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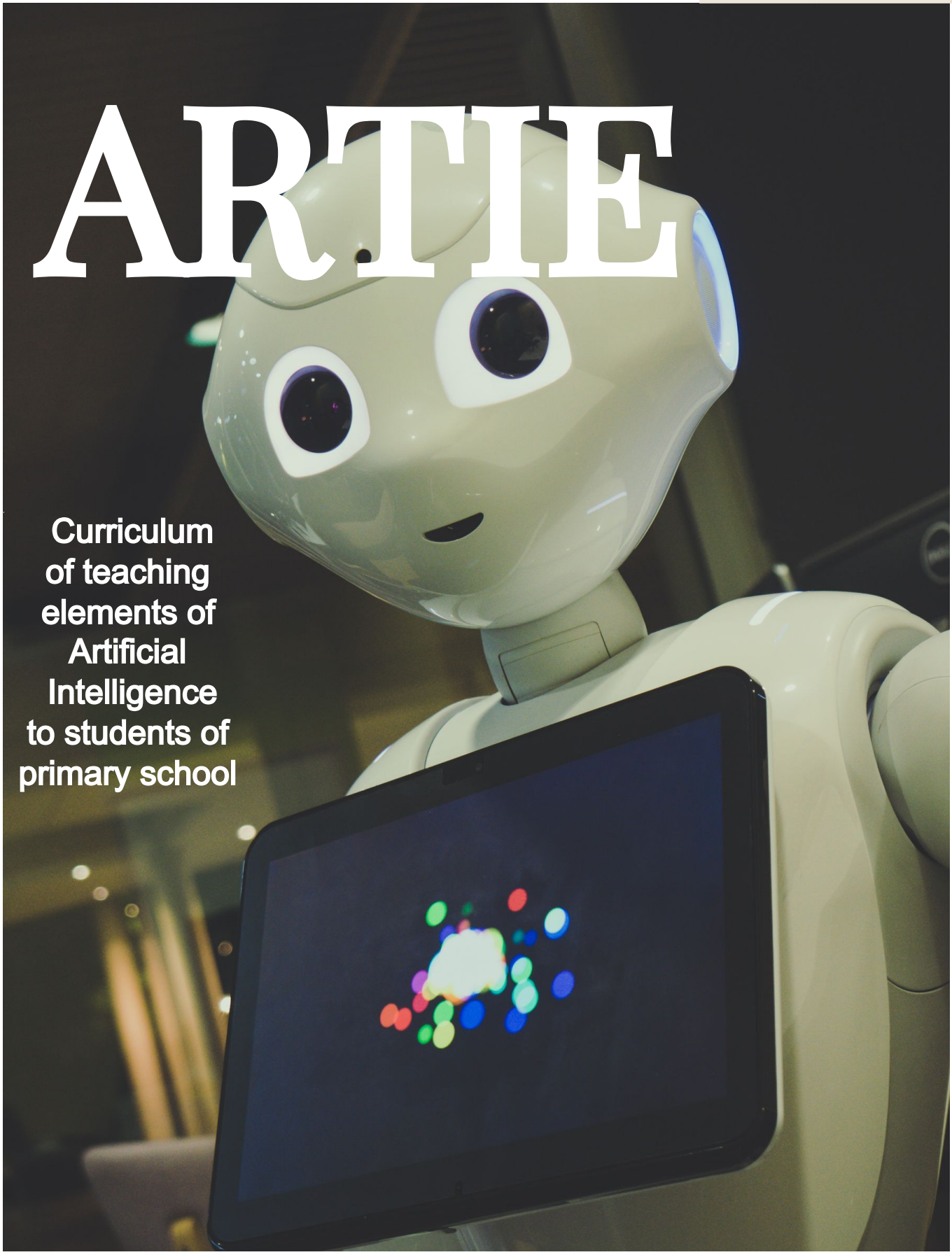

Curriculum of teaching elements of Artificial Intelligence to students of primary school

ERASMUS+ ARTIE
ARTIFICIAL INTELLIGENCE IN EDUCATION

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ARTIE: Artificial Intelligence in Education - challenges and opportunities of the new era: development of a new curriculum, guide for educators and online course for students
Project co-funded by European Union under Erasmus+ Programme,
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ARTIE

Curriculum for teaching the elements of artificial intelligence to students in primary school education

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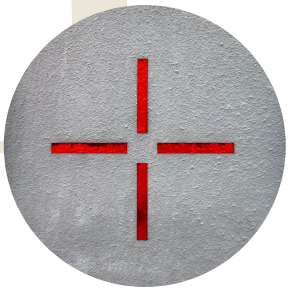

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Introduction

What is Artificial Intelligence ?

