarding the readiness of the lecturers to design, develop and implement highly engaging, motivating and personalized training in interactive settings the survey shows that there is a need for the trainers to enhance their knowledge skills and competencies in utilizing new technologies and digital instruments to develop high-quality interactive learning content and assessment instruments, to design sound instructional flows of learning activities and to track the progress of their students in the process of acquiring theoretical and procedural knowledge.

The lecturers should be provided with clear guidelines (less experienced individuals should be involved in a short training session if needed) and an easy-to-use, friendly toolkit that will facilitate the processes of high-quality learning resource development – templates, layouts, evaluation forms, etc.

Regarding the delivery methods is clear that master's degree students and PhD students prefer online training while bachelor's degree students would like to participate in blended courses.

Nearly 90 % of the students prefer to have access to all digital educational resources integrated into the topics and modules of the e-course during the entire training period. Less than 9% have specified that they want to have successive access to the educational resources, topics, and modules of the e-course.

In all countries students have selected as the most preferable communication channels, online forumc, chat, and video conference. This should be taken into account when designing the virtual learning environment.

Following the main instructional design principles, every course should provide the students with information about the objectives of the course, its duration, the evaluation system, and criteria for successful completion of the training.

The team activities contribute to improving the learning outcomes and are recommendable to be integrated into the course where applicable, and collaboration spaces have to be ensured for the purpose.

Suitable communication channels and facilities have to be ensured. for all participants in the training.

The learners have to be able to receive guidance and support from the lecturer on a regular basis.

The balance between theoretical and practical knowledge is essential.

It is recommended to provide gamified learning components, interactive learning resources and additional materials, which will contribute to increasing the motivation and commitment of students to the presented topics.

Analysis of the results from a survey among university lecturers and students regarding the training on green and management standards

The second part of the questionnaires distributed to both university lecturers and students consisted of questions aiming at the attitudes, considerations, and opinions of the respondents regarding the training in green, environmental and management standards to be collected.

This section of the report presents a summary of the results of the analysis prepared at the national level in the participating partner countries - Bulgaria, Lithuania, Spain, and Romania.

The report then presents the developed concepts for the university microcredit courses that are planned to be established. The standards that will be covered by each course are documented. These standards are determined as most appropriate based on the specific situation and educational context in the respective universities.

The last part of the report presents some conclusions and recommendations regarding the further development of the educational methodology of the B-Green-ED project and the concept of developing university microcredit courses for training in management, environmental and green standards.

Bulgaria

Most lecturers in Bulgaria (57%) believe that knowledge about standardization and standards, in particular environmental, green and management standards, are largely needed for the labor market today, while 28.6% believe that this knowledge and competencies are required in moderation. Only 14.3% are of the opinion that knowledge of these standards is necessary for successful implementation on the labor market to a small extent (See Figure 23).

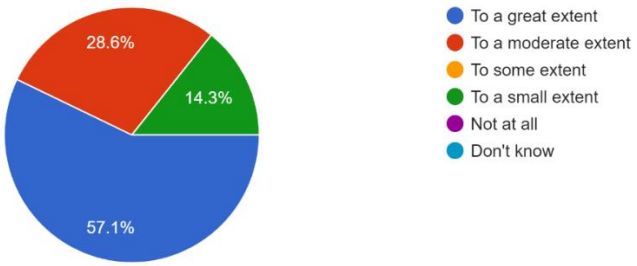
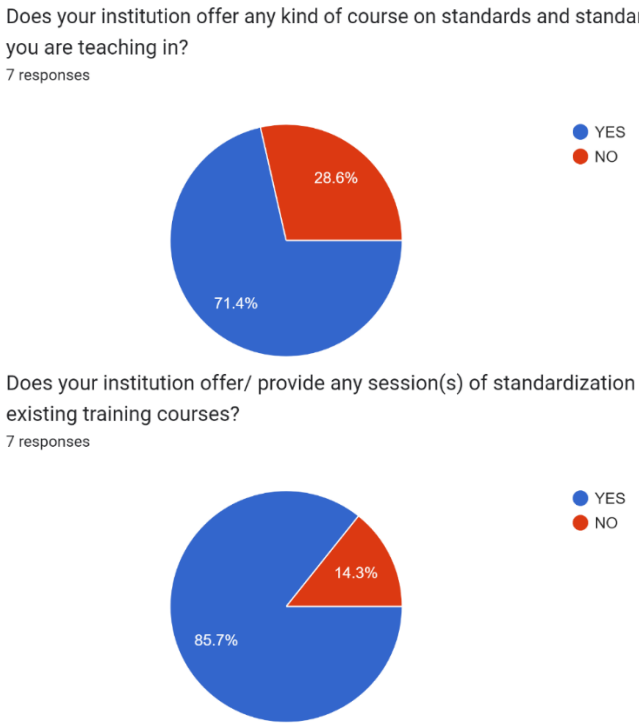


Figure 23 Lecturers' opinion on the importance of standards, in particular environmental, green and management standards, for the labor market (BG)

At BFU are provided special training courses focused on systems and standards related to risk management as well as courses about standards and systems for information security.

Moreover, in a lot of the existing courses, there are some short parts discussing the concrete standards but because the focus of the course is not on the standards themselves, the provided information about standards and standardization is very brief and general.

For this reason, most of the lecturers (71,4%) consider that BFU provided courses on standards and standardization, as is shown on both graphics in Figure 24.



Provision of courses focused on standards and standardization

Provision of short sessions related to concrete standards as a part of training courses from the university curricula

Figure 24 Lecturers' opinion about the existence of training on standards and standardization in their institution (BG)

However, despite the results shown in the figure above 57% of the lecturers declare that the offered courses do not cover at all or are not specifically focused on environmental and green standards in the domain/field they are teaching in. Consequently, there is a real and urgent need for d-flexible training courses related to green and environmental standards to be developed and provided for the students as additional or elective training offers.

The next figure (Figure 25) clearly shows that the lecturers are not very confident in the comprehensiveness of their own knowledge about the green, environmental, and management

standards. Therefore, they should enhance their knowledge of these topics first. The standardization organizations involved (BDS and ASRO) will provide materials for the selected standards to the lecturers and will support them during the development of the micro-credential courses.

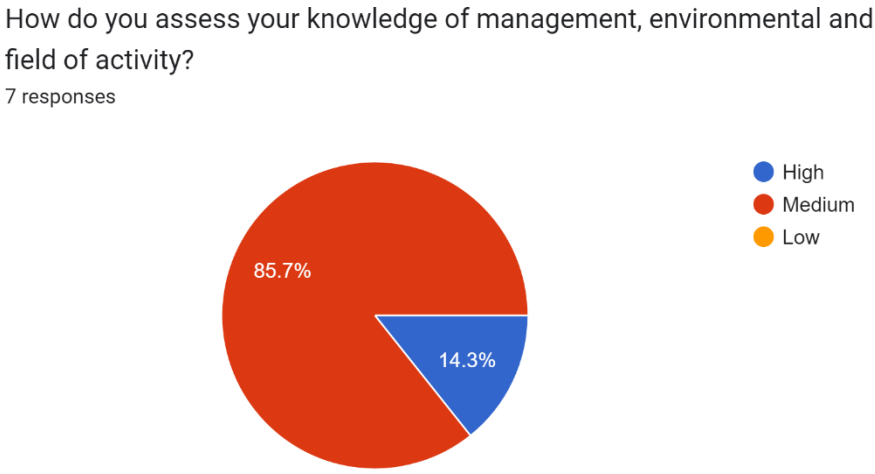


Figure 25 Lecturers' opinion of their knowledge of management, environmental and green standards in their field (BG)

Regarding the scope of the micro-credential courses, 71% of the lecturers think that apart brief introductory part presenting general information regarding standards, the courses should include detailed information about the specific environmental and green standards applicable to the corresponding specialty and field.

