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IMPROVING STUDENTS' COMMUNICATION AND PROBLEM SOLVING SKILLS DURING TEAMWORK¹¹

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Abstract: *The paper presents the successful experience of a team of lecturers, Bachelor, Master and PhD students at the University of Ruse in the area of using innovative training technologies. Different options for the improvement of the communication between lecturers and students and for increasing the students' interest towards different complicated subjects are analyzed. A pilot study activity is carried out. Special attention is dedicated to the improvement of important soft skills such as: teamwork, adaptivity, communication, presentation and problem solving skills. The objective of the training and learning technologies applied (joint scientific work with the students, organization and implementation of meetings with industry representatives, peer review) is to increase the chances of professional development and realization of students from engineering Bachelor and Master degree courses through participation in international programs and scientific activities. Some important criteria for evaluating presentations are summarized. The interaction between different soft skills is analyzed. Conclusions and recommendations are made.*

Keywords: *Training Technologies, Teamwork, Communication, Presentation and Problem solving skills.*

INTRODUCTION

The European Parliament's decisions of 20 April 2012 to modernize Higher Education systems in Europe underline the importance of graduates' employment. The assessment of Higher education outcomes and their compatibility with labour market requirements is especially important. It is recommended that Member States of the European Union have to collect and publish statistics concerning the compliance between different degrees of University education and employment opportunities.

In order to fulfill the objectives of the Strategy for the Development of Higher Education in the Republic of Bulgaria for the period 2014 - 2020, a long-term Action Plan was adopted by the Ministry of Education and Science. This plan includes different parameters for evaluationg the achievements of the strategic objectives mentioned.

Indicators necessary for measuring theses outcomes are described in detail in (Dobreva, A., Dimitrov, Y., Dobrev, V., Pantileev, P., Ronkova, V., Kamenov, K. & Angelova, A., 2017) and in (Popova, J., Harakchiyska, T. & Gueorguiev, T., 2016).

In a number of publications, the academic staff of the University of Ruse (Dobreva, A. & Haralanova, V., 2013), (Popova, J., 2011). and (Popova, J., Dobreva, A. & Ahmed, A., 2014) reflects

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the trends of national and international labor market in the field of Engineering, Project Management and Quality Management and deduces additional conclusions in this area.

The criteria for evaluating the quality of work of different representatives of the academic community are different and they are applied in various ways.

The quality of university lecturers' work is evaluated comparatively precisely by the Higher education rating system in every European country. Another, especially important, approach for assessment of academic achievement is to take into account the opinion of Bachelor, Master and PhD students concerning the quality of the study process through implementing feedback procedures, as described in details in (Dobreva, A. & Haralanova, V., 2013) and in (Ronkova, V., Dobreva, A., Kamenov, K., Dobrev, V. & Dimitrov, Y., 2016).

The best possible description of the level of knowledge, skills and competences that future bachelors, masters and PhD graduates need to acquire is set out in the European Qualifications Framework, <https://ec.europa.eu/ploteus/en/>.

The authoring team considers that it is especially important to analyze and recommend measures for improving soft skills, necessary for conducting study and learning process on a high level and enhancing the future professional opportunities of Bachelor and Master graduates. A short summary of the skills requirements to be demonstrated by Bachelors, Masters and PhD graduates in the relevant scientific field (Levels 6, 7 and 8 of the European Qualifications Framework) is given in Table 1.

Table 1. Skills required according to EQF

№	EQF Level	Skills
1	Level 6 (Bachelor)	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study
2	Level 7 (Master)	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
3	Level 8 (PhD)	The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice

The objective of the paper presented is to identify approaches, tools and instruments for stimulating the development of some of the most important types of soft skills: communication, presentation and problem solving skills.

UNIVERSITY STRATEGIES SUPPORTING SOFT SKILLS DEVELOPMENT

The Rector's team of the University of Rousse creates a favorable academic environment through which it is able to ensure the availability of study curriculum and syllabi in a way that encourages Bachelor, Master and PhD students to take an active role in participating in the training and education process.

One of the most significant strategies concerning this issue is the enhancement of the mobility of lecturers, administrative staff and students. This mobility is realized through participation in international educational and research projects, in staff and students' trainings, in national and international scientific forums, as summarized in (Dobreva, A., Wasowicz, A. & Dobrev, V., 2009), (Kosmanis, T., Krol, S., Pecqueur, M., Dobreva, A., Georgiev, G. & Dobrev, V., 2011), (Popova, J., 2014) and in (Rybinska, E., Dobreva, A. & Ivanov, R., 2010).

Another important activity which is supported quite intensely by the University authorities is the research done by students and PhD students. Up-to-date information is maintained on the website of the University of Rousse for upcoming scientific conferences, seminars and other scientific forums for students, PhD students and young researchers, <https://www.uni-ruse.bg/science/conferences>.

