World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 18, January,2023
ISSN: 2749-361X

EDUCATIONAL ROBOTICS AS A TOOL OF KNOWLEDGE IN THE COURSE IN PHYSICS

D.K.Nasriddinov
Academy of the Ministry of Emergency Situations of the Republic of Uzbekistan

Article history:

Received: 11th November 2022
Accepted: 14th December 2022
Published: 30th January 2023

Abstract:

The article deals with the formation of modern engineering culture among students. Educational robotics is defined as one means of solving this problem. The components of robotics application technology in learning process in physics are revealed. The features of robotics as the means of knowledge are defined. The use of this means in research and technical creativity of students is discussed.

Keywords: polytechnic principle, technical culture, learning physics, educational robotics, methods of knowledge, learning technologies.

Ensuring the polytechnic orientation of the educational process is one of the important tasks of the teacher's professional activity. The result of its solution is the mastering by students of a system of technical knowledge (concrete, generalized, including the meta-level of generalization). Students should gain experience in solving elementary technical problems in various areas of educational and labor activity. It is important that they have an idea about the possible consequences of these decisions in the context of the relationship "society (man) - technology – nature" and fully realize the level of their responsibility for the result.

The modern technology environment is rapidly evolving. The techno world is filled with new objects and their complex systems. The technical infrastructure of the life of society is being transformed. The older generation still remembers how rapidly began in the early 80s. last century informatization society has changed the technical environment by the beginning of the 21st century. There is every reason to believe that the new infrastructure revolution will be associated with robotization processes in all spheres of human life. In the near future, in the context of breakthrough IT achievements and the rapid development of technologies for creating new materials, production, science and culture, the entire system services, as well as our everyday life will be saturated with robotics. Robots will function next to us, as well as interact with each other and with a person over long distances, including in a wireless network version.

A graduate of a modern university must be ready for life in a robotic environment. In this regard, a new and very large-scale task should be set before the universities: training future consumers of robotic environment services, as well as future manufacturers of robotic systems (researcher engineers, design engineers, process engineers). The solution to this problem is connected with the formation of a new content and a new level of development among university students of a technical culture. It is important to identify among them the most capable and interested in technical creativity, a comprehensive support for their individual development in the chosen direction.

Robotics has been functioning in the global education system for more than 15 years. The intensive development of robotics as an object of technical creativity of students began with the appearance in 1998 of specialized robotic kits from LEGO called LEGO Mindstorms with a programmable RCX block. In 2006, the second generation of LEGO Mindstorms with the NXT brick was released, and in 2013 the third generation set was released with the EV3 brick. To date, there are about a dozen robotic kits from various manufacturers for sale, designed for children of different university students. Accordingly, educational and methodological aids began to appear that support the spread of the practice of students working with certain robotic sets. In the last 6-7 years, the activity of Robotics in domestic education is considered as one of the effective areas of training young people in the field of technical modeling and design.

Possibilities of robotics (RT) as an object of technical creativity students are extremely high. However, in our opinion, they are not yet fully implemented in the domestic practice of polytechnic education. Robotics classes are organized mainly in the system of additional education or are associated with extracurricular work of students. It is important to find effective solutions for the use of RT in the educational process, and, taking into account the multidisciplinary of this area of technical knowledge, to reveal the possibilities of each academic subject in its development by students. Content, methods and technologies for the use of educational robotics in the

World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 18, January,2023
ISSN: 2749-361X

implementation of the polytechnic orientation of education in university students should be the subject of special pedagogical research.

Robotics in scientific knowledge and educational research. In the system of scientific knowledge, technical knowledge and objects of technology are used, as a rule, for the purpose of setting up experiments (observations, experiments). Field experience implemented using robotics technologies can be defined as robotic. Observations and experiments of this type are already used in many areas of scientific knowledge (studies of the microcosm, archeology, underwater research, the study of the internal structure of human organs, analysis of the molecular structure of substances, including at the nanolevel, studies of phenomena and processes in conditions of near and far space, etc.). The need for robotization of scientific experiments is determined by the key functions of the robot as a technical object.

