ADDING VALUE TO HEIGHT EDUCATION THROUGH MAINSTREAMING OF TRAINING IN STANDARDIZATION INTO UNIVERSITY CURRICULA

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Abstract. In today's single market, standardization helps integrate market requirements and reduce costs, and standards ensure compatibility, quality, safety and efficiency. The impact of standards is highly dependent on the level of knowledge among the workforce. Knowledge, skills, attitudes and experience in standardization add value to professions and roles in many fields. The rising awareness and spread knowledge about standardization are globally-recognised as a powerful tool to assure public safety having a proficient workforce, bring new technologies to market and drive future businesses.

The paper presents the main results of research aiming to identify what is the expectations and requirements of the lecturers and students of five EU countries, namely Bulgaria, Finland, Greece, Latvia, and Romania, for a standardization course. What are opinions, and attitudes of the faculty staff as well as the students regarding the standards focused education? How the integration of the standards' focused training into HE could be facilitated and improved?

Keywords: training in standardization; higher education; e-learning

1. Introduction

In 2010, the European standardization organizations set up a joint working group on European standardization education and training, which developed an European standardization education policy together with a master plan containing a strategy for the promotion of education and training and a follow-up plan to achieve the goals set. These documents outline the main guidelines for the introduction and promotion of standardization in the training programs of the EU member states. Standards and standardization training will increase the quality and relevance of education, as the ability to put standards into practice is a valuable asset for any professional qualification. For the society, this is an activity with a long-term effect, because when the future experts from the student bench will get used to working with standards and will be able to apply them in their work in the future. A key factor in this will be provision of world–class level education

about standardization, using a wide spectrum of learning approaches including conventional and innovative methods. Moreover, the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC) in close collaboration established policy on Education about Standardization (CEN-CELENEC, 2011). The International Federation of Standard Users (IFAN, 2018) observes in their annual report that while the use of the standards ''as a strategic tool to underpin innovation, strengthen the professional performance and competitive advantage of an organization'' is becoming more and more important, many companies and other stakeholders take insufficient advantage of them.

The project STUNED is focused on the processes of fostering and integration of training in standards and standardization in the University curricula.

As the virtual learning environments (VLEs) are a successful tool to progress students from passive to active learners, its usage has grown in the past years and now almost all universities have an institutional VLE. Moodle is, perhaps, the most widely used open-source software platform for the establishment of a flexible learning environment for blended and purely online courses' delivery.

To detect the needs and gaps standardization training in higher education it was conducted an extensive research in all countries involved in STUNED project. The survey is carried out in each partner country of the project. The survey was completed by 25 lecturers and 365 students. This article presents the results of surveys in following aspects: identification and evaluation of the possibility for usage of Moodle platform functionality to support educational activities on standardization and the expectations of the respondents from training modules in the area of the standardization.

The main goal was to be performed in-debt comparative analysis of HE lecturers and students' actual knowledge and of knowledge needs for identifying the current performances and gaps. The project consortium takes into account the results of this survey as well as the outcomes of IFAN Guide 4:2014 (IFAN, IFAN, 2018) on the needs for education and training related to standardization in order to identify the different standardization education and training needs in different academic levels.