Is there a definite definition of it? Even AI researchers have no exact definition of AI as this field is constantly being redefined and new topics and solutions emerge.

A machine is said to have artificial intelligence if it can interpret data, potentially learn from the data and use that knowledge to adapt and achieve specific goals.

This means that the determinants of AI are: *Autonomy* (understood as the ability to perform tasks in complex environments without constant guidance by a user) and *Adaptivity* (the ability to improve performance by learning from experience). This also means that the scope of AI related issues will undergo constant changes.

To know more about AI in our lives, watch a short video.

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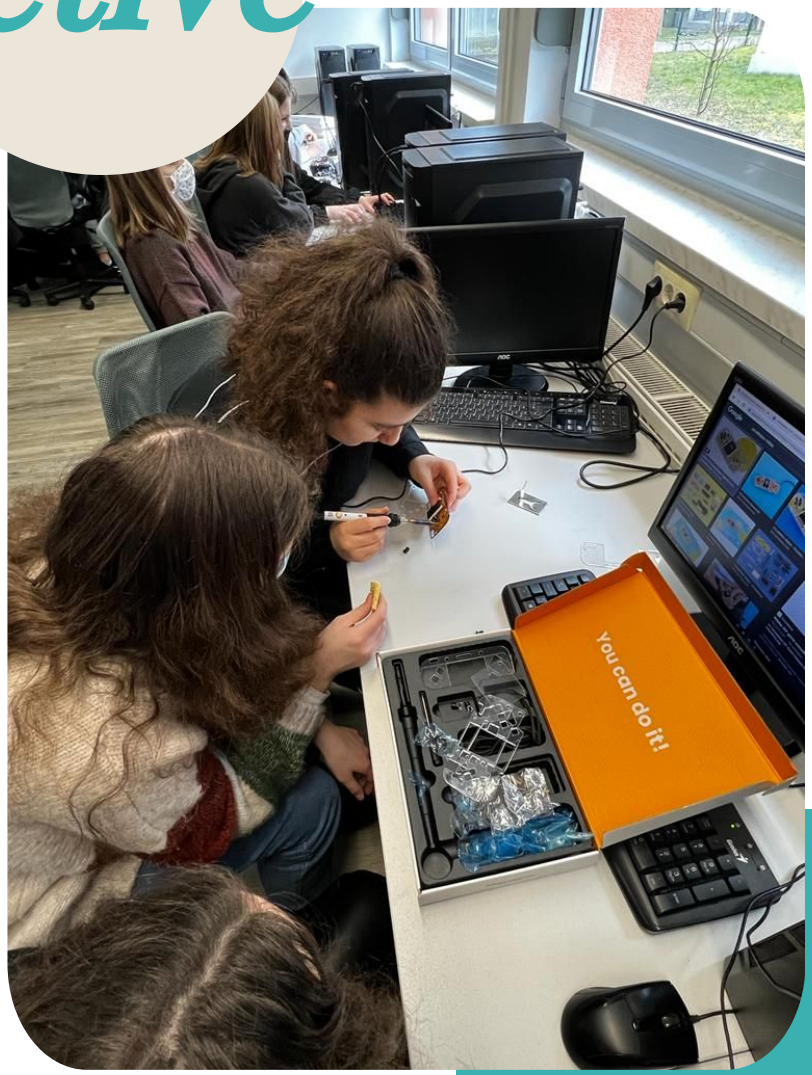
The Main *Objective*

Preparing students to function in the modern world, taking into account the current level of civilization development, by shaping key competences and increasing students' interest in AI technologies.



