FRI-K1-1-QHE-13

INCREASING THE MOTIVATION FOR LEARNING OF THE STUDENTS FROM THE PROFESSIONAL FIELD MECHANICAL ENGINEERING AT THE UNIVERSITY OF RUSE

Assoc. Prof. Tanya Grozeva, PhD
Department of Repair, reliability, machinery, logistics and chemical technologies and Materials-handling Equipment,
"Angel Kanchev" Univesity of Ruse
Phone: 082 888 258
E-mail: tgrozeva@uni-ruse.bg

Abstract: *The University of Ruse has a rich human and material resources for the implementation of quality education and good practical training for engineers. The accumulated experience at the university in the Bachelor's and Master's educational level from the Professional field Mechanical Engineering provides an opportunity to apply new approaches to the motivation of both future and current students. Recognizing motivation for learning as an extremely important factor aims at improving the students' success in acquiring knowledge to be applied to improve and further develop machine-building in our country.*

Keywords: *motivation for learning, Professional field Mechanical Engineering*
JEL Codes: *I 20*

INTRODUCTION

The modern world is characterized by the rapid development of technologies, the trend of globalization, the development of information and communication technologies, the development of the information society, the need to master the chains of company networks, etc., factors that require good educational background. This is the basis that is also needed to flexibly build new capabilities, new skills, readiness for constant change through education. Therefore, during the first education, the student should acquire a desire for self-development and skills to search for new information. (Fonselius, J., M. K. Hakala & K. Holm, 2001).

The future mechanical engineers are trained in designing, analyzing, testing, controlling, operating and maintaining mechanical systems that are different in complexity. If we have to compare the objects they study, they can start from the driver of the sewing machine needle, pass through the valve of the artificial heart, through the car engine and reach the nuclear power plant, i.e. they study all aspects of turning the heat into useful work and machines that make it possible. This complexity of the studied matter requires a high academic motivation to acquire the necessary theoretical and practical knowledge in order to achieve the learning outcomes. (Hristova, D. 2011).

Motivation for learning is seen as a direction towards the individual parts of the learning process, related to the inner attitude of the personality to it.

PRESENTATION

According to teachers, the factors determining the motivation of the students are internal and external (Lecheva, G., 2009). The internal, personal one (pleasure of learning due to the sense of achievement, personal growth) and external motivation (getting high marks, personal benefit, fear of parents, reward, avoidance of punishment, desire for self-expression) are all aspects of one phenomenon, linking learning and its goals. There are cases where the achievement of a given goal leads to the development of the internal motivation.

Students with internal motivation are those with innate needs to be competent and self-defining. (Vansteenkiste M., Simons J., Lens W., Sheldon KM, & amp; De EL, 2004). They use learning strategies that require more effort to process information, tend to focus on tasks that are moderately difficult and challenging, while students with external motivation are oriented towards

easier tasks that do not represent a big challenge. In general, internal motivation ensures more consistent and serious learning.

It turns out that most students are better internally motivated than externally, and in general mechanical engineers have a lower level of motivation than men and women in other specialties (Turner J. K. & Patrick H. 2004). This is due to other motivational factors such as flexibility of graduation plans, interactions with coevals, mentoring and parental influence, etc.

Today, on the agenda, we have the following questions: What can be done to promote active learning, while ensuring the maintenance of the necessary academic standards? How do we stimulate the internal motivation of students studying mechanical engineering by giving them opportunities for independent learning development?

In the process of building motivation, there are three responsible parties: the teachers, the students themselves and the labor market in the face of the state and companies.

1. Analysis of the role of the lecturers

Unfortunately, in Bulgaria, the average age of teachers in the specialties in the field of Mechanical Engineering is quite high and the department has a lack of basic funding because of the way of determining the subsidy in the state universities. This strongly predetermines the difficulties in building a new learning paradigm.

Teachers' duties include recruiting, training and retaining students, which adds extra work beyond their direct responsibility for training and research.

A) The recruitment of future mechanical engineers requires special focus motivation - clarifying that these are people forming the future elite of society.

Still during the admissions campaign, the reasons for studying Mechanical engineering should be explained (in an appropriate and attractive way), emphasizing the following advantages:

- It brings great prestige and creates a guarantee of professional success (engineers become highly qualified specialists; they are at the forefront of future technologies; they learn with great effort and the element of respect comes naturally; they think in a special way - logically and critically; engineering is the most common Bachelor degree of CEOs in the world);
- It is ready to solve any problems (the engineer acquires skills and confidence to deal with problems by looking at them as a challenge and opportunity for growth);
- It has financial security (high salaries) and gives global opportunities and a chance to improve the world (it contributes positively to society).

In the overall campaign, the leading leitmotif should be: "More and more engineers are being sought all around the world and they speak with pride about their achievements!"