The academic staff of the Department of “Mechanical Engineering, Machine Elements, Engineering Graphics and Physics” manages to adapt the quality assurance policy of the University of Ruse in practice through various innovative technologies and activities for sustainable improvement of the quality of education and training of bachelors, masters and doctoral students, such as:

- incorporating research outputs as new topics in curriculum development for undergraduate, Master and PhD students (Stoyanov, S., Dobrev, V. & Dobрева, A., 2019);

- integrating research findings as new topics in textbooks and laboratory tutorials: (Kolev, B., Stoyanov, S. & Dobрева, A., 2003) and (Kamenov, K., Dobрева, A. & Ronkova, V., 2016, 2017);

- participating in public lectures and seminars aiming to disseminate scientific results and outcome of international activities. The academic staff of the department “Machine Science, Machine elements, Engineering Graphics and Physics” members create good practices for promoting the research and project results of academic staff and students. A specific and original form for promoting the creative results achieved is the annual Global Village seminar, which aims to present the integration of the academic activity of the academic staff of this department with the international and scientific achievements, <http://www.bta.bg/bg/c/BO/id/2010373>, <https://www.uni-ruse.bg/news/Lists>.

- involving undergraduate and doctoral students in research teams in scientific and applied projects;

- creating joint publications with students and doctoral students;

- realizing research results into practice through consultancy and expertise (Dobrev, V., Stoyanov, S. & Dobрева, A., 2015), (Dobрева, A., 2013) and (Dobрева, A. & Stoyanov, S., 2012).

Innovative educational technologies, modern methods and tools are used in the preparation and training of students and PhD students in the fields of Machine Science, Machine elements and Engineering Graphics. These approaches are mainly related to:

- Application of computer technology and copyrighted and specialized software products for modeling and simulation (Stoyanov, S., V. Dobrev & Dobрева, A., 2017);

- Using modern automated experimental systems, (Dobrev, V. et al, 2016);

- Stimulating the participation of students and doctoral students in creative teams and improving their skills in presenting the achieved research results.

DEVELOPING SOFT SKILLS AND THE INTERACTION BETWEEN THEM

Based upon the favorable academic environment created by the Rector's management and the academic staff of the University of Ruse, a pilot study activity was carried out in the following sequence:

The impact factor of different soft skills for the professional realization of bachelor, master and PhD students was discussed. According to the authors' team, the most important soft skills are communication and presentation skills, teamwork and decision-making skills.

A team of 24 representatives of the academic community (Lecturers, Bachelor, Master and PhD students) was formed. All members of this team participated voluntarily in this pilot study activity aiming to achieve in short-term improvement of the several soft skills mentioned above. The participants in this project were representatives of 4 European countries and one African country.

During 15 weeks different kinds of presentations on specific topics within 5 academic subjects were performed publicly. The presentations have been elaborated by teachers, bachelor, master and doctoral students.

Each audience member made his/her evaluation in an explicit form to all other presenters as a peer review. The students had the opportunity to assess the level of lecturers' presentations. These presentations were mainly designed individually. Only relative complex topics have been elaborated as a teamwork. An obligatory time requirement was formulated: 5 to 7 minutes for one presentation due to the circumstance that the topics were specific and short.

Within this pilot study activity, a seminar has been implemented aiming to discuss the criteria for evaluating presentations. The most important criteria which has been summarized and indicated in Table 2.

Table 2. Assessment of presentations as design products

Criteria	Engineering Design – Master degree subject	Machine elements – Bachelor subject
Simplicity of presentation	3	4
Relevance to the topic	4	4
Appropriate citation of literature sources (for scientific presentations)	2	1
Timing	4	4
Dynamics, interactivity, model of behaviour	3	4
General design of presentation	4	4

The criteria presented are shown through their weight and impact factors. Concerning presentations prepared for general and fundamental engineering subjects such as “Machine Elements” the appropriate citation of literary sources in presentations is relatively less important in comparison with Master degree subjects (such as Engineering Design). The Master degree subjects have a greater integration degree between research investigations and study syllabi.

During this pilot study activity, the following results have been achieved: a significant number of the participants in this activity improved the quality of their presentations. The established interdisciplinary, international and intercultural team of representatives of the academic community contributed to the improvement of communication within this group.

The opportunity to evaluate different representatives of the academic community in different subject areas gave the students additional experience in the decision-making process. This circumstance improved the students’ overall level of decision-making skills as one of the most important types of soft skills.

An additional effect of the communication developed was the improvement of teamwork and adaptability: the ability to adapt to different requirements and criteria.

The experience gathered concerning important soft skills such as teamwork, time management and critical analysis have led to the improvement of problem-solving and decision-making skills in the area of engineering design, project management, total quality management, etc.

Students who are almost perfect in communication, time management and in decision making process are usually preferred by employers and business partners.

CONCLUSIONS

The paper presents the successful experience of a team of the lecturers and Erasmus students at the University of Ruse in the area of using innovative training technologies.

The successful academic environment at the University of Ruse and within the Department of “Machine Science, Machine Elements, Engineering Graphics and Physics” is especially important for the professional development and realization of Bachelor, Master and PhD students through:

- Systematic work aiming to ensure high quality of training and teaching process;
- Active support for increasing the creativity work of Bachelor, Master and PhD students encouraging their participation in scientific and international activities.

Different options for the improvement of the communication between lecturers and students have been analyzed. Special attention is dedicated to the improvement of important social skills of students such as: communication and presentation skills, teamwork and problem solving skills.

The results of the pilot study activity applied (joint scientific work with the students, organization and implementation of meetings with industry representatives, peer review, etc.) have increased the chances for professional development and realization of students from engineering Bachelor and Master Degree courses.

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