TEACHING STANDARDS IN HIGHER EDUCATION PROGRAMMES

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Abstract

It is well known that the role of standardization has increased largely during the last decades; however, the knowledge of students and higher education teachers about the process of standardization is low. In this paper, the results and outcomes of the project for standards teaching in higher education programmes is given. The survey of the knowledge and expectations of engineering students of the first study year was done and selected online modules about ISO standards were created and piloted. Positive feedback was received.

Keywords: *standards training, higher education, teaching, online modules*

INTRODUCTION

The importance of standards and standardization for businesses has increased dramatically over the last decade. It is widely recognized that standards provide a range of benefits, including enhancing the competitiveness of the European economy, facilitating trade, fostering innovations, and facilitating the elaboration of technical regulation within the Single European market. The European Commission (EC) has shown its interest in increasing awareness about standardization. In its Communication on a Strategic vision for European Standards (2011) the EC asked the European standardization organisations, the Member States and other standards bodies to improve awareness and education about standards. The Joint Initiative for Standardization (2016) also sets programmes for education in standardization. CEN and CENELEC made in 2018 the major conclusion regarding the complete lack of targeted and structured efforts for including standards training in university curricula at European level. So, in the medium and long term, the lack of knowledge and skills in Europe about standards will result in a reduction in the competitive abilities of European businesses.

Many things have been done already to improve the situation in European level. However, there is still a lack of proper university education on standards of the European level. Also, students and university professors are not very well aware of the standardization process. There is very limited academic infrastructure in the field of standardization at higher education institutions. Academic teaching in the field of standardization in Europe does not correspond to the status that it should have.

Our purpose is to support universities to enrich their curricula by developing and integrating into study courses innovative educational modules in the area of standardization of a selected set of standards of the International Organisation for Standardisation /ISO/, some of which are adopted also as European standards. For this goal, we in the frame of the Erasmus+ project “Standards Teaching in University Education” (STUNED) accessed the student needs, created the training modules about selected standards, piloted them during, and evaluated the satisfaction of students.

1. MATERIALS AND METHODS

To assess the state of the art, student knowledge, and expectations about possible learning modules in the online environment, the survey of the transport engineering and ICT engineering students of Riga Technical University was done. The questionnaires had been designed to cover the following aspects of the sample:

1. General personal data;
2. Common perceptions and attitudes of the interviewed learners on using the capacity of ICT in the learning process;
3. Assessment of the opportunities that universities offer for standardization training;
4. Assessing the degree of awareness of the learners of the standards.

14 questions in the questionnaire were multiple choice questions and 5 are open questions. The questionnaire is demonstrated in Appendix 1.

The survey was sent to 100 students submitted in the period from the 25.03.2020, to 27.04.2020. 43 have completed the survey, making the responding rate at 43%. Age characteristics of the sample are shown in Fig.1.

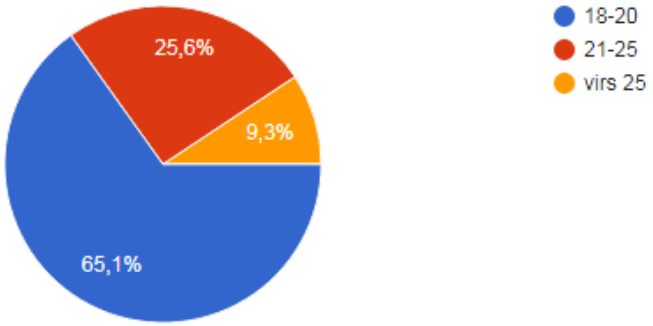

Fig. 1. Age characteristics of the sample

Source: Authors research

One of the goals of the survey was to choose the right environment for study module creation. So, the first part of the questionnaire was devoted to investigating the common perceptions and attitudes of the interviewed learners on using the capacity of ICT in the learning process. The second part of the survey was devoted to the preferences for the structure of training in a virtual learning environment. The third part was dedicated to the assessment of the opportunities that universities offer for standardization training, and the fourth part - assessing the degree of awareness of the learners of the standards.

2. RESULTS

Analysing answers to the question “How often do you use the Internet to learn something new and to enrich your knowledge of a topic in order to achieve better results and progress in your learning?”, the students very often use the Internet in the learning process (51,2%). 39,5% of the students use the internet often, only a small percent use the internet rarely and very rarely (both, 4,7%). We have to take into account that the survey was done shortly before the pandemics.