Regarding the duration of the courses 43% consider as most reasonable the duration of 30-40 hours, and nearly 29% think that the duration should be between 10-20 hours. 14,3% consider that the duration should be more than 40 hours and the rest 14,3 % have answered that they cannot decide (Figure 26).

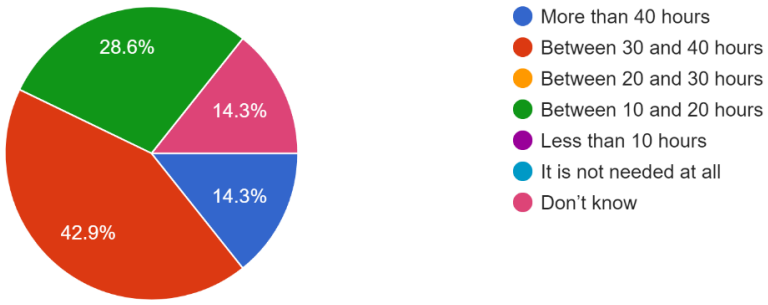


Figure 26 Duration of micro-credential courses recommended by lecturers (BG)

Regarding the correlation between the knowledge about standardization and standards and the successful labor market realization have been outlined three main groups of students. According to 39.3%, knowledge about standardization and standards is a key factor for a successful career and predetermines it to a large extent. 27,9% believe that knowledge about standardization and standards is necessary for successful labor market realization to a moderate extent while 23% think that it is necessary to some extent. 4,9% have answered that they cannot decide and only 1% think that there is no correlation as is shown in Figure 27.

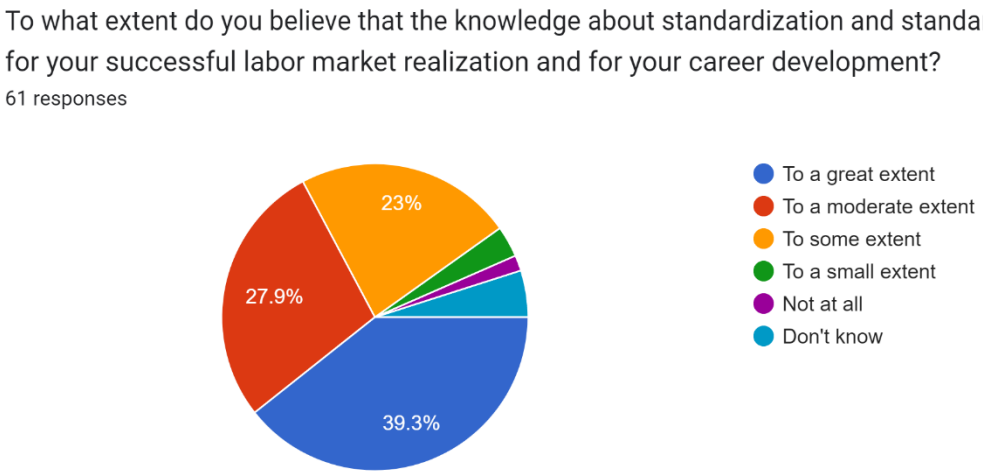


Figure 27 Correlation between the knowledge about standardization and standards and the successful labor market realization and successful career – students' opinion (BG)

86,9% of the students confirm that at the university are provided some training offers related to standards. Nearly 46% of the students declare that they are not familiar at all with the international and European standardization system – Figure 28.

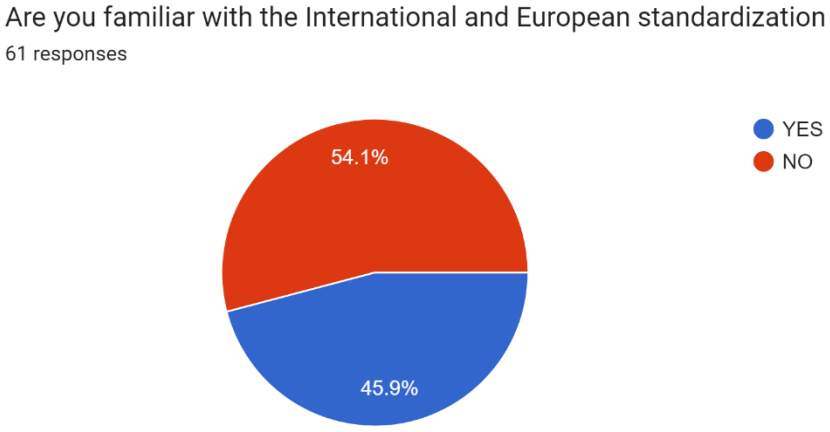


Figure 28 Students' awareness of the international and European standardization systems (BG)

Regarding the knowledge about environmental and green standards related to their field of study 41% of the students share that they have nearly no knowledge, 52% think that they have some knowledge about these standards while only 7% think that they know well the standards related to their field of study – Figure 29.

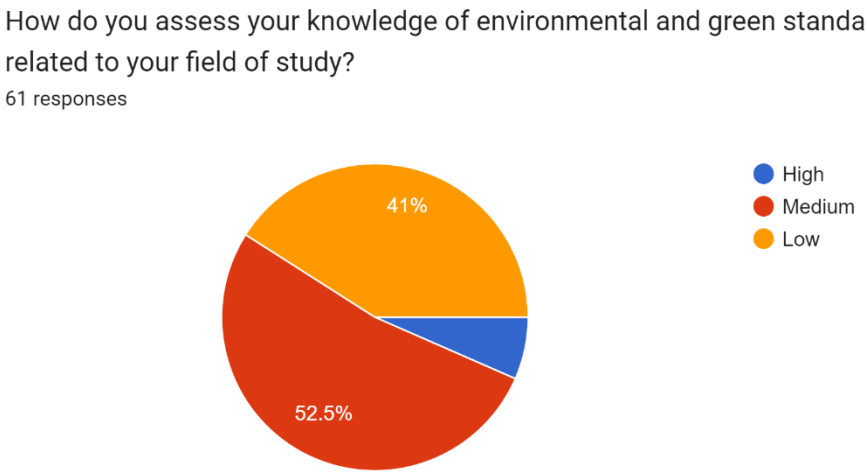


Figure 29 Students' knowledge about environmental and green standards related to their field of study (BG)

The students were also asked if they would take part in a course regarding standardization and standards related to the transition to a green economy, conducted fully online. As is shown in Figure 30, 77% of the students declare their readiness and willingness to join such kind of training.