The robot is able to replace a person in dangerous and excessively difficult experimental work, can solve tasks more efficiently and, finally, perform work that a person simply does not want to do, freeing up time for solving complex intellectual problems that are still inaccessible to the robot. A robotic experiment or observation is distinguished by a better implementation of the process, a wide range and high accuracy of data recording, their automatic accumulation, processing, a complete and error-free formal-logical analysis, visualization of the experiment and its results.

There is no doubt that students, mastering the methodology of scientific knowledge, must master the elementary skills in setting up traditional, computerized, and now robotic experiments. An university physics course and educational robotics equipment provide them with that opportunity.

Robotics in scientific and technical research and in organization of technical creativity of students.

In the system of scientific of technical knowledge, robotics is presented in different capacities.

The robot can serve as an effective learning tool or diagnostics of already created technical objects, starting with research of unique artifacts and ending with the diagnostics of modern production and service equipment (search for defects, assessment of their scale, identification of inconsistencies between the properties of an object and specified indicators, prevention of the threat of a technical failure in work, manufacturing defects, etc.). Various robotic technological diagnostic complexes have already been created and are functioning. These are robots equipped with sensors and scanning systems. They move relative to the objects of control, accumulate and process information about the studied objects, transmit signals about the state of these objects and its changes.

The use of robotics in such studies eliminates the influence of subjective factors, reduces the time to search for a technical defect, increases the accuracy of its diagnosis, ensures that diagnostic tests are carried out if necessary, and in some cases, automatic elimination of the defect.

Robot design may be the goal of scientific and technical research. The creation of new and more advanced robotic systems is one of the most urgent problems of modern engineering. The tasks of engineering activities include: performing an analytical study technical problem, the invention or modernization of a technical object in order to solve it, the manufacture and study of a model of this object, the creation and implementation of a real technical object in the relevant area of social practice, support for its work, timely diagnosis and elimination of emerging defects.

The methods of scientific and technical knowledge include:
a) methods analytical studies, b) full-scale experiment, c) mathematical and computer modeling, d) physical modeling of technical structures and technologies. At an elementary level, any of these methods is quite accessible to students. So, we have considered one of the components of educational robotics as a technology for teaching physics (a robot as a learning tool). On the basis of the experimental and search work carried out in the framework of this study, it can be argued that the results of the introduction of this technology into the educational process in physics are the development by students of modern technologies for conducting a physical experiment and the acquisition of an initial experience in solving problems related to modeling and designing the simplest robots. Students' knowledge of the subject is expanding and deepening, including the field of technical applications of physics, their cognitive skills and abilities are being improved, and teaching and research competencies are being formed. The project activity of students in educational robotics is of great educational importance and contributes to the formation of a whole complex of significant personal qualities in them.

World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 18, January,2023
ISSN: 2749-361X

LIST OF USED LITERATURE:

1. M.G.Ershov. Designing training modules for school physics workshop using educational robotics training kits / Y.Antonova, A.Y. Deryushev,
   M.G. Ershov, O.N. Churilov // Bulletin of PSPU. Series "ICT in Education". - 2014. - issue 10. - S. 154 -165.
2. I.V.Ilyin. Systematization and metalevel of generalization of technical knowledge as one of the directions for implementing the principle of polytechnics in teaching physics / I.V.Ilyin, E.V.Ospennikova // European Social Science Journal. - 2012. - No. 3 (19). - S. 111-118.
3. E.V.Ospennikova. The use of ICT in teaching physics in secondary general education school: methodological manual / E.V. Ospennikov. – M.: Binom. Knowledge Laboratory, 2011. - 655 p. ISBN 978-5-9963-0111-9.
4. E.V.Ospennikova. The development of schoolchildren's independence in learning in conditions updating the society's information culture: At 2 pm: Part II. Fundamentals of technology for the development of independence of schoolchildren in the study of physics: monograph. - Perm: Electronic publishing systems OTSNTI PSTU, 2003. - 328 p. ISBN 5-85218-164-1.