Ask to indicate to what extent a virtual learning environment (such as Moodle) is used in the university studies, the results were quite diverse and the answers were distributed quite equally; the largest groups voted for "to a small extent" (27,9%) and “to a very small extent” (25,6%). 20,9% of respondents responded "to a moderate degree", and 14% responded, "to a great extent". Only 2,3% responded, "to a very great extent" . It can be taken into account that these responses would be changed after the extraordinary situation due to COVID-19 lockdown since during this period the studies at Riga Technical University were conducted online only.

In evaluating the student's choice of type of training the survey showed that blended learning is the preferred form. The majority of respondents prefer blended learning (53,5%) and another large group of students prefers the traditional course (39,5%). Only 7% would like to have an "Online course".

Regarding the kind of communication with other participants in the courses, according to the collected data, many forms were chosen. "Chat" is more popular (24,1%), and the next large group of respondents prefers "Free access to all topics of educational materials during the entire course "(22,2%). Then a quite similar number of respondents voted for "Online forum" (14,8%), "Successive access to topics" (13%) "Videoconferences" (11,1%).

In the next part, the knowledge of standardization and standards necessary for a successful realization on the labour market and for career development, are rated by the respondents. The data are summarized in Figure 2. 39,5% of the respondents believe that this knowledge will be of moderate use for their professional realization, and for 20,9% supported knowledge of standards to a "great extent" and the same amount for "some extent" for successful realization in the labour market.

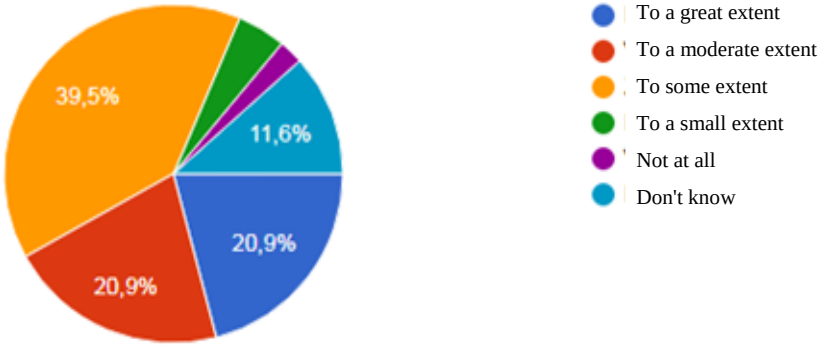

Fig. 2. The results for the question: "To what extent do you think that knowledge of standardization and standards is necessary for your successful realization on the labour market and for your career development?"

Source: Authors research

The last group of questions was dedicated to studying the level of knowledge of standards and standardization from the surveyed learners. The answers to this group of questions indicate pure awareness of the respondents and the lack of knowledge of the subject standardization. 41,9% of respondents answered that they are familiar with the International and European standardization system but the majority are not informed.

Answering the question "How do you assess your knowledge on standards and standardization related to your field of study?", 37.2% of the respondents gave a low scores for their knowledge of standards and standardization related to their field of study. 53,5% of respondents showed an intermediate level of knowledge of standards and standardization. Only 9,3% showed a high level of knowledge.

Asked about main advantages in their opinion, the respondents shared their opinion on the provided advantages of the standards as options:

- Facilitated international trade (18,4%)
- Conformity and interoperability of products and services (16,3%)
- Economic development (12%)

- Improving competitiveness (10,2%)
- Higher safety and quality (10,2%).

The open-ended question, what standards organizations do you know (international, European, national), was answered by only 23 respondents. The following have been named: ISO, Universal Postal Union, FGH, National Standards, IEEE-SA, WHO, W3C.

Answering the question "If you have the opportunity, would you participate in a standardization course or training course(s) or standards in your area, conducted entirely online?", a very high percentage (83,7%) of students would like to participate in online training.

Concerning the preferences of the content of the training course, 67,4% of the respondents would like their standardization training to be closely related to their subject area. The next large group of respondents (60,5%) would like to enrich the knowledge about "General information regarding the standards and standardization" but 55,8% would like to get acquainted with the benefit of standards and in particular their specialty. Only 7% consider that they don't need to enrich or to improve knowledge about standards.

3. DISCUSSION

The survey conducted between engineering students at the Riga Technical University showed that the students' knowledge about standardization is rather low than high. Survey participants were aware of the need for knowledge about standards in general as well as in their field but most of them could not name some standardization organization examples.

The results also showed that students would be very interested in training about standards and standardization. From the answers, we could conclude that the best option could be a blended learning course (online and classroom training). However the pandemics have put some limitations to it, so the chosen option was a fully online course. The best option, as appeared in the survey, is to allow free access to all topics of educational materials during the entire course rather than gradually opening the next topics. The most recommended communication tool between participants was chosen chat.