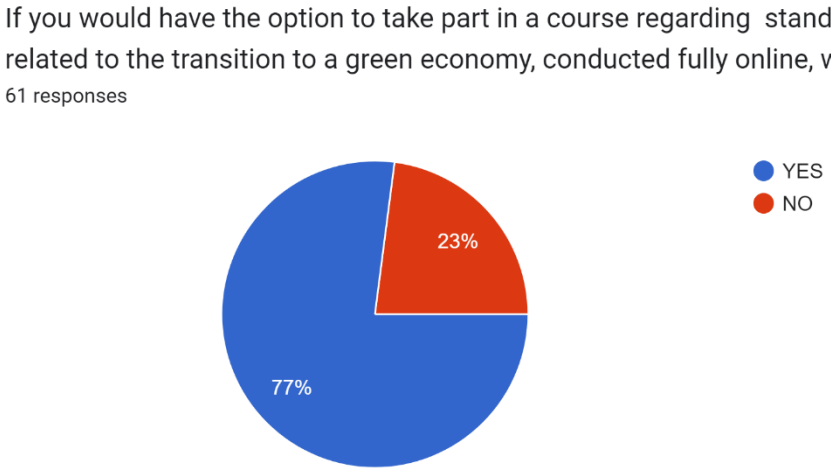


Figure 30 Readiness and willingness of students to take part in training courses focused on standards related to the transition to a green economy (BG)

Lithuania

Lecturers' opinions on what extent knowledge about standardization and standards are needed in the labour market considering specifically standards on management systems, environmental and green standards are shown in Figure 31.

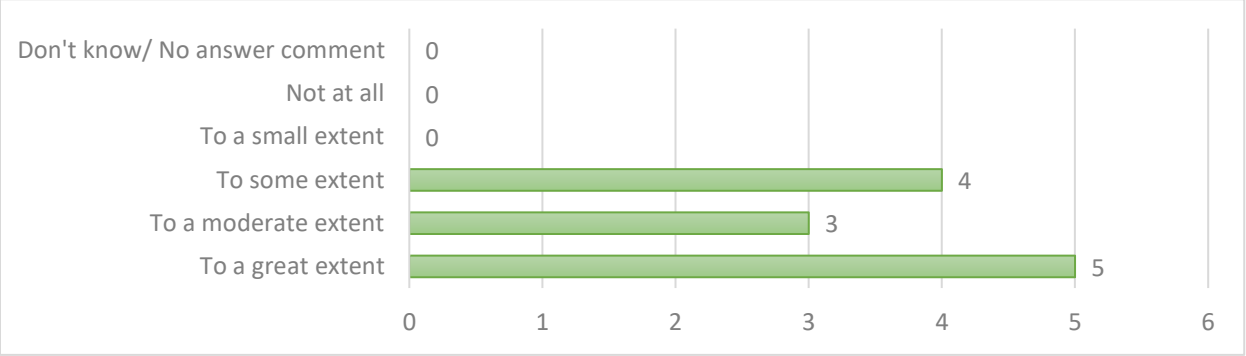


Figure 31 Lecturers' opinion on the importance of standards, in particular environmental, green and management standards, for the labor market (LT)

Lecturers' opinions on whether the institution offers any courses on standards and standardisation were divided (see Figure 32). A slightly higher proportion of lecturers 58% disagreed that the institution offers any kind of course on standards and standardization in the domain/field they are teaching in. However, in response to the question "Does your institution offer courses specifically focused on management systems, environmental and green standards on the domain/field you are teaching in" a slightly higher proportion of lecturers 58% answered "yes". Lecturers' opinions on whether the institution offers/provides any session(s) of standardization and standards as part of existing training courses were distributed equally: 50% of respondents agreed and 50% of the respondents disagreed.

In noting what information on standards lecturers think should be included in the curricula of the subjects taught, most of them (66%) indicated that it is necessary to include both general information on standards related to the speciality and information on the basic standards related to the specific subjects. 16% pointed out the need to include general information on standards related to the specialty and 16% pointed out the need to include basic information on standards related to specific subjects.

The survey aimed to find out lecturers' views on the total number of training hours they plan to spend on teaching and learning about standards/standardisation or about a specific area of

standards. The analysis of the survey results showed that 42% of the lecturers indicated that they would like to spend less than 10 hours on this aspect, 16% consider the duration between 10 and 20 hours, 8% indicated a duration between 30 to 40 hours and 8% indicated duration between 20 and 30 hours. 25% of the lecturers indicated that they did not know how much time they planned to spend on this aspect (See Figure 32).

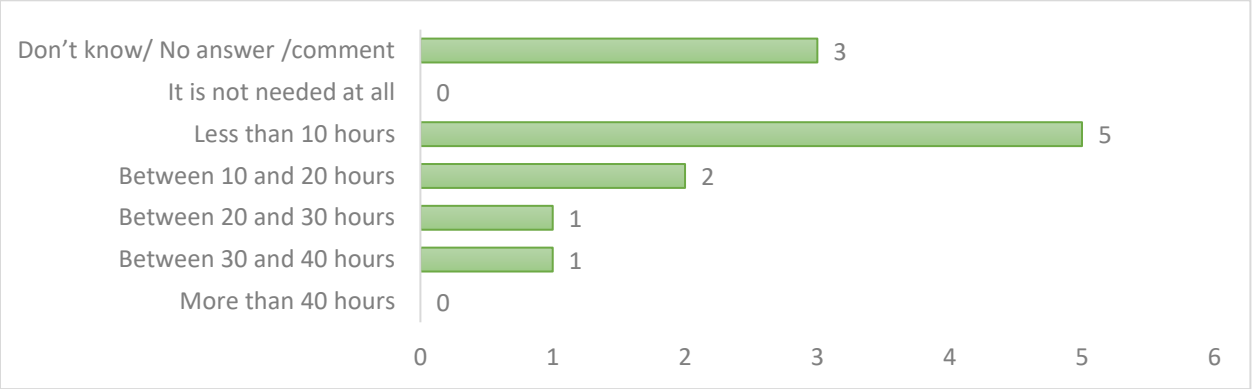


Figure 32 Duration of micro-credential courses recommended by lecturers (LT)

Regarding the extent to which students consider the knowledge of the standards to be essential for successful integration into the labour market and career development, 39% stated that it is to some extent, and 21% stated that it is to a moderate extent. Only 14% indicated that knowledge of standards is essential for successful labour market integration and career development. 6% indicated that this information is important to a small extent. 1% indicated that this information is not at all important while 17% chose the answer option 'don't know, no opinion' (see Figure 33).

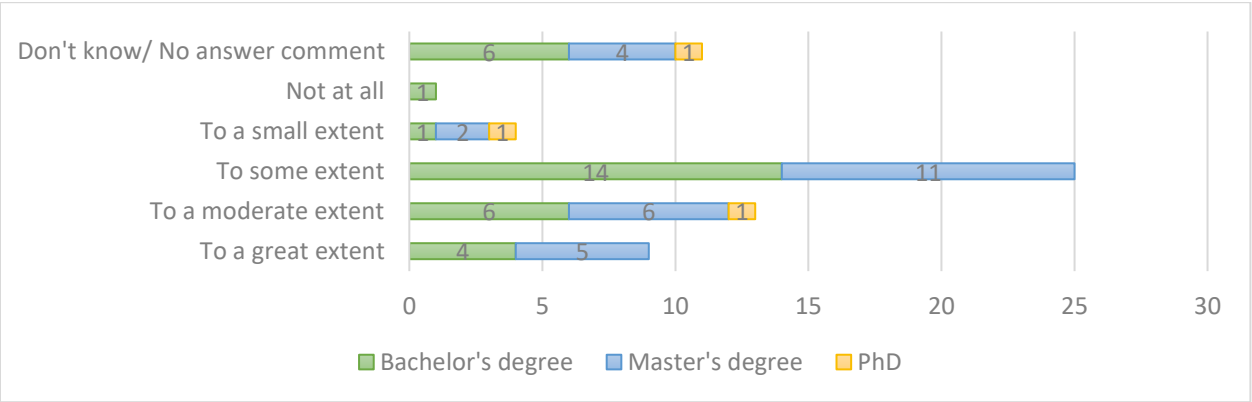


Figure 33 Correlation between the knowledge about standardization and standards and the successful labor market realization and successful career – students' opinion (LT)

Most lecturers (75%) indicated that the training institution provides no standards and standardisation courses in the field they are studying. Only 25% indicated that such courses are available (see Figure 34).