B) Training of future engineers

Unfortunately, in Bulgaria, nearly all higher schools use historical "traditional" methods of engineering training aimed at students to know how to solve given problems rather than encouraging them to explore, provoke and thus build their "own" knowledge. In this direction, trainers have to work hard to become partners, not just mentors. So they will engage them in the research process, provoke criticism and creativity.

This can be done by:

- methods of teaching, responding to innovative trends and practice – interactive ones (group work, brainstorming, etc.) and information entertainment. In order not to be in the role of an animator in front of the audience, the teacher should find the optimal balance between academic, intellectualized knowledge and its funny presentation, or what is called "learning by fun", which is quite difficult in engineering education and requires serious training by the teacher;
- adherence to a discussion and a dialogue style of teaching,
- linking the teaching material with current social issues and creating interest by referring to the latest world achievements in the corresponding field,
- more practical exercises, more tests, course assignments, etc. during the semester, that will be a part of the exam evaluation;

- by assessment, considering the absences from exercises, more individual work (during lectures and outside the audience).

By preparing the curriculum for its discipline, the teacher should adapt the learning content to the students' knowledge and gradually complicate it, visualizing it to the maximum degree and looking for practical orientation.

An important element in teaching is also **the change of the communicative code**. The new digital generation also implies a new attitude towards it. It is obligatory to use interactive teaching methods (multimedia presentations, electronic courses, video-training materials, electronic textbooks with opening objects of machines and mechanisms, etc.), use of more accessible language, giving more basic tasks, which will lead to a completely independent issues, developing thinking on problematic issues.

The Academic Council of Ruse University continuously analyzes the training in the professional field of Mechanical engineering and searches the reasons for difficulties of the students' success rate.

Regarding the training in Bachelor degree the following issues are raised:

- Updating the curriculum in the direction of improving the training. It turns out that the fundamental disciplines are demotivating because they are highly theoretical ones and the student loses faith in his own abilities; believes that all the training will be similar and does not see its meaning (often students in the first course give up and leave the university).

- A possibility for students to choose themselves disciplines in a given semester (this requires programs flexibility) and organize them in order not to blame the system.

- Mathematics and physics teachers are required to specify in the study programs, in which engineering tasks the relevant knowledge will apply and the conditions of tasks to be of an applied character, not as an end in itself. If a group problem solving is possible, everyone will solve a small part of it and will be interested in getting a good end result for the whole group. Using software tools to solve the tasks would raise the interest of students.

- Efforts to bring students into the library assigning them creative tasks, learning to work in a team with a sense of community; with the conviction that the student protects not only himself but also the team; studying techniques for presenting project management, etc.

- Enhance the enthusiasm of teaching and demonstration; the teacher should be continuously ready to answer emails and any student questions.

- Short lectures by prominent university professors on global engineering problems and achievements, showing innovations, good practices and scientific research in engineering education.

- The teacher should strive to make his subject a favorite one through the contents and his own skill as a lecturer, inspiring and motivating the students, teaching in combination with specialized disciplines and learning a foreign language.

The Master programs also need specific and focused strategies and visions, careful formulation of goals, focus areas and their own identity or role in the national and international framework.

The following additional tools could be used to increase the motivation for mechanical engineers learning: early in the semester the learning technology should be clear, what we expect from the students and what they expect from us; to show them what and how to study in related disciplines at world-renowned universities, and what they can also achieve through the respective discipline; if possible, after each teaching a short test would be given to show what they have learned from the lessons and an assessment; stimulating interest and effort, even with lower learning outcomes; to teach them the conviction that they must constantly improve their qualifications as future engineers or retrain and specialize closely; to allow willing students to lecture themselves by helping them in the preparation; to provide feedback after each lesson - anonymous questions in the end which would be explained at the next lesson; other opinions about the lecture, etc.; to introduce various additional training initiatives in the academic world

(extracurriculum training with motivated students) in order to provide the necessary knowledge, skills and attitude so that future engineers can compete on the global market.

2. Analysis of the student role

A key factor in nurturing motivation is the relationship in developing a "motivating environment" and the student himself. (Kotseva, T. Baltadzhieva, Mineva, 2013).

Expectations from motivated students studying Mechanical engineering:

- To find that the mathematical challenge is not too big, engineering boring, and they are properly trained for the styles of university education;
- To show moderate interest that stimulates the learning process;
- Feeling emotionally involved in the learning process and gaining success in terms of the difficulty degree of the learning material;
- To show a continuous interest in the disciplines studied and to be ready for a high emotional start in choosing and effectively practicing a profession in this field;
- Keep feedback, which includes information, constructiveness, clear criteria to be motivated and timely;
- To participate actively in the control and quality of training - to make mass inquiries, consultation and provocation to involve good students in the training process.

