Learning Algorithmic thinking in primary education: the curriculum in Greece in Distance Learning

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Introduction

Algorithmic thinking, an aspect of computational thinking, is a problem-solving approach that involves breaking down a problem into a series of steps or instructions, known as algorithms. It is a fundamental skill in computer science and is increasingly recognized as an essential competency in primary education.

Algorithmic thinking in primary education refers to the development of logical and computational thinking skills among young children. It involves teaching students to break down problems into smaller, manageable steps and to develop a systematic approach to problem-solving. In primary education, algorithmic thinking is introduced to young learners to develop their logical reasoning, problem-solving, and critical thinking abilities. By engaging in algorithmic thinking activities, students learn how to analyze problems, identify patterns, and devise systematic solutions.

Algorithmic thinking as a skill

Algorithmic thinking involves the ability to solve problems by designing and implementing a sequence of steps or instructions that can be followed to reach a desired outcome. It emphasizes logical reasoning, pattern recognition, decomposition of complex tasks, and algorithm design. It helps student develop skills needed in computer science and everyday life as well, such as sequencing, decomposition, pattern recognition, abstraction, algorithm design, evaluation and iteration.

Students learn to organize and arrange instructions in a specific order to achieve a desired outcome. This involves understanding the concept of a sequence and determining the correct order of steps. They also learn to break down complex problems into smaller, more manageable parts. They identify the components of a problem and understand how these parts interact to solve the problem effectively.

Students develop the ability to identify patterns, regularities, and similarities in problems. They learn to recognize patterns in data, algorithms, and processes, which helps them in problem-solving and generalizing solutions. They learn to focus on essential details while ignoring irrelevant or unnecessary information. Abstraction helps in simplifying problems and understanding the underlying principles or concepts.

Students learn to create step-by-step instructions or algorithms to solve specific problems. They gain experience in formulating algorithms that are clear, efficient, and effective. They understand the importance of evaluating their algorithms and solutions. They learn to test, refine, and improve their algorithms through iterative processes, fostering a growth mindset and perseverance.

Algorithmic thinking in primary education

Integrating algorithmic thinking into primary education offers several benefits. It nurtures logical reasoning, problem-solving skills, creativity, and critical thinking abilities. It also helps students develop computational and mathematical thinking, which are increasingly important in various fields. Educators can introduce algorithmic thinking through unplugged activities, such as puzzles, games, and hands-on exercises, that do not require computers. These activities lay the foundation for later engagement with coding and programming concepts.

Algorithmic thinking can be taught through various activities and approaches in primary education, such as:

Sequencing: Teaching children to arrange a series of steps or actions in the correct order to achieve a specific goal.

Pattern Recognition: Encouraging students to identify patterns and generalize them to solve similar problems.

Decomposition: Breaking down complex problems into smaller, more manageable subproblems to find solutions more effectively.

Abstraction: Focusing on the essential features of a problem and ignoring irrelevant details.

Algorithm Design: Guiding students to design their own algorithms or sets of instructions to solve problems.

Algorithmic thinking in primary education in Greece

Algorithmic thinking in primary education in Greece is gaining recognition as an important aspect of the curriculum to equip students with critical thinking and problem-solving skills. The Greek educational system has been incorporating computational thinking and coding concepts into the new curriculum to foster students' logical reasoning and problem-solving abilities.

Algorithmic thinking is integrated into the primary education new curriculum through the subject of "Information and Communication Technologies" (ICT). The new curriculum focuses on introducing computational thinking concepts and developing basic programming skills.

In Primary School, as mentioned in the new curriculum, the content is structured in five main thematic fields or axes: (a) Algorithmic-Computer Programming, (b) Computer Systems, Digital Devices, Networks, (c) Data-Data Analysis, (d) Digital Literacy, and (e) Digital Technologies and Society. The following Table summarizes the objectives of the 'Algorithmic-Computer Programming', focusing on the development of algorithmic thinking.

Thematic Area	Sub-thematic units	Objectives		
		1st Grade	2nd Grade	3rd Grade
Algorithmic / Computer Systems Programming	Algorithmic	Describe a simple linear process for solving an everyday problem	Analyze and express an iterative process to solve an everyday problem	Design, represent and control a process for solving a decision problem
		4th Grade	5th Grade	6th Grade
		They identify events and actions in problems they are called upon to solve and formulate algorithms	They decompose a problem into simpler, devise and algorithmically solve solution strategies	Analyze, plan, represent, control, and improve a process that describes the solution of a problem

Conclusions

In Greece, algorithmic thinking is integrated into the primary education new curriculum through the subject of "Information and Communication Technologies" (ICT). It is recognized as an important aspect of the curriculum to foster computational thinking skills and prepare students for the digital era. Algorithmic thinking in primary education in Greece aims to develop computational thinking skills, problem-solving abilities, logical reasoning, and creativity among students. It prepares them to be active participants in the digital world, equipping them with essential skills for future academic and professional pursuits.

References

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