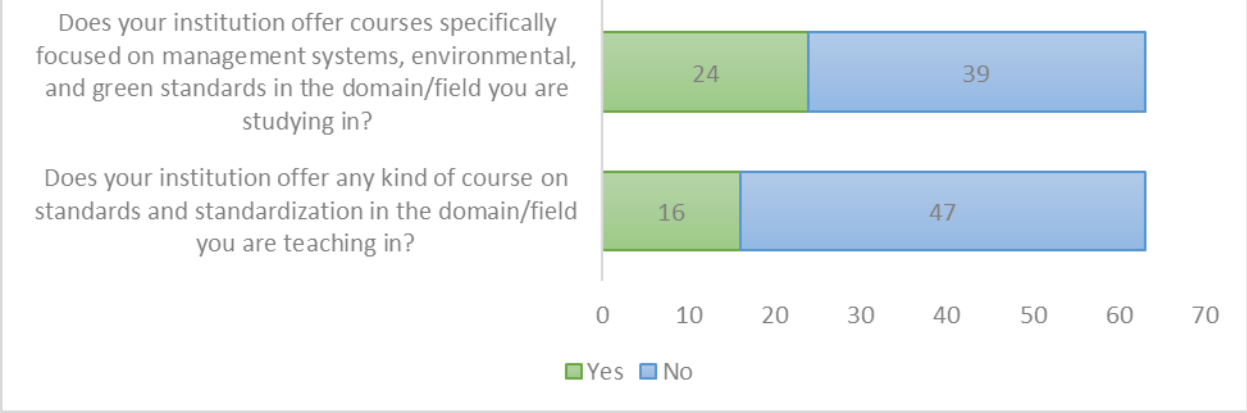


Figure 34 Lecturers' opinion about the existence of training on standards and standardization in their institution (LT)

Just over half 61% of the respondents indicated that their training institution does not offer any courses on standards related to management systems, environmental protection, and eco-standards in the field of study. In response to whether the university offers/provides training sessions in standardization and standards as part of the study program training courses, slightly more than half of the students 61% said no. (see Figure 34).

The research aimed to reveal how students assess their knowledge of management, environmental and green standards related to the field of study. It was found that more than half of the students 57% rate this knowledge as low. 38% rate their knowledge as average. Only 4% rated their knowledge of management, environmental and green standards related to the field of study as high (see Figure 35).

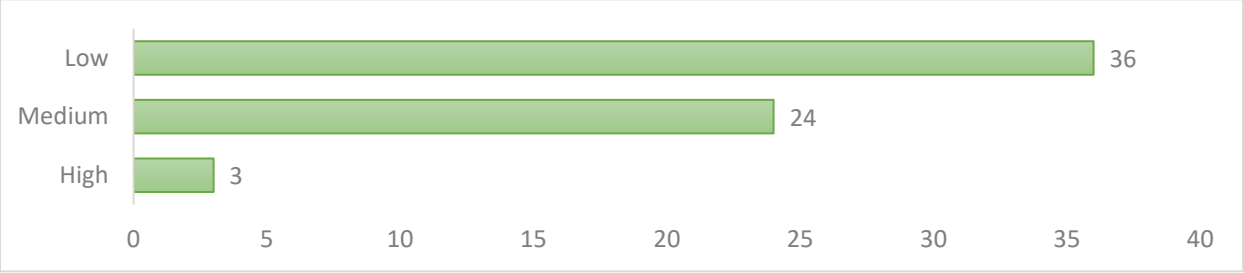


Figure 35 Students' knowledge about environmental and green standards related to their field of study (LT)

The study aimed to find out whether students would participate in an online course on standardisation and standards related to the transition to a green economy if they had the available opportunity. It was found that 76% would participate in such training. 24% of the involved students indicated that they would not choose such training.

It was found that most students (59%) would like to improve their knowledge of applicable standards in their specialty. Just under half of the students (49%) indicated the need for information on the benefits of standards, especially in their field of study. 29% identified the need for general information on standards and standardisation. Only 13% indicated no need to improve their knowledge in the area under analysis.

Spain

The need for knowledge about standardization and standards, and specifically green standards, for the labor market, is important to a moderate extent to 72,7 % of the lecturers who answered the survey while 9,1 % of them considered standards to be of great importance, as shown in Figure 36.

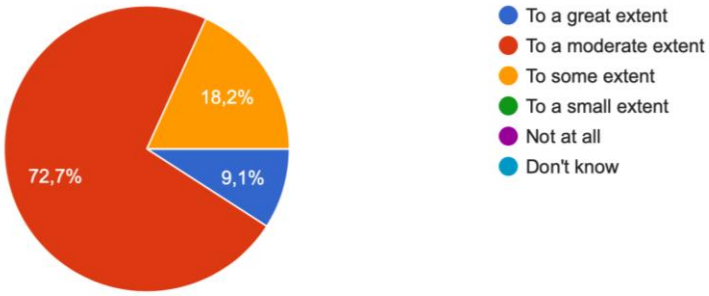


Figure 36 Lecturers' opinion on the importance of standards, in particular environmental, green and management standards, for the labor market (ES)

Most of the students consider that the knowledge about normalization (standardization norms) and standards is significantly necessary (49,5%) or highly necessary (17,2%) for their successful development in the labor market and their professional development, as shown in Figure 37.

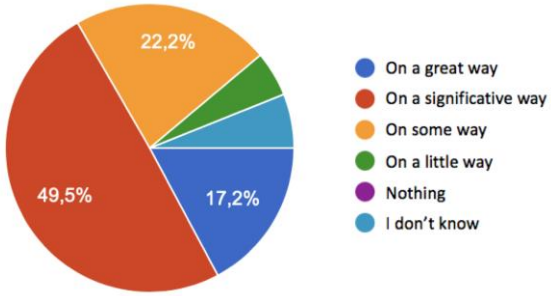


Figure 37 Students' opinions about their knowledge of normalization and standards (ES)

Most of the lecturers (63,6 %) consider that their institution does not offer any kind of course on standards and standardization in the domain/field they are teaching in, as shown in Figure 38.

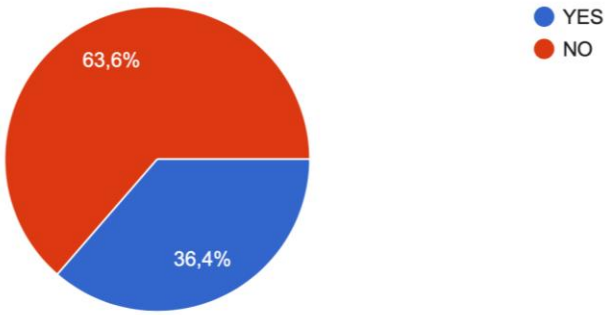


Figure 38 Lecturers' opinion about the existence of training on standards and standardization in the field they are teaching in (ES)

However, despite the results shown in Figure 38, Figure 39 shows that most of the lecturers (54,5%) answered that their institution offers courses specifically focused on management systems‘ standards, and environmental and green standards in the domain/field they are teaching in. These results may suggest that in some way the perception of lecturers about the availability of training in green standards is contradictory.