2. Scope and specifics of the survey

The study covers five European countries: Bulgaria, Finland, Greece, Latvia, and Romania. The survey was submitted to 50 potential lecturers, 25 if whom have completed the it. The survey was submitted to 500 potential students; 365 of whom have completed the survey. Therefore, the responding rate is accordingly 50% and 73%. Figures 1 represent the distribution of participants' lecturers and students in the survey by partner countries in the project.
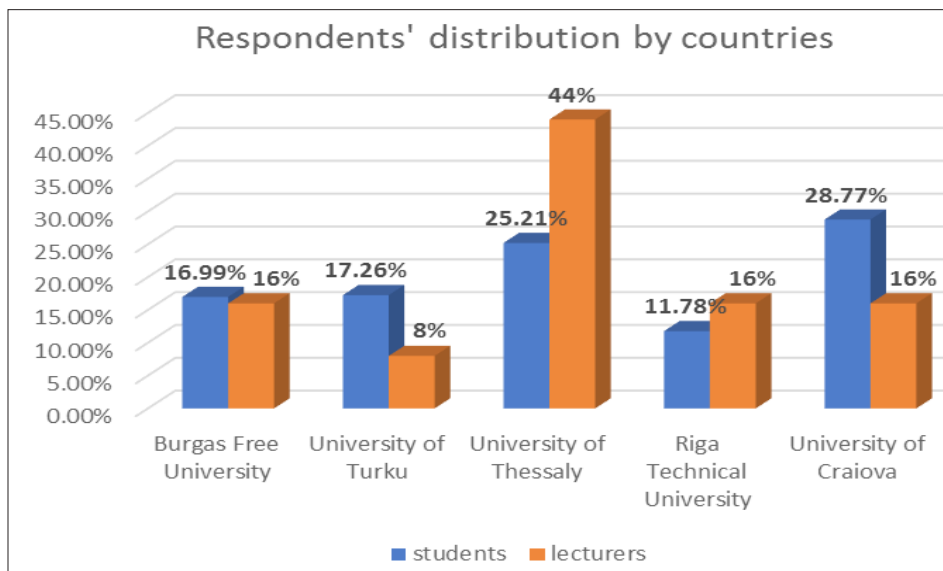
Figure 1. Distribution of lecturers and students in the survey by countries

The research methodology is based on a survey method. Two types of question-naires have been developed.

Type 1, addressed to students, had been designed to cover the following aspects of the sample: general personal data; common perceptions and attitudes of the interviewed learners on using the capacity of ICT in the learning process; assessment of the opportunities that universities offer for standardization training; assessing the degree of awareness of the learners of the standards. 15 questions in the questionnaire are multiple choice questions and 5 are open questions.

Type 2 consists of 18 multiple choice questions and focused on the following areas: profile of surveyed lecturers; perceptions and attitudes to the ICT-based learning and training; preferences and needs of the learners regarding the functionality of VLE and the e-courses integrated in it; awareness about standards.

The main characteristics of the two target groups by partner country in the project are represented in the next table and figures. Table 1 presents the collected responses from the lecturers by countries regarding the areas of expertise. All respondents are university lecturers from the following departments: Economics and Management; Informatics and Technical Sciences; Teaching Staff Department; Material Science and Applied Chemistry. 40% of the respondents are full professors. 52% have declared PhD as their academic degree. The rest of the respondents have Master's degree.

Table 1. Areas of expertise by countries

Country	Specialties selected for modernization				
BG	Electronics	Computer Sciences	Marketing	Management	Administration	
FI	Quality System	Telecommunications	Cybersecurity			
GR	Information Technologies	Macroeconomic Policy	Marketing & Etrepreneurship	Sociology	Human Geography	Economics
GR	Computational Economics	Defence & Security Economics	Entrapreneurship	Management	Labor & Health Economics	
LV	Physics	Smart Structures	Material Science	Communication theory		
RO	Quality Management	Economic processes modelling	Business Management	Investment Management	Enviromental Policy	Computer Networks & Administration

According to the data processed nearly all respondents (96%) are engaged with teaching activities addressed to students from Bachelor level, 76% from the sample are involved in teaching activities addressed to Master's degree students, and 36% have training courses addressed to PhD students (Fig.2).
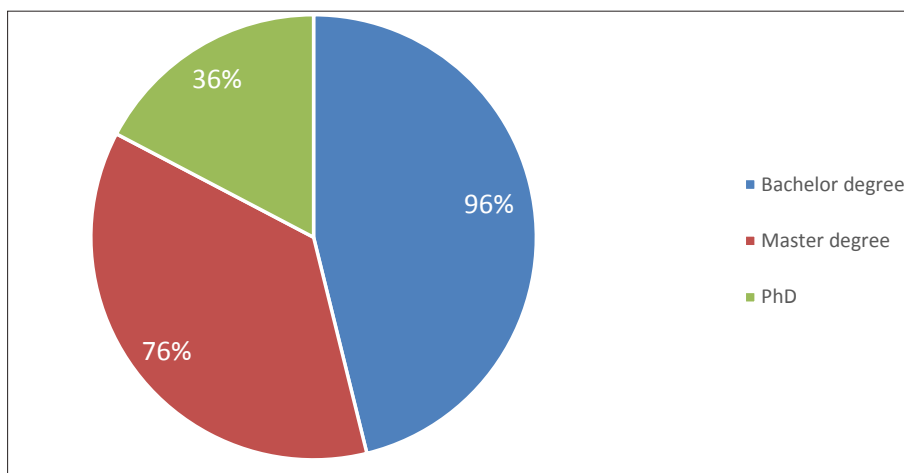

