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## **EDUCATION AND PERSONAL SKILLS OF A CHEMICAL TECHNOLOGY ENGINEER IN THE 21<sup>ST</sup> CENTURY**

**Introduction.** At the beginning of the 21st century, the education of chemical and process engineers is facing enormous challenges. The globalization of the world economy has altered the working environment and job market for chemical engineers. Thus, engineering in the 21st century is much different from what it used to be. Today, it requires adjusting to the fast-paced world and keeping up with development.

**Objectives.** The basic objectives of this research are:

- to shed some light on the changes in the modern education in the chemical engineering field;
- to study the demands being placed on tomorrow's chemical engineers;
- to analyze main job skills that are in demand for the future specialists.

**Presenting main material.** One of the major challenges facing universities is their role in shaping the future of higher education.

Academic curricula don't really adjust to the new realities, and the old-fashioned, four-year degree programs may be considered inadequate in the era of fast progress. The programs designed are too old-fashioned and simply can't teach specialists to handle problems occurring in the modern world.

Important elements include: teaching the fundamentals, using illustrative examples, methodical approach, interdisciplinary teamwork, opportunity to experience cross-border, international study. International cooperation should be intensified. Networks involving suitable foreign partner universities and institutes

should be created and extended. It will be necessary to educate students for true world reality rather than relying on imparting factual knowledge, which has generally been emphasized until now. Also further training courses and programs are needed in order to meet the demand for life-long learning.

When considering the requirements that chemical engineers will need to meet in the future, it is important to bear in mind just how extensive the field in which they work has become. Thanks to a generally broad, relatively unspecialized education, chemical and process engineers have an opportunity to work in the chemical industry, the oil and gas industry, the plastics industry, the food industry, the pharmaceuticals industry, medical technology, environmental technology, the automotive industry, the steel industry and many others [1].

The work they are involved in ranges from teaching and research, design, production, planning and technical management to applications technology, marketing and sales.

The World Economic Forum found *10 critical job skills* that will be in demand for the future job market of engineering. Four of these skills will be particularly relevant:

***Complex Problem Solving.*** Problem solving is the core of engineering: find a problem, break it down to understand it, and then apply existing knowledge to create a system, device or process that solves it. This makes problem solving the most important ability engineers will need for their future career.

***Critical Thinking.*** Critical thinking involves analyzing a concept or situation with the aim of reaching valid, sound and objective conclusions. Strong critical thinking skills take practice, as it's easy to make decisions "uncritically" based on one's own interests, biases and emotions, rather than the facts.

***Creativity.*** Creativity is the ability to make, invent or produce something new, rather than imitating something that already exists. Engineers are exceptionally creative, and this creativity is the reason engineers dream up innovations and

solutions to all kinds of problems. Employers value creativity because creative people are the flexible thinkers who can not only find new solutions for new problems, but new ways to motivate [2].

***People Management and Emotional Intelligence.*** Engineers not only work closely with their own co-workers and teammates, they must also be able to easily work with engineers and non-technical staff from other companies and organizations. Those who are good at managing people are better in taking leadership roles and oversee entire projects or companies, keeping all their employees working together like the proverbial well-oiled machine [2].

**Conclusions.** So, dealing with technology is the absolute must in today's world. Nowadays, there are no jobs that haven't changed or weren't affected by technology. In some fields the changes occur more rapidly while in others, it happens gradually. The working environment of the chemical engineer is changing too, so the higher education programs in chemical and process engineering must give graduates the skills to work successfully in a wide range of jobs environments. The courses must not be overly specialized. The capacity for innovation is very often based on the ability to transfer problem solving strategies from one area to another. This requires not only knowledge of one's own subject but also knowledge of the fundamentals and methods of other disciplines. Besides, today's engineers are required to have a whole range of skills and impersonal and professional competencies, including responsibility, ethics and lifelong learning!

## REFERENCES

1. Molzahn M. Chemical Engineers for the 21st Century Challenges for University Education [Електронний ресурс] / М. Molzahn, К. Wittstoc // Chem. Eng. Technol.. – 2002. – Режим доступу до ресурсу: [https://efce.info/efce\\_media/Downloads/wpe/Molzahn+Wittstock.pdf](https://efce.info/efce_media/Downloads/wpe/Molzahn+Wittstock.pdf).

2. Moore A. Engineering in the 21st Century: 3 Most Essential Basics to Remember [Електронний ресурс] / Anastasia Moore. – 2019. – Режим доступу до ресурсу: <https://engineeringmanagementinstitute.org/engineering-in-the-21st-century/>