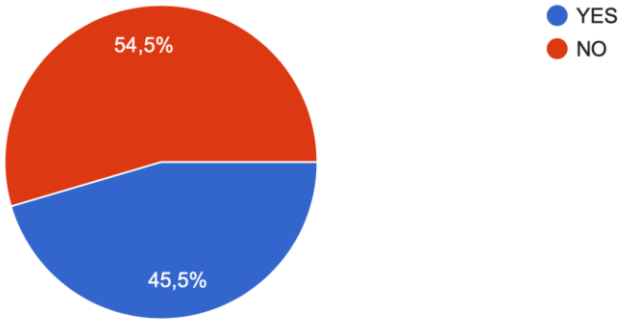


Figure 39 Lectures’ opinion about the existence of training on standards and standardization in their institution (ES)

Most of the lecturers that participated in the survey (54,5 %) consider that both general knowledge of standards related to their specialty and basic standards related to specific subjects are equally appropriate to be included in the curriculum of the subjects they teach, as shown in Figure 40.

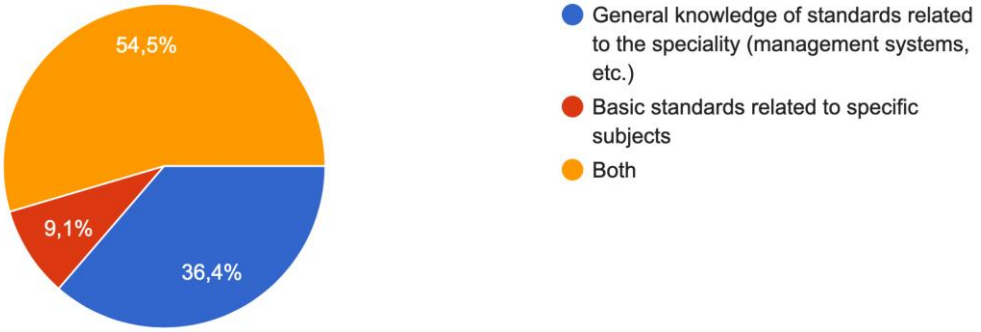


Figure 40 Lecturers' opinion of the importance of general knowledge versus basic knowledge about standards (ES)

Figure 41 shows lecturers' opinions about their knowledge of management, environmental and green standards in their field of activity. Only 18,2% consider their knowledge to be high, while the majority consider it to be medium (36,4%) or low (45,5%).

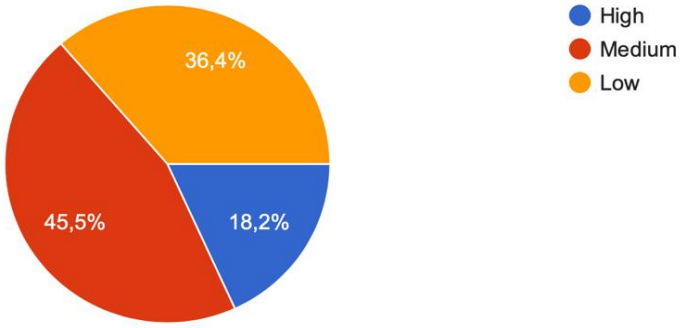


Figure 41 Lecturers' opinion of their knowledge of management, environmental and green standards in their field (ES)

Figure 42 shows that half of the students (49,5%) are familiar with the international and European standardization system, while the other half are not used to it.

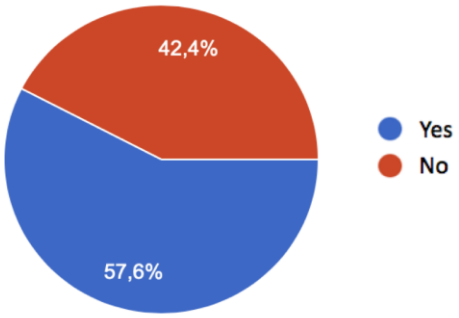


Figure 42 Student's familiarity with normalization and standards (ES)

Figure 43 shows that most of the students (68,7%) consider their knowledge about environmental and ecological standards and standardization to be medium, while 22,2% consider it to be low and only 9,1% of the students consider it to be high.

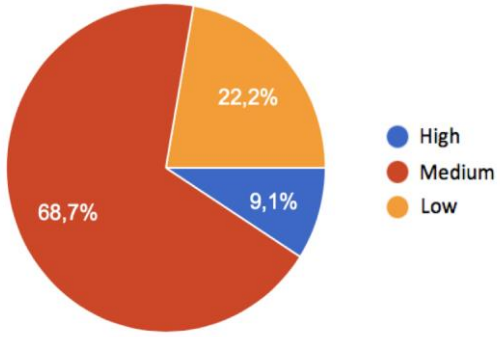


Figure 43 Student's opinion about their knowledge about environmental and ecological standards and standardization (ES)

Following the results of the survey (Figure 43), most of the lecturers (45,5 %) expect to spend less than 10 hours on teaching and learning about standards/standardization or a specific standards domain, while 18,2 % expect to spend between 10 and 20 hours.

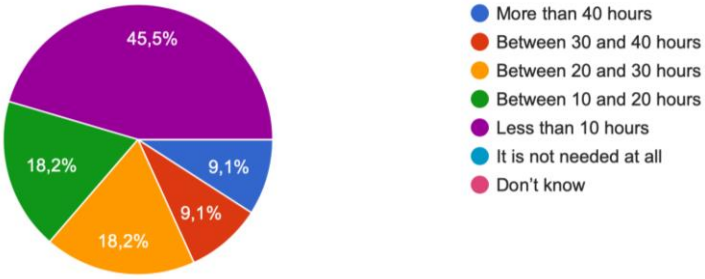


Figure 44 Lecturer's opinion about the duration of training in standards (ES)

If they had the option to do it, most of the lecturers (82%) would take part in a fully online free qualification course regarding standardization or environmental and green standards in their field.

Figure 45 shows the lecturer's opinion about the relative importance for their students of general, relevant, and specific knowledge about standards and the standardization system. 63,6% of the lecturers acknowledge that it is particularly important for the students to acquire knowledge and general information. 45,5% consider it important to acquire knowledge about

relevant management systems standards and 36,4% consider it important to acquire knowledge about specific environmental and green standards.

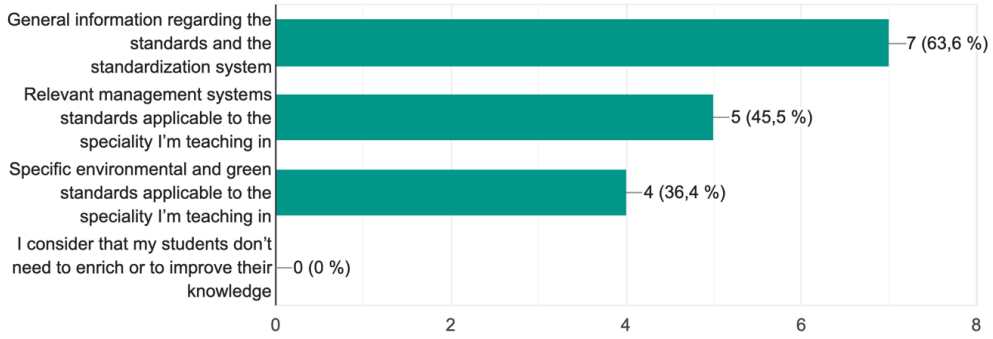


Figure 45 Lecturer's opinion about the relative importance for their students of general, relevant, and specific knowledge about standards and the standardization system (ES)

Romania

100% of the respondents in Romania strongly believe that knowledge about standardization and standards, specifically standards on management systems, and environmental and green standards, is absolutely necessary for the labor market nowadays (Figure 46).

