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PEDAGOGICAL FOUNDATIONS FOR PREPARING STUDENTS TO WORK AS OPERATORS USING DIGITAL EDUCATIONAL TECHNOLOGIES

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Abstract

This article discusses the pedagogical foundations, content and effective methods of preparing students for operator activities in the context of digital technologies. Due to the increasing need for operator professions in modern production and service industries, the integration of digital technologies into the educational process is gaining importance. During the study, the potential of the competency-based approach, practical training, virtual laboratories, simulators and project-based learning methods in developing operator competencies was analyzed. The results showed the effectiveness of the digital learning environment in forming students' technological thinking, independent decision-making, information processing and management skills of modern technical means.

Keywords: digital technologies, operator activities, competence, virtual laboratory, simulator, professional training, technological education, digital learning environment.

Introduction

The rapid development of the digital economy is increasing the demand for qualified specialists who can work with modern technologies in all areas. In particular, in automated production, robotics, logistics, energy, agriculture and information and communication systems, operator activity is one of the important professions.

An operator is a specialist who manages modern technical equipment, monitors their operation, detects malfunctions and makes quick decisions. Therefore, preparing students for operator activity in the general secondary and vocational education system is an urgent pedagogical task.

Digital technologies are creating new opportunities for visualization of the educational process, individual training, distance learning, virtual modeling and organizing practical training.

Main part.

Content of operator activity

Operator activity includes management, monitoring, control of technological processes and, if necessary, rapid intervention in them.

The operator must have the following competencies:

- technical thinking;
- use of information technologies;
- control of digital devices;
- algorithmic thinking;
- quick decision-making;
- responsibility;
- teamwork;
- compliance with safety rules.

Possibilities of digital technologies

Scottish International Conference on Multidisciplinary Research and Innovation – SICMRI 2026

The use of the following digital tools in the training of operators is highly effective.

Digital technology	Role in education
Virtual laboratory	Safe execution of practical exercises
Simulators	Practicing device control
Artificial intelligence	Providing individual recommendations
VR and AR	Modeling of real production processes
3D modeling	Studying technical objects
LMS platforms	Organizing independent learning
Cloud technologies	Remote collaboration

Stages of formation of operator competencies

Stage 1. Theoretical training.

At this stage, students acquire knowledge about:

- technological processes;
- automation;
- sensors;
- control systems;
- safety equipment.

Stage 2. Virtual training.

Using virtual simulators, students:

- start up equipment;
- control parameters;
- detect errors;
- exercise emergency response.

Stage 3. Practical activities.

At this stage, professional skills are strengthened by working on real or training laboratory equipment.

Stage 4. Independent project.

Each student develops a small operator project.

For example:

- automatic greenhouse;
- smart irrigation system;
- mini conveyor;
- Arduino-based control system.

Competencies formed in operator activities

Competence	Result
Information competence	Data analysis
Technical competence	Device management
Problem solving	Rapid decision-making
Digital competence	Use of software tools
Communicative competence	Teamwork
Professional competence	Independent performance of operator activities

Pedagogical conditions

The effectiveness of training students for operator activities depends on the following factors:

- modern computer classes;
- Internet;
- virtual laboratories;

Scottish International Conference on Multidisciplinary Research and Innovation – SICMRI 2026

- digital platforms;
- interactive methods;
- cooperation with manufacturing enterprises;
- organization of project activities.

Results and discussion.

The analysis shows that training organized on the basis of digital technologies increases the professional motivation of students. The use of virtual simulators reduces the fear of working with real equipment and allows for repeated practice in a safe environment.

Project-based training develops independent thinking, creativity, and technological problem-solving competencies. The use of artificial intelligence elements helps to create individual learning trajectories.

Conclusion.

Digital technologies are taking the operator training system to a new level. The use of virtual laboratories, simulators, artificial intelligence, VR and AR technologies allows students to combine theoretical knowledge with practical skills. In the future, it is advisable to further improve the methodology for training operators based on dual education integrated with manufacturing enterprises, digital platforms and adaptive training technologies based on artificial intelligence.

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