Figure 2. Academic levels where the respondents-lecturers lead training courses

Results from a comparative analysis of the expectations and requirements of the two respondent groups for a standardization course

The particular interest for the research team conducting the survey was the identification and evaluation of the possibility for usage of Moodle platform functionality to support the main educational activities in order to provide effective process based on needs and requirements of the lecturers and students.

As to a VLE (such as Moodle) used in the university education, the list revealed is quite diverse, with "To a very large extent" predominant (40%). As can be seen from Figure 5, the next two big groups of respondents (16% each) are responded "To a large extent", and the "To a moderate extent". Only 4% of the participants in this survey have declared that they use VLE to a very small extent and 12% of lecturers answered that they cannot exactly to estimate the extent of usage.
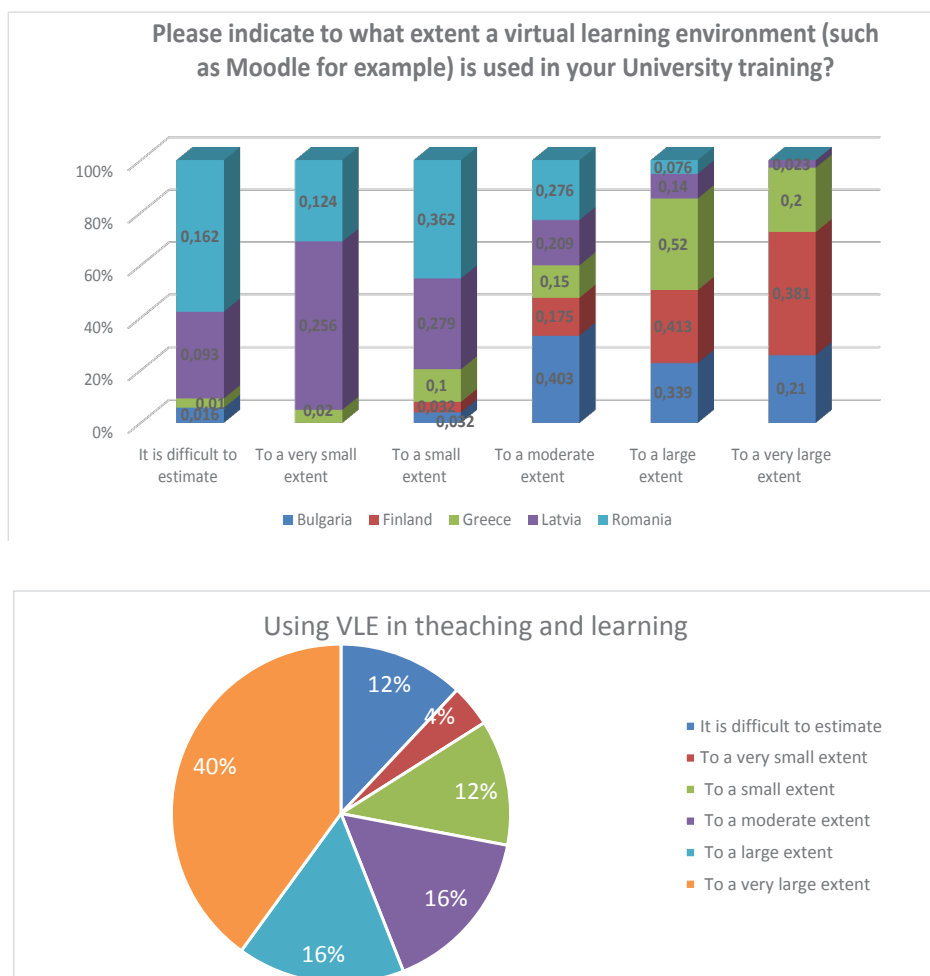
Figure 4. Lecturers' opinion for using VLE in teaching and learning

The results show that in all universities, where the respondents are lecturing, the appropriate digital infrastructures and virtual educational environments are already established. The majority of the respondents (over 70%) declare that they use the facilities provided by the established University VLEs in their regular work with students to a very large, large or moderate extent.