Figure 46 Lecturers' opinion on the importance of standards, in particular environmental, green and management standards, for the labor market (RO)

According to the results of the survey, most of the students (39,2 %) find that knowledge about standardization and standards is necessary for their successful labor market realization and for their career development to a great extent. Another 27,2% find it to a moderate extent and 23,2% to some extent as shown in Figure 47.

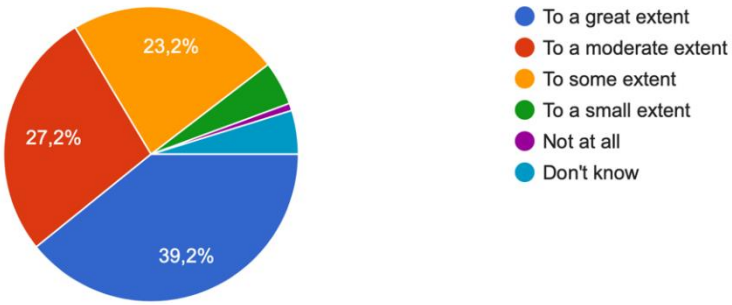


Figure 47 Students' opinions about their knowledge of normalization and standards (RO)

Over 40% of the lecturers consider that the universities do not offer any kind of course on standards and standardization in their field of activity (Figure 48).

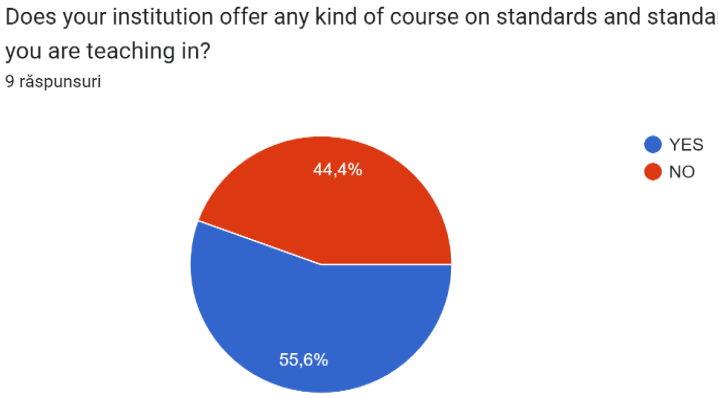


Figure 48 Lecturers' opinion about the existence of training on standards and standardization in the field they are teaching (RO)

More than half of the students (64,8%) answered that in their university are offered courses specifically focused on standardization and standards in their field of study (Figure 49).

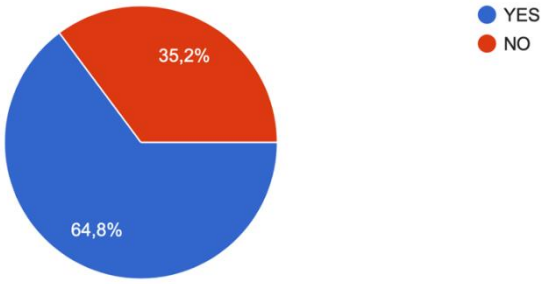


Figure 49 Students' perception about the existence of training on standards and standardization in their institution (RO)

However, despite the results shown in Figure 48, Figure 50 shows that most of the lecturers (55,6%) answered that their institution doesn't offer any courses specifically focused on management systems, and environmental and green standards in the domain/field they are teaching in.

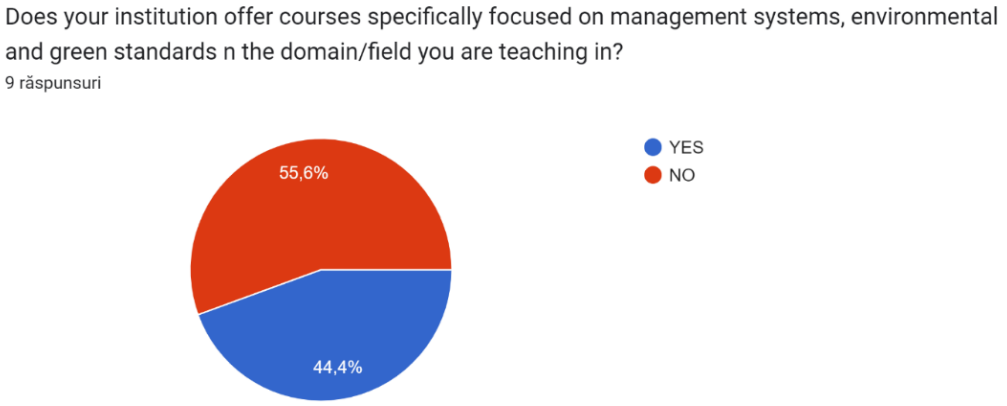


Figure 50 Lecturer's perception about the existence of training on management, green, and environmental standards and standardization in their institution (RO)

Most of the lecturers that participated in the survey (66,7 %) consider that both general knowledge of standards related to their specialty (management systems, etc.) and basic standards related to specific subjects are equally appropriate to be included in the curriculum of the subjects they teach, as shown in Figure 51.

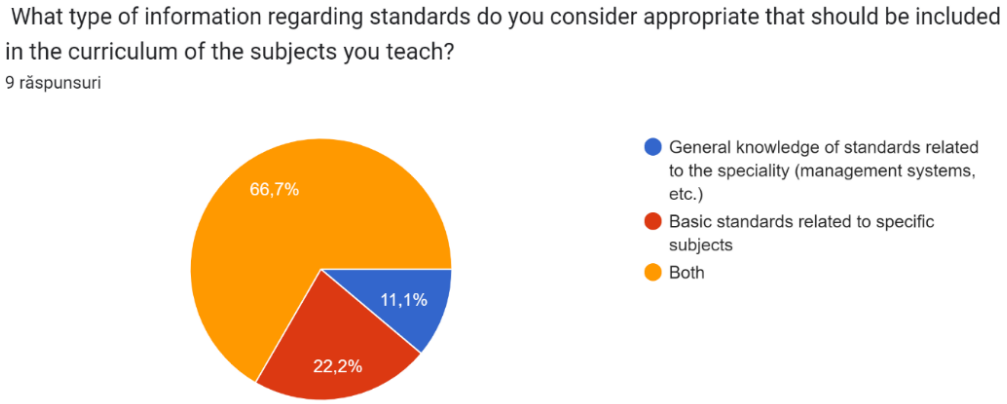


Figure 51 Lecturer's perception of the importance of general knowledge versus basic knowledge about standards (ES)

As is shown in Figure 52, the great majority (77.8%) of lecturers estimate their knowledge in the field to be at an average level. An equal percentage (11,1%) was obtained for the categories of teachers who have low knowledge level in standardization and those who classified themselves as having very good knowledge in this field.