3. Analysis of the role of the Labor Market* (*state institutions and companies*) *as part of the motivating environment

The data of National Statistics Institute and Eurostat show the shortage of staff in the industry sector, where the main realization of the graduating professional education is concentrated. Traditionally, in recent years, the share of companies in the industry sector has been relatively large, which indicates the lack of qualified staff as a factor hampering their activity, followed by companies in the sectors of construction, trade and services.

The large investments in recent years in the IT sector imply a total shifting of knowledge and mechanical engineers towards the mechatronics. Disciplines such as automation, materials and manufacturing technologies, information and communication technologies, a combination of multidisciplinary skills, etc. are becoming more and more important, which changes the paradigm in the training of mechanical engineers. The development of social skills also takes precedence, e-learning leads to collaboration through the Internet, as between universities as well as with fast-growing international organizations in the field.

All this strengthens the role of mechanical engineers in the direction of increasing the motivation of students.

Engineers' employers would be useful mostly by clarifying the needs of engineers' skills, collaborative work on projects and research projects, lectures given by business and industry representatives at universities, and representation of companies in diploma theses and curriculum drown up in universities.

This would be done through the following steps on the part of companies and government institutions:

- prominent professionals would be ready to be invited to make presentations, showing what they are doing and how the knowledge of the discipline would help the future engineer; they themselves would choose interesting topics for students related to research, and have warm and friendly messages to encourage them to study;
- allocate funds for furnishing laboratories at universities to train future engineers of the latest technology;
- when recruiting, academic capabilities should be just one of the factors used in the assessment. There should be introduced additional criteria when conducting interviews that include the personal interests and qualities of candidates, their "soft skills" (communication, negotiation, language, cooperation, etc.);
- to be prepared for appropriate remuneration for the Bachelor and Master degree, as well as for the doctors, to have the care and interest in training mechanical engineers for the particular job (to grant scholarships, employment contracts, etc.);

- to create a mechanical engineers' society to promote the success of those working in the field and to prove that this is an exciting career;

- through the press and other means to work to change the public opinion about the prestige and importance of mechanical engineering as a profession.

Mechanical engineers in Bulgaria are much more likely to remain in their home country than those who study abroad. This requires taking measures by the state in the direction of a decent pay of young specialists, as well as introducing a mandatory post-graduation period.

An active strategy for the needs of mechanical engineers should be proposed according to the industry development and supporting the methods for motivation for study in this type of education.

With clarity about the regional role of universities, their division into research and training institutions, the Rector's direction would develop its own strategies for the development of the dominating and priority specialties.

The distinction between mechanical engineering for expert and development positions, research and training of engineers for direct production, should be clear.

CONCLUSIONS

The University of Ruse realizes its main responsibility for the development and quality of training in the specialties in the field of Mechanical Engineering and undertakes systematic strategic planning, development of teaching methods, raising the level of research, staff development, cooperation and internationalization, etc. in order to seek out forms for raising students' motivation for learning.

For the achievement of better motivation for learning, efforts are needed from all three sides - teachers, students and the labor market, that should be well aware in advance. These efforts should be joined in the development of activities rather than tackling the challenges in isolation, sharing teaching methods (e-learning and systematic use of comparative analysis where applicable, to identify the best practices), different forms of cooperation between universities and practical business life (industry lecturers), international mobility of students, etc.

REFERENCES

Fonselius, J., M.K. Hakala & K. Holm (2001). Evaluation of Mechanical Engineering Education at Universities and Polytechnics, Publications of тhe Higher Education Evaluation Council 14:2001, Helsinki 2001.

Turner J. K. & Patrick H. (2004). Motivational influence on student participation in classroom activities, Teachers College Record , Vol. 106 (9), 09.2004 г.

Vansteenkiste M., Simons J., Lens W., Sheldon KM, & Deci EL, (2004). *Motivating learning, presentation and persistence: the synergistic effects of the internal goal contents and autonomysupportive contexts*, Journal of Personality and Social Psychology , Vol. 87(2), pp. 246-260.

Hristova, D. (2011). Some views on student motivation for learning. SCIENTIFIC LA-BOR OF RUSE UNIVERSITY, volume 50 (series 1.2), pp. 107-110.

Kotseva, T. Baltadzhieva, Mineva Kr. (2013). Academic motivation through the eyes of students and lecturers, Yearbook of BSU Volume XXIH, 2013, p. 160.

Lecheva, G. (2009). Motivation - a Guarantee for Positive Attitude to the Learning Pro-cess, SCIENTIFIC LABOR OF RUSE UNIVERSITY - 2009, vol. 48.

URL:http://www.dipku-sz.net/izdanie/422/motivaciyata-za-uchene-i-obrazovatelnata-sreda-moodle

URL:https://www.researchgate.net/publication/288455354_izavi_na_motivaciata_za_ucene_na_studentite_manifestations_of_student%27s_motivation_for_learning