This means, from one side, that the lecturers have the necessary digital competencies and will not be difficult to get involved and actively participate in the train-the-trainers e-course focused on standardization and domain-specific standards. From the other side, the lecturers who successfully pass the standardization and standards-related training phase will need less time to modernize their disciplines via integration into them of appropriate training modules related to standardization (e-learning materials and online activities) which to be adapted to the specifics of the subject and to the concrete educational context.

According to the majority of the surveyed students from Finland and Greece, VLE such as Moodle is used in university learning "To a great extent" (41.3% and 52% respectively), the majority of respondents from Bulgaria are responded "To a moderate degree" (40.3%), and for the majority of respondents from Latvia and Romania – "To a small extend" (27.9% and 36.2% respectively) (Fig. 4). The study reveals the different experiences of students in different countries in using virtual learning environments in university education.

Regarding the e-courses' development, a dominant group of respondents-lecturers (88%) consider as significantly important to provide the students in the very beginning of the training, highly informative and concise description of the course and its structure, prerequisites, learning objectives which define the demonstrative skills and/or knowledge to be acquired by the student as a result of the training, as well as procedures and criteria for the assessment of the achievements and successful completion of the course.

The same number of respondents-lecturers (88%) share the opinion that it is very important the presented topics in the course to be enhanced and enriched through the provision of additional materials addressed to the learners who have deeper interests in the corresponding topic and work beyond the group level because this will contribute to increasing the students' commitment to the corresponding topic(s) and to the course as a whole respectively.

The predominant group of the respondents-lecturers (more than 90%) are convinced that the integration of the team-based activities in the instructional flow contributes to improving the learning outcomes.

76% of the participants-lecturers in this survey consider the test questions compulsory regarding enabling the students to move on to the next stage of the training.

In 68% of the received responses from lecturers is stated that for an e-course it is essential the development of e-cooperation to be supported and that it is useful and effective for trainees to collaborate in groups using an online collaborative environ-

ment with limited access, so that they can work together on joint tasks or projects. Nearly the same number of respondents (64%) state that it is important the contact with the learners to be enhanced and facilitated via support of a virtual classroom.

A very slight advantage (56%) has the respondents-lecturers, who consider that it is not essential the online course should cover a variety of topics which are not included in the traditional (classroom) courses as well as that the theoretical formulations should be prioritized in the online training materials.

In evaluating the students' choice of the type of training it is understood that blended learning is the preferred form. The majority of respondents prefer blended learning and another large group of students prefer the traditional course as can be seen in the Figure 5. Regarding kind of communication with other participants in the courses, according to the data gathered, the most preferred for the respondents are "Chat" and "E-mail" (Figure 5). As regards the approaches to assess study materials, a dominant group prefer "Free access to all topics of educational materials during the entire course" (Figure 5).