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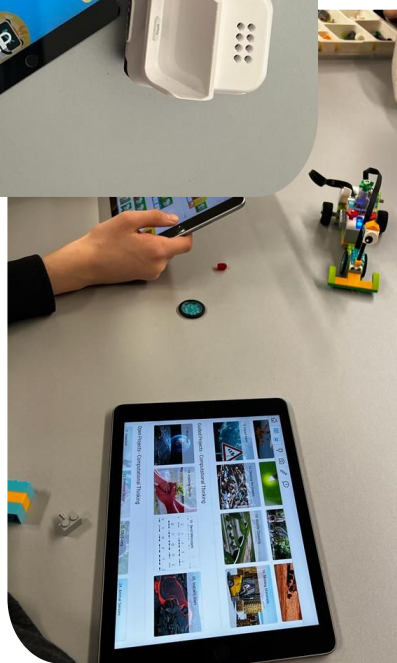
SPECIFIC OBJECTIVES

- Developing algorithmic thinking
- Planning of the processes enabling the use of newest technologies in various areas of life
- Developing the skills of logical thinking, intuition, imagination and inference
- Problem solving and communication using a computer and other digital devices
- Developing the ability of searching for, collecting, organizing and using information from various sources
- Developing social competences, including team and project work skills
- Developing elements of students' cooperation, exchange of ideas and experiences with the use of technology
- Developing creative problem solving skills
- Developing the ability of using AI support wisely and consciously



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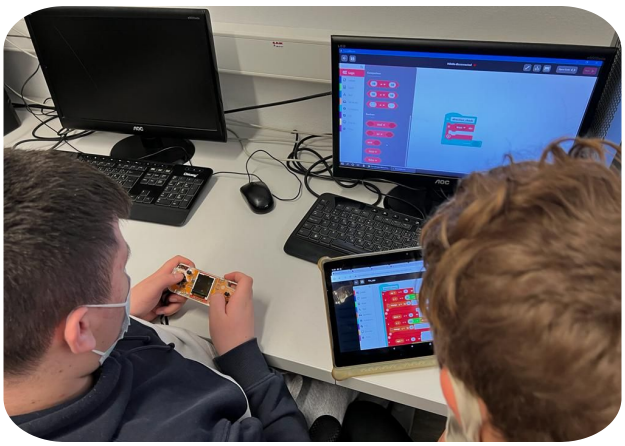
The Curriculum Content

The teaching content to be implemented in the following thematic blocks:

1. Understanding of AI:

- what is Artificial Intelligence and what is not part of it;
- concepts: Artificial Intelligence, Machine Learning, Deep Learning, Robotics;
- differences between programming and Machine Learning;
- Machine Learning stages;
- various types of Artificial Intelligence.



2. Algorithmic thinking - understanding, analyzing and problem solving:

- the concept of an algorithm and methods of its notation;
- algorithms in our everyday life: dealing with problem tasks which require creativity;
- basic steps of algorithmic problem solving: defining the problem and the goal to be achieved, analysis of the problem situation, developing a solution, checking the problem solution for sample data, saving the solution in the form of a diagram or program.

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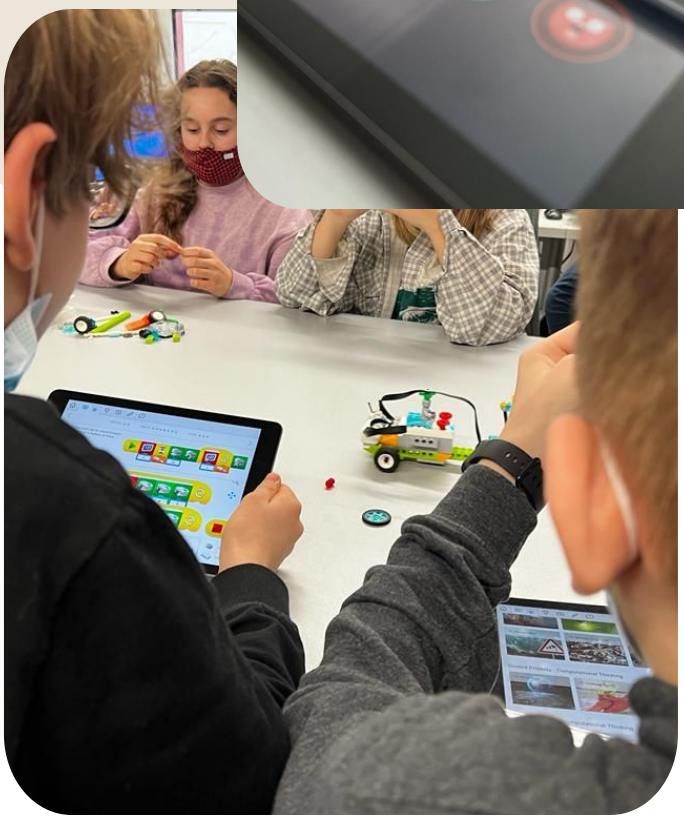
3. Programming solutions with the use of a computer and other digital devices:

- designing, creating and writing in a visual programming language: ideas, stories and solutions to problems of varied complexity (including simple algorithms using simple commands, sequential, conditional and iterative commands and events);
- simple programs that control a robot or other object on a computer screen;
- testing of programs in terms of compliance with the assumptions made, introducing corrections and explaining the course of program operation;
- the use of Machine Learning in applications based on a block programming language;
- collecting, organizing, selecting the outcomes of work and the necessary resources in a computer or other devices, as well as in virtual environments (the cloud).



