PUMPS AND PUMP STATIONS SCIENCE IN TEACHING STUDENTS ENGINEERING COMPETENCE DEVELOPMENT CREATIVE METHODS

Rakhimov Ashraf Rasul o'g'li
Norchaev Abdulla Jabborovich
E-mail: norchayevabdulla28@gmail.com
ORCID: 0009-0006-4902-9092
KARSHI STATE TECHNICAL UNIVERSITY

Abstract. *In the article pumps science teaching in the process in students engineering competence to develop aimed at creative pedagogical approaches analysis Modern technological processes with harmonious without to the problem based education, practical projects, digital simulations, design thinking and gamification such as of methods education efficiency in progress role illuminated. Also, the industry enterprises with cooperation based on organization attainable practical of training students professional competence in formation importance showing passed. Research results creative methods application pumps in science theoretical knowledge and practical skills harmony to ensure proves.*

Key words *: pumps science, engineering competence development, innovation pedagogical technologies, creative teaching methods, problem-based learning, digital simulators, design thinking approach, gamification, practical cooperation, technical thought.*

Today on the day technologies intensity with developing one at the time engineering in the direction of education taking students modern knowledge and to skills has to be extremely is important. Especially pumps and pump stations science with related sciences industry, energy, agriculture agriculture, water supply and other many in the fields important place Pumps mechanical engineering system main from the joints one is considered, this because of this science in teaching creative approach, practical experience and technician thinking to develop big attention focus necessary.

Students engineering competence development is only theoretical knowledge to give with limited They will not remain . technician problems according to acquisition, analysis can real processes understand and creative solutions offer can to receive Below is the "Pumps and pump

stations" science in teaching application possible was creative methods using this competencies how formation possibility about idea is maintained .

1. Problems based on teaching

Latest in years education in the process to the problem based teaching approach wide This is being used . in a way to the student clear one task or problem is given and he is independent accordingly or group become solution to find movement does.

Pumps and pump stations in science application possible was problematic tasks for example:

• " Why?"of the pump water to give productivity" Is it coming out lower than expected?"

• “ Pump work in the process cavitation what because of to the surface arrival Is it possible?

• “Pump on devices pressure to decrease reason happening Find the factors.”

• "The pump energy spending reduce for how technician offers to give Is it possible?

Student this to questions answer seeking in process comparison, observation, analysis to do, independent conclusion release such as skills It also helps to solve problems. engineer as to look learns.

2. Practical projects and experiments

Students engineering competence in formation practical of training place very big. Only theoretical knowledge with limited stay their thinking circle Therefore, pumps and pump stations in science small practical projects organization to do useful will be.

For example:

• Using a 3D printer simple pump model create

• Pump worker characteristic laboratory under the circumstances measurement

• Mini pump system collection and work modes test

• Various in construction pump wings compare and efficiency comparison

• Pump work principle mini- video on preparation

Such assignments student's activity increases it to search encourages and technician processes better to understand help gives.

3. Digital technologies and from simulations use

Today on the day technician sciences digital without technology imagination as Pumps and pump stations science in teaching various

computer programs, 3D models, animations and virtual labs very big fruit gives.

The following application possible:

- ANSYS, SolidWorks , Flow Simulation programs through pump inside water flow modeling
- H-Q characteristics of pumps in virtual conditions see
- Pump details in 3D view analysis to do
- Various of constructions efficiency simulation through compare
- Cavitation process animation through show

Such tools student's imagination expands , real process eye in front of reviving gives and topics lighter to master help gives.

4. Constructive thinking approach

Constructive thinking about it to the problem creative and systematic approach is the student's creative thinking in development very effective. This approach following from stages consists of:

1. The problem determination
2. Thoughts collection
3. The most good the idea choice
4. Prototype create
5. From the test transfer and improvement

Pumps and pump stations in science students "energy" economical pump create", "less costly pump like" model" assignments to be given possible. Students own their ideas in the form of a realistic model preparation through creative engineering approaches they shape.

5. Gamification

Game elements with enriched education process student is interested in it to class active attraction will and remembering to stay makes it easier. Pumps and pump stations in science gamification as follows to be possible:

- " Quickly" answer giver students " competition
- At the pump malfunctions find virtual tests on
- Collective competitions

This method education process animates and students mutual competition in the spirit performance provides.

6. Real businesses with cooperation and practice

Students for the most good teacher is a real practice. Pump stations, irrigation systems, water supply enterprises and industry to enterprises visits organization to grow in students big interest They wake up. of

pumps real work conditions sees problem observes and experts with they talk .

Also:

- Enterprise experts in the presence of seminars
- Real failures case studies on
- Production release process observation

of these all students experience enriches and science further deep to understand help gives.

Conclusion:

Pumps and pump stations in science students engineering competence develop for creative from methods use very important. To the problem based teaching, practical projects, digital technologies, constructive thinking, gamification and real businesses with cooperation students active, inquisitive and technician in terms of mature expert as shapes.

Such approaches using youth not only theoretical to knowledge has they will be, maybe practical experience, independent thinking to the ability and innovative rich in ideas real to engineers they turn.

REFERENCES:

1. Uzbekistan republic Decree “ Uzbekistan Republic supreme education system by 2030 develop Concept “ October 8 , 2019 , No. PF-5847.

2. Abdukodirov A.A, Tursunov Sh.Q. In education information technologies . Textbook . T.: “ Literature Sparks ”, 2019

3. Biden VI « Bolonsky process : result training I competent podkhod . - M.: Issledovatelsky quality problem center preparation specialists . 2009. – P. 482-492.

4. Bespalko VP Bumajnaya version electronic textbook . School technology . - M.: « Narodnoye obrazovanie ", 2007. - No. 2. - C.54-55.

5. Prigozhin I. Vvedeniye v thermodynamiku neobratimix process — Izhevsk : NITS « Regulyatornaya I chaotic dynamics ", 2001. — p. 160.

6. Nikolis G., Prigozhin I. Self-organization and neravnovesnix system — M : Mir , 1979. — p. 512.

7. Ismailov DM http://www.idpublications.org/wpcontent/uploads/2020/06 Full Paper. METHODS-OF-SCIENTIFIC KNOWLEDGE-AND-RESEARCH-IN-THE CONTENT OF SECONDARY EDUCATION.pdf.

8. Jalolovich , Kuvatov Ulugbek , Rakhimov Majid Orif son , and Kuziboev Islambek Ruhiddin son "OPREDELENIE PARAMETROV DAVLENIYA VODY V KRUPNYX NASOSNYX TRUBAX." AMERICAN JOURNAL OF EDUCATION AND LEARNING 2.5 (2024): 1214-1222.

9. Kuvatov U.J, Doniyorov T.O, O'Gli RMO ANALYSIS OF THE STATE OF ENERGY SUPPLY AND OPERATING MODES OF PUMPING STATIONS //Eurasian Journal of Academic Research. - 2025. - T. 5. – no. 4. – S. 99-103.