What approach for access to learning materials would you prefer?
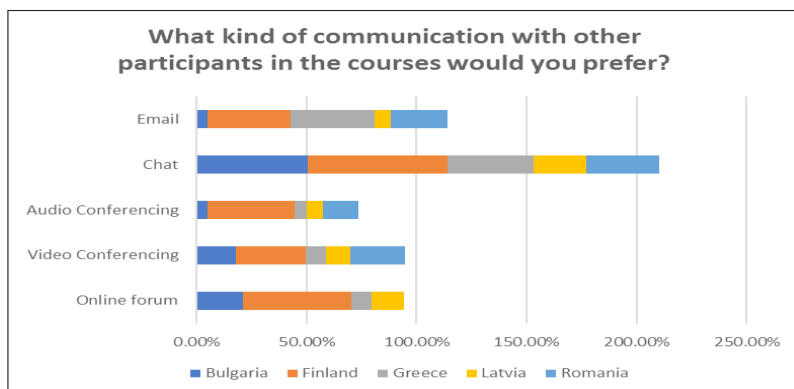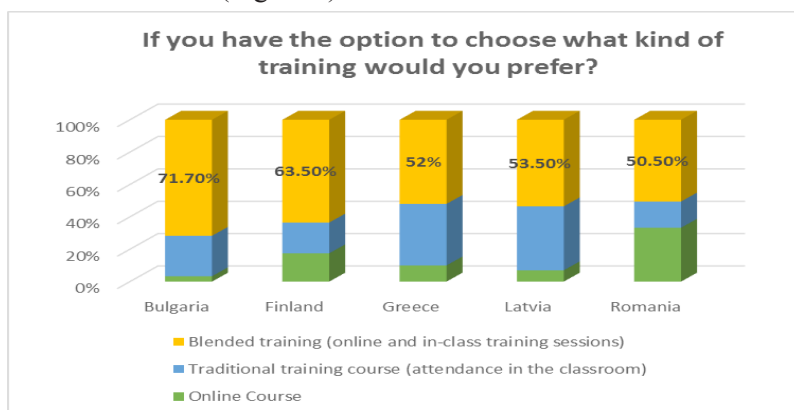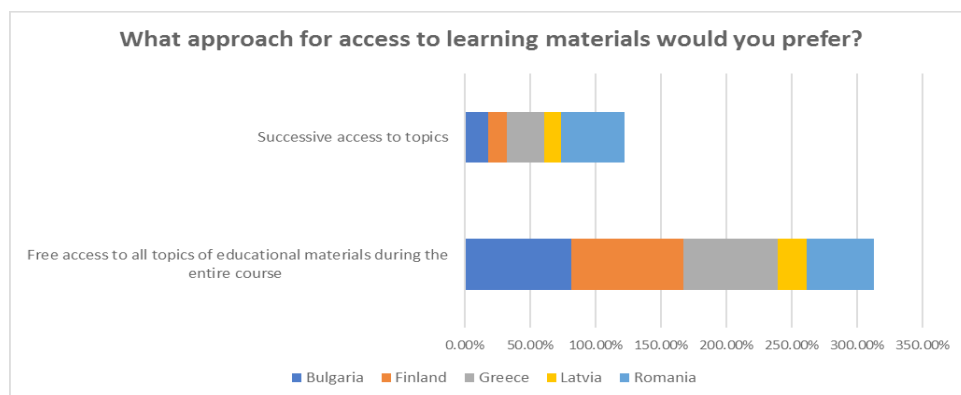
Figure 5. Preferences of the students for the structure of training in a virtual learning environment

Finally, the recommendations of the students to the creators of the training modules of the standardization are: to create easy to operate courses that contain a variety of teaching materials and allowing self-organization of the curriculum, they are structured in individual lessons with questions for self-assessment at the end of each section as the options for self-assessment to contain open-ended questions and test tasks with multiple choice or have practical tasks, allowing free access to all topics of educational materials during the entire course   and   for   communication between participants to provide chat.

**4. Expectations from training modules in the area of the standardization**

Preferred topics (Figure 6), to be involved in an online training course for improvement of the lecturers' capacity regarding the standardization and standards are specified by the respondents are as follows: the biggest number of lecturers (64%) want to know more about the standardization principles and the usage of the standards (48%); 40% of the respondents have expressed their desire to know more about the development of standards; the topics related to the regulations and legislation related to the standards are considered as important part of the training course by 32% of the lecturers; according 28% of the lecturers some topics focused on the benefits of standards it is appropriate to be included in the course; 20% of the lecturers are interested in topics regarding participation in the standardization processes.
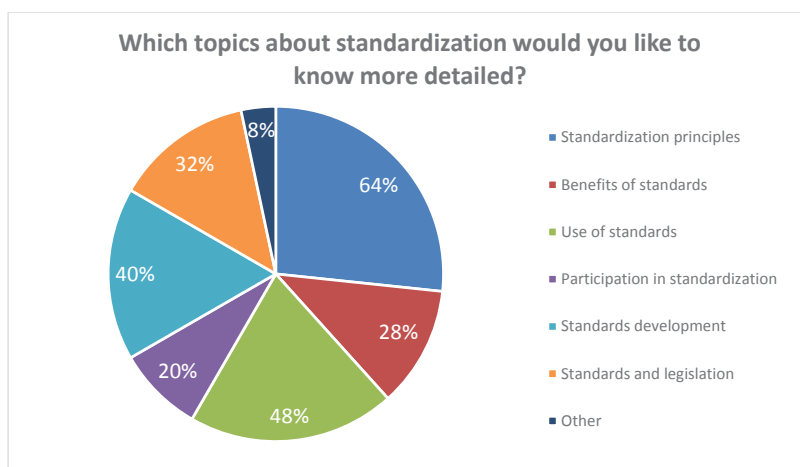
Figure 6. Preferred topics, to be involved in the training course focused on standards and standardization