4. Civilization related (social and economic) implications of AI:

- examples of Artificial Intelligence use: voice assistant, chatbots, autonomous vehicles, product or service recommendations, search engine suggestions, medicine, finances, marketing, etc.;
- threats posed by AI, including ethical issues;
- threats related to universal access to technology and information;
- the right to data and information privacy and the right to intellectual property;
- Internet of Things and Smart City.

5. Experimenting with AI:

- training, testing and improving models of image, sound, movement, text and speech recognition;
- systems based on AI technology used in teaching/learning various school subjects (e.g. Duolingo, Brainly);
- the use of programs and applications using AI;
- building and programming robots.

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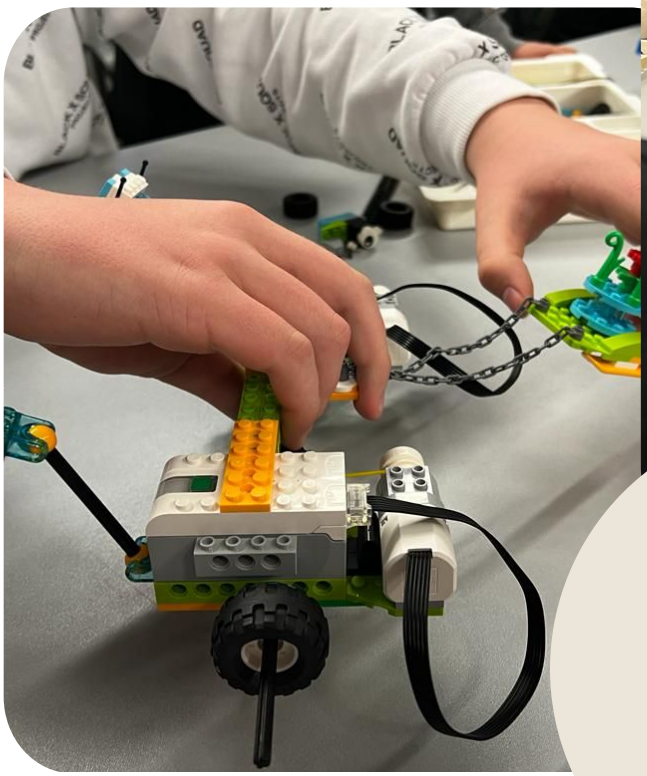
STUDENTS' ACHIEVEMENTS



Grade 4 - students aged 10 - 11 years

- design and create simple programs in a graphic environment using sequential and conditional algorithms (stories, games);
- understand the concept of a variable and use it in their programs;
- define and use variables in their programs;
- test models related to the image recognition;
- recognize examples of AI use in everyday life.

Grade 5 - students aged 11 - 12 years

- design and create simple programs in a graphic environment using iterative and conditional algorithms (stories, games);
- define and use variables in their programs;
- test models related to the recognition of images, speech and sounds;
- create their own projects using online AI platforms (e.g. https://comixify.ai/ https://classifier.appinventor.mit.edu/).

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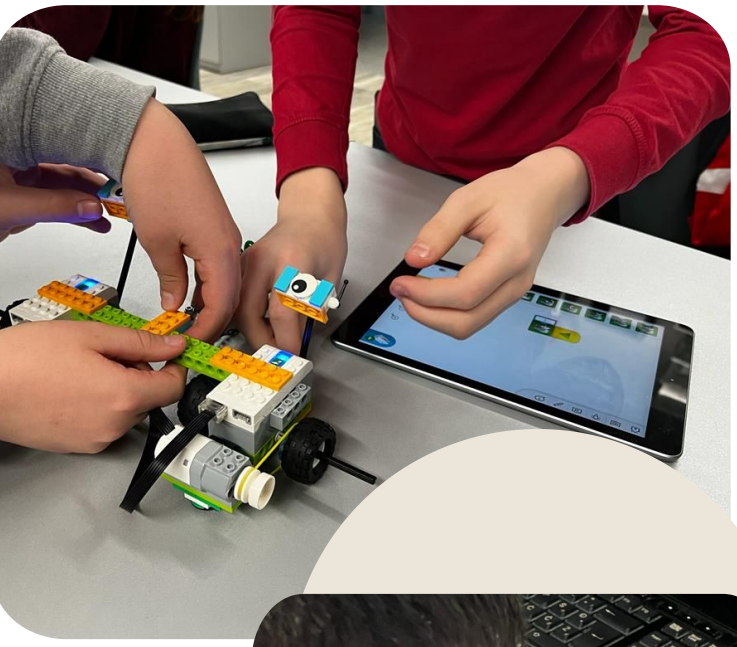

