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TECHNICAL LITERACY IN TECHNOLOGY LESSONS BASED ON ELEMENTS OF ROBOTICS

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Аннотация: В статье рассматриваются педагогические и методические возможности развития технической грамотности учащихся на уроках технологии посредством использования элементов робототехники. Анализируются сущность и компоненты технической грамотности, роль робототехнических средств в образовательном процессе, а также подходы к организации практической деятельности. Кроме того, в статье представлены рекомендации по интеграции проблемного обучения, метода проектов, работы в малых группах, конструирования, разработки алгоритмов, а также экспериментально-исследовательской деятельности.

Ключевые слова: технологическое образование, техническая грамотность, робототехника, алгоритмизация, конструирование, проблемное обучение, проектный метод, инженерное мышление, практическое занятие, цифровая компетентность.

Abstract: This article explores the pedagogical and methodological possibilities for developing students' technical literacy in technology classes through the use of robotics elements. It analyzes the essence and components of technical literacy, the role of robotics tools in the educational process, and approaches to organizing practical activities. The article also provides recommendations on integrating problem-based learning, the project method, small-group work, construction, algorithm development, and experimental-testing activities.

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Keywords: *technology education, technical literacy, robotics, algorithmic thinking, construction, problem-based learning, project-based learning, engineering thinking, practical lesson, digital competence.*

Today on the day education system in front of standing important from tasks one is a student not only ready knowledge appropriative, perhaps knowledge practical in situations hand capable, technical devices with conscious working and new solutions able to offer person as Digital technologies, automation and smart devices daily life and working of release many to the fields enter is coming. That's why general middle in education technology science the content is also in the student's modern technician thought and practical competencies to develop orientation necessary.

Technology in their classes robotics from the elements use through students technician literacy to develop circle methodical approaches justification and practical recommendations working exit . In the article technician literacy composition, training design stages, exemplary assignments and assessment criteria statement will be done.

1. Technical literacy concept and his/her structural parts

Technical literacy is technician devices , materials , mechanisms and technological of processes task understand , from them safe use , simple problems determination and to the goal appropriate solution choice It is only of equipment name to know with not limited. The student of the device how performance his / her explanation parts between connection understanding, technical drawing or the scheme study and work the result I will evaluate. to receive need .

2. Robotics of elements educational opportunities

Robotics mechanics, electronics, informatics, mathematics and design elements one task within combines the same feature because it is

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interdisciplinary integration done to increase comfortable conditions for example, a simple moving the model in making student of the structure strength, wheel diameter, friction and movement direction into account If the model is equipped with a sensor equipped if, that distance or in the light change to observe possible. Commands using while the controlled model algorithmic thinking develops .

Robotics of training important advantage — student the result directly according to If the mechanism if it doesn't work, it will try to connect checks the construction again seeing comes out or orders order This process analysis, test and improvement natural accordingly unites. Students one kind task various solution they do possibility because of creative thinking and independent decision acceptance possible to do is born.

3. Technology in their classes robotics application methodology

Robotics elements based on exercise organization in the process of following sequence recommendation is problematic situation create, task clarification, solution planning, model design and assembly, testing transfer, result analysis to do and improvement. This sequence engineering design per cycle suitable comes and the student ready sample from repetition according to active to search encourages.

First in stages teacher vital problem presented for example: "How as small model marked distance pressing" How is it?" or " How is it? " device to the barrier when approaching stop " Is it possible?" Question of the students previous knowledge activates. The second in stages groups necessary parts , materials and work order determines . Third in stages drawing, diagram or algorithm is being prepared. Planning on time students tasks distributes: constructor, tester, record provider and presenter

Fourth The model is assembled in stages. Teacher necessary in places guidance gives, but opportunity until all decisions himself/herself acceptance

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as does not give. Fifth in stages test conducted, the result in advance designated criterion with compared. Sixth in stages defect reasons discussion will be done and the model is improved. Finally, groups own solution presented will, which decisions successful what happened and next trip what to be changed explains.

4. Practical training for exemplary assignments

4.1. Creating a moving model

Assignment purpose — mechanical of parts each other connection understanding, simple construction collection and model movement observation. To the student's wheel, axle, body for safe material, fasteners and there is if small motor or ready robotics package is given. Initially groups model simplified drawing will fix, then parts gather, move tries.

Sensor or based on a conditional signal working model

If at school touch screen set there is if, students distance sensor or light sensor using simple model creation possible. Resources limited under the circumstances and sensor work principle cards, schemes or teacher demonstration through for example, conditional algorithm as follows expressed as: "If the barrier close if — stop; otherwise without — forward move on."

"Smart" device the idea design

To groups daily in life one problem choice offer done: in the room light enough to signal otherwise, to plant irrigation the necessity display model or door opened signaling signal. Students problem, user, device task, necessary parts and expected the result statement If true the device assembly possibility otherwise, layout, block diagram or paper prototype is prepared.

The teacher's role and education environment organization to grow

Robotics based on the lesson effective organization to grow for teacher first of all training purpose to define and the task students age and preparation to the level adapt necessary. Complicated devices there is even if it's not, it's simple mechanic models, again used safe materials, cardboard models,

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drawings and algorithm cards through main concepts to teach possible. Importantly, the reader problem understanding, solution planning and the result analysis to do for conditions is the creation.

Evaluation criteria

Robotics in training only final model performance underestimation Process, planning, collaboration, security compliance to do and conclusion justification also taken into account is taken. Evaluation criteria lesson at the beginning to the students if explained, they own activity conscious accordingly manages.

Criterion	Observable pointer	Score
Technical concept	Structure parts and tasks explains	0-2
Planning	Drawing , diagram or my progress will make	0-2
Practical to perform	Modil right and thorough collects	0-2
Test and analysis	The result return at least one improvement offer will	0-2
Collaboration and safety	Task does it , security to the rules action does	0-2

Total 10 points criterion based on student to the activity grade to give possible.

Security and responsible use

Robotics with at work security requirements every how practical from the result column It stands . To the students' tools right catch, work place orderly storage, wire and connections inspection, electricity from sources teacher permission with use rules explained. School under the circumstances

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low voltage only, education for intended from collections use, damaged wire and batteries not in use, mobile into parts hand not to touch necessary.

Conclusion

Technology in their classes robotics from the elements use of the student's technician literacy develop for big methodical opportunity creates. In this student technician device about only theoretical information can't, maybe him/her design, assembly, testing, debugging determination and improvement in the process active participation Thus, the technical thinking, algorithmic thinking, problem solution to do, creativity and cooperation skills together is formed.

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