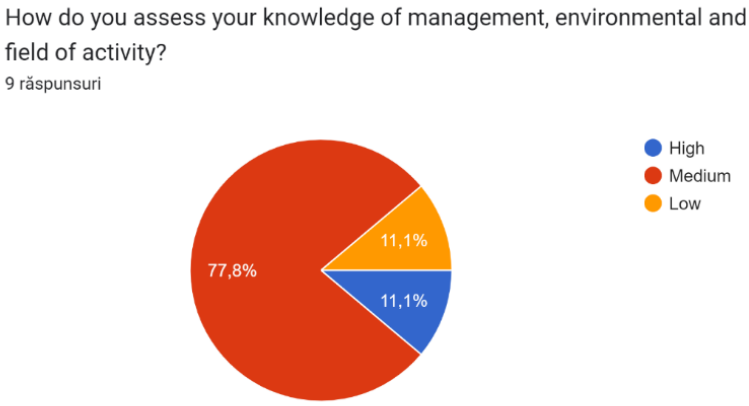


Figure 52 Lecturers' opinion of their knowledge of management, environmental and green standards in their field (RO)

The need for improvement of the teachers in the field of standardization is reflected by the overwhelming percentage (88.9%) of those who expressed their willingness to participate in such free qualification courses (Figure 53).

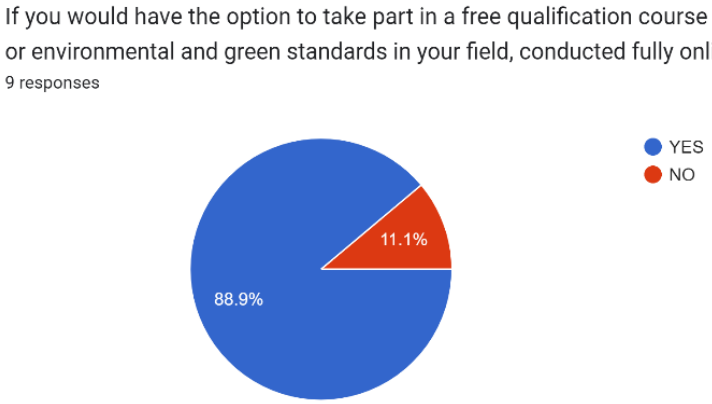


Figure 53 Lecturer's willing to take part in a fully online free qualification course regarding to standardization or environmental and green standards in their field (RO)

Most of the students (52,2%) consider that they are familiar with the International and European standardizations system, the rest 47,2% are not familiar with the standardization system at the International and European level as shown in Figure 54.

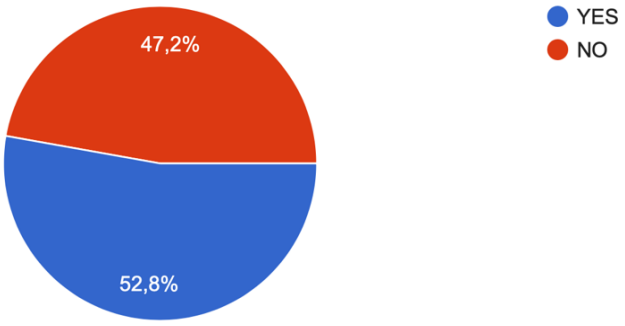


Figure 54 Students' perception about knowing International and European standards (RO)

The assessment about standardization and standards, and specifically environmental and green standards, in the field they are studying, is considered by most of the students (64,8%) to have medium importance. Equal in percentage of 17,6% students rate it as very high but at the same time very low (Figure 55).

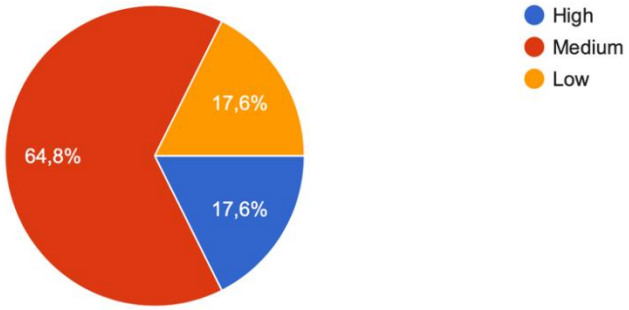


Figure 55 Student's opinion about their knowledge about environmental and ecological standards and standardization (RO)

Regarding the required teaching and learning period about standards/standardization or about a specific standards domain 33.3% of the lecturers pointed out between 20-30 hours. The same percentage of the respondents selected the option less than 10 hours. For 22% of teachers, the duration of courses should be between 30-40 hours, while the smallest percentage (11,1%) considers the duration of micro-credentials should be 10-20 hours as is shown in Figure 56.

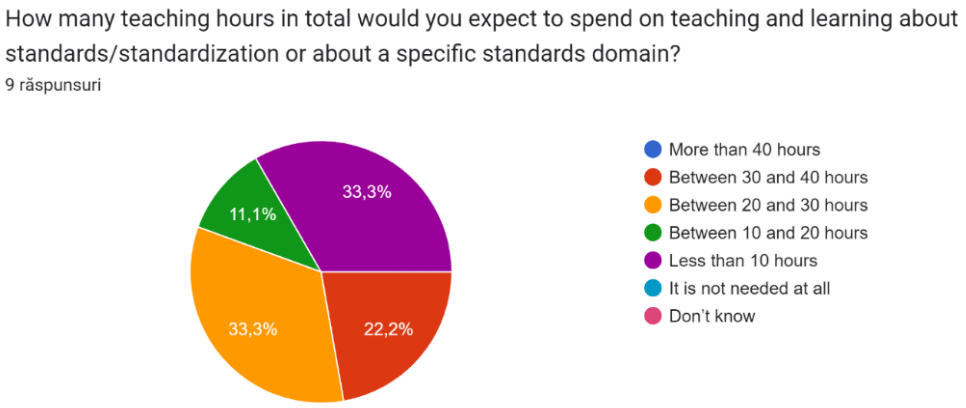


Figure 56 Lecturer's opinion about the duration of training in standards (RO)

If they had the option to do it, most of the lecturers (88,9%) would take part in a fully online free qualification course regarding standardization or environmental and green standards in their field.

B-Green-ED micro-credential courses concept – selected standards

This section presents the concepts of the micro-credential courses intended to be developed at the involved universities. The standards to be covered by university micro-credential courses were first selected at the university level. Refinements were then performed based on review and validation by experts in the respective fields at two levels. Internally, the micro-credential course concepts were validated by experts from the standardization bodies involved in the project - BDS and ASRO, and externally - by experts representing organizations not involved in the project, such as business professionals, experts from employers' organizations, trade unions and others. The final version of the micro-credential courses' concepts elaborated are provided below by countries.

Bulgaria

Course: Circular Economy business models and green standards

- CLC/TR 45550:2020 Definitions related to material efficiency.
- EN 45555:2019 General methods for assessing the recyclability and recoverability of energy-related products.
- EN ISO 14006:2020 Environmental management systems - Guidelines for incorporating eco-design.
- EN 45554:2020 General methods for the assessment of the ability to repair, reuse and upgrade energy-related products.

Course: Electronics and Communication of Renewable Energy Sources – green standards

- EN ISO/IEC 13273-2:2015 Energy efficiency and renewable energy sources — Common international terminology — Part 2: Renewable energy sources.
- EN ISO 50001:2018 Energy management systems - Requirements with guidance for use -
- EN IEC 62934:2021 Grid integration of renewable energy generation - Terms and definitions.

Course: Engineering and Exploitation of Energy Systems – green standards

- EN ISO 50001:2018 Energy management systems - Requirements with guidance for use.