Apart from the above, 8% of the respondents suggest in the course to be included topics related to some specific standards which could be applied in their scientific practice as well as some domain-specific standards such as these related to the optics and laser technology.
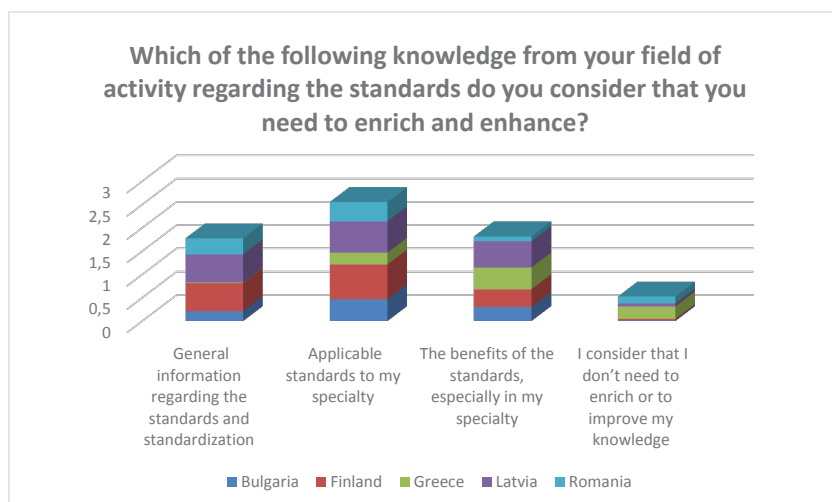
Figure 7. Aspects for improvement of the standardization and standards-related knowledge

A very high percentage (80%) of the lecturers involved in the survey consider that they need to enrich and enhance their knowledge about the standards applicable in their specialties (Figure 7). According to 40% of the respondents, they need to be provided with general information regarding the standards and the standardization. 32% of the lecturers want to know more about the benefits of the standards, especially in their specialties. It is noteworthy that the most of the students prefer their standardization training to be closely related to their subject area. And the next large group of respondents would like to get acquainted with the benefit of standards, and in particular their specialty.

Conclusions

The survey's results show that the existence of intuitive interface and useful functionality implemented through mechanisms based on simple operations is a key factor for achieving the effectiveness of the e-training focused on standardization. The conclusions which could be drawn from this survey conducted in Bulgaria, Finland, Greece, Latvia, and Romania in the framework of the STUNED project can be systematized as follows:

– Concerning the organisational structure of the STUNED train-the-trainers course could be concluded that:

    – It is significantly important in the very beginning of the training, highly informative and concise description of the course and its structure, prerequisites, learning objectives which define the demonstrative skills and/or knowledge to be acquired by the trainees as a result of the training, as well as procedures and criteria for the assessment of the achievements and successful completion of the course to be presented.

    – The course topics should be enhanced and enriched via the provision of additional materials addressed to the learners who have deeper interests in the corresponding topic and work beyond the group level.

    – The integration of some team-based activities in the instructional flow will contribute to improving the learning outcomes. The e-cooperation to be supported -the trainees to be able to collaborate in groups using an online work environment with limited access and thus to work together on joint tasks or projects.

    – The e-tests should be compulsory regarding the movement on to the next stage of the training.

    – The online course should cover a variety of topics which are not included in the traditional (classroom) courses. The theoretical formulations and the practically oriented learning materials should be well balanced.

– STUNED course content - topics, to be involved:

    – Standardization principles and the usage of the standards;

    – Development of standards;

– Regulations and legislation related to the standards;
– Benefits of standards;
– Participation in the standardization processes.
– Regarding the modernization of the higher education via integration of standardization and standards-related training in the University curricula could be done according the following two strategies: development of stand-alone standards-related courses and modification of the existing courses via integrating standards-related modules or topics.

Acknowledgements

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