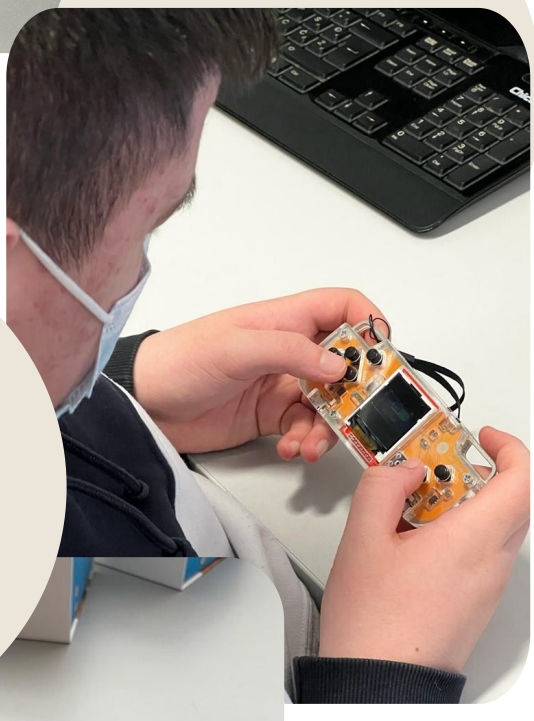

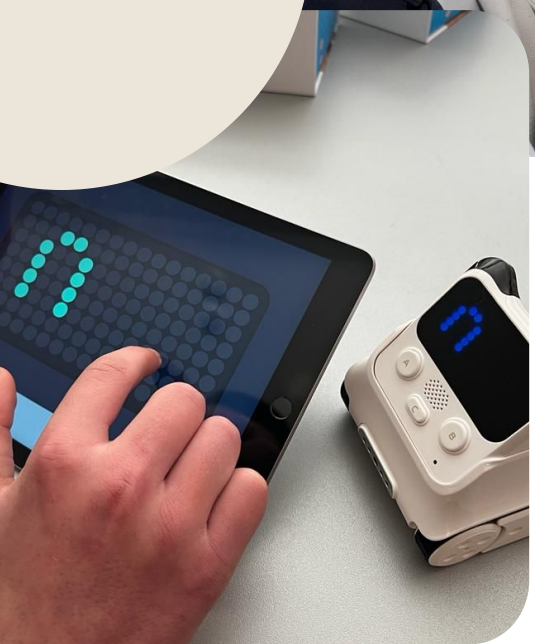

STUDENTS' ACHIEVEMENTS

Grade 6 - students aged 12 - 13 years

- design and create programs in a graphic environment using iterative algorithms (stories, games);
- create simple projects using machine learning and online platforms (e.g. machinelearningforkids.co.uk) and software in a graphical environment;
- create simple programs that control robots;

Grade 7 - students aged 13 - 14 years

- design and create programs in a graphic environment using recursive algorithms (stories, games);
- create projects with the use of machine learning and online platforms (e.g. Google Colaboratory) and software in a text environment;
- create complex robot control programs using AI methods;
- understand the benefits and risk of using AI in everyday life;
- know and use systems based on AI technology in various school subjects.

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STUDENTS' ACHIEVEMENTS

Grade 8 - students aged 14 - 15 years

understand the civilization related significance IT/AI and its application;
use Artificial Intelligence algorithms to solve problems;
recognize practical issues that can be solved algorithmically;
solve practical (IT) problems on their own by creating new Artificial Intelligence algorithms;
can analyze advanced algorithms and implement them;
have the ability to self-educate and are open to new areas of computer science;
can work in a team.

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