After clarifying the needs and expectations concerning the content and form of the training, the training modules for the students of the programmes in the field of Aviation transport were developed and piloted during the Spring Semester 2021.

The study module was incorporated in the Moodle environment and given for students to acquire free of choice. The study module was chosen to study by 30% of the students of the first study year.

The module included such topics as basics of standards, standardization, main standardization organizations, benefits, the development of standards, influence of standards on the competitiveness of business and economy of Europe in general, information of selected standards important for aviation, scope of those standards, basic chapters and explanation of their content requirements of the standard, possibilities for conformity, assessment and certification, possibilities of application of the standards. The standards included were the ISO/IEC 17025:2017 Laboratory Standards and AS 9100 Quality Management systems in aviation.

Finally, measuring the satisfaction of the students, 93,3% responded that they liked the possibility to acquire the additional module to a great and moderate extent.

4. CONCLUSIONS

Solving the problem of lack of knowledge and training at the university level, in the frame of the project Erasmus+ "Standards Teaching in University Education" (STUNED), in this research the state of the art, student knowledge, and expectations about possible learning modules in the online

environment was done by a survey of the transport and ICT engineering students of Riga Technical University. The main conclusions were:

1) The analysis of the results shows that the students' knowledge about standardization is rather average than high.

2) Survey participants are aware of the need for knowledge about standards in general as well as in their field and would be very interested in this type of training.

3) The recommendations of the trainees to the creators of the training courses of the standards are:

- to use blended learning courses (online and classroom training) if possible,
- allowing free access to all topics of educational materials during the entire course;
- for communication between participants to provide chat.

Following these recommendations, the training module about standards for the engineering bachelors in the aviation transportation field was created and piloted during spring semester 2021. A high level of satisfaction of the learners was demonstrated.

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Appendix 1. Questionnaire for survey and analysis of the attitudes and the needs of students

Country	
University	
Faculty/ Department	
Specialty	

1. Please indicate your age group

☐ 18 - 20

☐ 21 - 25

☐ Over 25

2. Select the academic level in which you are learning

☐ Bachelor degree

☐ Master degree

☐ PhD

3. How often have you been using the Internet for learning something new and to broaden your knowledge on a given topic in order to achieve better results and progress in your training?

☐ Very rarely

☐ Rarely

☐ Often

☐ Very often

4. Please indicate to what extent a virtual learning environment (such as Moodle for example) is used in your University training?

☐ It is difficult to estimate

☐ To a very small extent

☐ To a small extent

☐ To a moderate extent

☐ To a large extent

☐ To a very large extent

5. If you have the option to choose what kind of training would you prefer?

☐ Online Course

☐ Traditional training course (attendance in the classroom)

☐ Blended training (online and in-class training sessions)

6. What kind of communication with other participants in the courses would you prefer?

☐ Online forum

☐ Video Conferencing

☐ Audio Conferencing

☐ Chat

☐ Email

7. What approach for access to learning materials would you prefer?

☐ Free access to all topics of educational materials during the entire course

☐ Successive access to topics

8. To what extent do you believe that the knowledge about standardization and standards is necessary for your successful labour market realization and for your career development?

☐ To a great extent

☐ To a moderate extent

☐ To some extent

☐ To a small extent

☐ Not at all

☐ Don't know/ No answer comment

9. Does your university offer any kind of course specifically focused on standardization and standards in the domain/field you are studying in?

☐ Yes

☐ No

10. Does your university offer/provide any session(s) of standardization and standards as part of existing training courses in your study programme?

☐ Yes

☐ No

11. Are you familiar with the International and European standardization system?

☐ Yes

☐ No

12. How do you assess your knowledge of standards and standardization related to your field of study?

☐ High

☐ Medium

☐ Low

13. What in your opinion are the main benefits of standards?

☐ Economic development

☐ Facilitated international trade

☐ Increased competitiveness

☐ Product and service compatibility and interoperability

☐ Higher safety and quality

☐ Spread of innovation

☐ Platform of knowledge transfer

☐ Support for legislation

☐ Other_____

14. What standardization organizations do you know (International, European, national)? Please, list below.

15. If you would have the option to take part in a course or session(s) regarding standardization or standards in your field, conducted fully online, would you take part in it?

☐ Yes

☐ No

16. Which of the following knowledge from your field of activity regarding the standards do you consider that you need to enrich and enhance?

☐ General information regarding the standards and standardization

☐ Applicable standards to my specialty

☐ The benefits of the standards, especially in my specialty

☐ I consider that I don't need to enrich or to improve my knowledge