- EN IEC 62933-1:2018 Electrical energy storage (EES) systems - Part 1: Vocabulary.
- EN ISO/IEC 13273-2:2015 Energy efficiency and renewable energy sources — Common international terminology — Part 2: Renewable energy sources.

Lithuania

Course: Andragogical technologies and safe environment:

- General information regarding the standards and standardization
- EN ISO 56000:2021 Innovation management - Fundamentals and vocabulary
- EN ISO 21001:2018 Educational organizations — Management systems for educational organizations
- EN ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework

Course: Social responsibility and career management

- General information regarding the standards and standardization
- ISO 26000:2010 Guidance on social responsibility
- ISO 21500:2021 Project, programme and portfolio management — Context and concepts
- ISO 31073:2022 Risk management — Vocabulary
- EN ISO 14001:2015 Environmental management systems - Requirements with guidance for use

Course: Social responsibility in family work

- General information regarding the standards and standardization
- ISO 26000:2010 Guidance on social responsibility
- IWA 34:2021 Women's entrepreneurship — Key definitions and general criteria

Spain

Course about Quality Management Systems standards

- ISO 9000:2015 Quality management systems – Fundamentals and vocabulary

- ISO 9001:2015 Quality management systems – Requirements
- ISO 9004:2018 Quality management – Quality of an organization – Guidance to achieve sustained success
- ISO 10006:2017 Quality management – Guidelines for quality management in projects
- ISO 10007:2007 Quality management – Guidelines for configuration management
- ISO 18091:2019 Quality management – Guidelines for the application of ISO 9001 in local government

Course about Environmental Management Systems standards

- ISO 14001:2015 - Environmental management systems - Requirements with guidance for use
- ISO 14004:2016 - Environmental management systems - General guidelines on implementation
- ISO 14006:2011 - Environmental management systems - Guidelines for incorporating eco-design
- ISO 14031:2013 - Environmental management - Environmental performance evaluation - Guidelines
- ISO 14040:2006 - Environmental management - Life cycle assessment - Principles and framework
- ISO 14044:2006 - Environmental management - Life cycle assessment - Requirements and guidelines

Course about Waste Management and Industrial Pollution control standards

- ISO 24161:2022 Waste collection and transportation management — Vocabulary
- ISO 15270:2008 - Guidelines for the recovery and recycling of plastics waste
- ISO 18601:2013 - Packaging and the environment - General principles
- ISO 18602:2013 - Packaging and the environment - Handling and storage

- ISO 14064-1:2018 - Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
- ISO 14064-2:2019 - Greenhouse gases - Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements

Romania

Course: Risk management in bioeconomy

- ISO 31000:2018 Risk management — Guidelines
- ISO 31073:2022 Risk management — Vocabulary
- IEC 31010:2019 and EN IEC 31010:2019 Risk management — Risk assessment techniques
- IWA 31:2020 Risk management — Guidelines on using ISO 31000 in management systems.
- EN ISO 22005:2007 Traceability in the feed and food chain — General principles and basic requirements for system design and implementation

Course: Carbon Footprint Assessment

- IWA 42:2022 Net zero guidelines
- EN ISO 14067: 2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- EN ISO 22526-1:2021 Plastics — Carbon and environmental footprint of biobased plastics — Part 1: General principles
- EN ISO 14090:2019 Adaptation to climate change - Principles, requirements and guidelines
- EN ISO 14091:2021 Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment

Course: Biomass and Good Practices in the Management of Degraded and Desertified Lands

- EN ISO 17225- 1:2021 Solid biofuels
- ISO 17828:2015 - Solid biofuels — Determination of bulk density
- BS EN ISO 18135:2017 - Solid Biofuels — Sampling
- ISO 14055- 1:2017 Environmental management — Guidelines for establishing good practices for combatting land degradation and desertification — Part 1: Good practices framework.
- ISO/TR 14055-2:2022 Environmental management — Guidelines for establishing good practices for combatting land degradation and desertification — Part 2: Regional case studies.

Conclusions and recommendations for the development of university micro-credential courses

The results from the survey show that before the micro-credential courses are developed a train-the-trainers activity should be conducted so to extend the lecturers' knowledge base and the skill set related to green, environmental, and management standards.

The training materials prepared by the standardization organisations will be delivered to the lecturers via a virtual learning environment in the form of a flexible online self-paced course.

Trained educators to be closely involved in the development of microcredit courses. They will adapt educational resources provided by BDS and ASRO and integrate them into student-focused microcredit courses, also adding examples, case studies, exercises and assessment tools for formative and summative assessment.

The duration of micro-credential courses could vary depending on the students' prior knowledge about the standards and the standardization.

For the students without any prior knowledge, the courses should be 30-40 hours or more. In the micro-credential courses addressed to such audiences is recommendable an introductory part presenting fundamental concepts and general information regarding the standards and the standardization system to be included.

For the students with some basic knowledge about standards and standardization, the introductory part could be shorter or even omitted and the duration could vary from 10-20 up to 30 hours.

Regarding the issuing of certificates for the micro-credential courses, the EU approach will be followed where are recommended the following properties:

- Title of the micro-credential
- Country/region of the issuer
- Awarding body
- Date of issuing

- Notional workload needed to achieve the learning outcomes (in ECTS, wherever possible)
- Level (and cycle, if applicable) of the learning experience leading to the micro-credential (EQF and/or national qualifications framework;
- Overarching Framework of Qualifications of the European Education Area (Learning outcome)s
- Form of participation in the learning activity (online, onsite or blended, volunteering, work experience)
- Type of assessment (testing, application of a skill, portfolio, recognition of prior learning, etc.)
- Supervision and identity verification during assessment* (unsupervised with no identity verification, supervised with no identity verification, supervised online or onsite with identity verification)

There is no European or National recognition system for micro-credentials. In most countries, only short learning programs and modules taken out of an accredited degree program have some form of accreditation.

Microcredits should enable further training in a specialized field. Created or accredited by universities, they are designed to help the processes of mastering in-demand career skills and preparing for work in fast-growing industries. Any microcredit must include a formal assessment, and some might even offer academic credit to be used towards a degree.

Because of the involvement of different universities, designing and developing micro-credential courses is a complex activity, the following aspects should be considered:

- Connection with institutional and cross-institutional policies and strategies, more specifically related to continuing education and professional development.
- Sharing a joint vision on the course with the partner universities: definition of the macro-objectives, based on a needs analysis and learner characteristics; development of an academic and professional profile and determining specific course settings for

meeting lifelong learners' living and working conditions; developing synergies with other universities for higher quality and making the course internationally attractive for continuing education.

- Ensuring (cross-)institutional professional support through teaching and learning.
- Designing the course according to current pedagogical principles so that it can be successfully developed and implemented: defining learning outcomes and competences, developing a course plan and distributing the design and development tasks across the partnership, designing and sequencing learning activities, designing modular course units, improve the student's learning experience, define modes of delivery, design course interactions, select and align media and tools, design space for flexibility; determine the study load; and make the course inclusive.
- Coherent approach to formative and summative assessment and feedback
- Justifying a joint award to be granted, for example, credit points or a badge aligned with institutional and national qualification structures for continuing education and professional development.
- Defining an admission framework for the course and developing a student recruitment plan.
- Agreements on a common scheme for quality assurance, linked to institutional frameworks and based on ESG and the Guidelines for e-learning[1].

[1] ENQA (2015). *Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG)*, ENQA, (2015). https://www.enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf