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Title of the STEPAM Unit: Coding in Action

AUTHORS (NAMES /SCHOOL / COUNTRY): EXPERIENCE WORKSHOP, JAGODINA

RELATED SUBJECTS	AGE GROUP OF THE STUDENTS	TOTAL ACTIVITY TIME	LEARNING OBJECTIVES DURING THE LESSON SUBJECT-SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON

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Science, Mathematics, Physical Education, Language, Arts	1-4 grade (6 to 11 years old)	90 minutes	Learning about algorithms and coding, some basic computational concepts such as sequencing, repetition, conditional logic Developing spatial relations (left, right, forward, backward, up, down) Drawing using Science: mozda nesto u	Recognizing the importance of using algorithms in everyday life Improved spatial abilities and orientation

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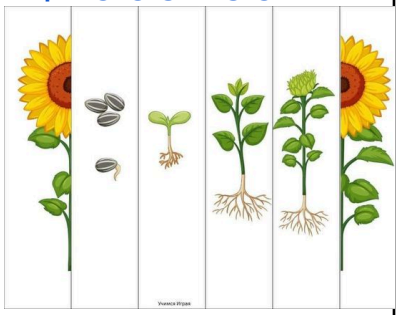
			 https://www.pinterest.com/pin/985231163251144/  https://www.pinterest.com/pin/563018697429337/ https://www.pinterest.com/pin/1764145103909573 94/ **Development of movement coordination,**	

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			**concentration and balance**	

OVERVIEW: TOPIC & PURPOSE

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ACTIVITY PREREQUISITES -

STEAM ELEMENTS

ELEMENT 1: context presentation	What are the characteristics of shadows in everyday life? What are the conditions for the formation of shadow and penumbra? Using shadows in art.
ELEMENT 2: creative design	Creating characters and objects for shadow theater Using different materials in order to boost the creativity in children. Using different materials in construction techniques. combining real objects, their shadows and textures to create static art installations.
ELEMENT 3: emotional and social learning	Learning cooperation and communication skills through working in groups. Experiencing focus and concentration during the building process. Experiencing focus and concentration during the exercises.

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STEAM SUBJECT ELEMENTS

STEAM SUBJECTS	SCIENCE	TECHNOLOGY	ENGINEERING	Physical Education	ARTS	MATHEMATICS
SHORT INTRODUCTION TO RELATED SUBJECT ELEMENTS	The healthy daily routines and habits	Using Bee bots for coding (or web tools, mobile apps for coding)	Construction of maze in Minefields and Trap maze games.	Different way of movement – walking, skipping, hopping, crawling etc. Minefields and Trap maze games.	Creating pictures and drawing instructions in Art coding game.	Spatial relations and directions (left, right, forward, backward, up, down)

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SYLLABUS

LESSONS	SUBJECTS	TOPIC OF THE UNIT	LEARNING OBJECTIVES DURING THE LESSON: SUBJECT SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON: STEAM COMPETENCIES

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1	**Technology, Science, Mathematics, Engineering, Physical education**	**Introducing students to the basics of algorithms.** **Recognizing algorithms in everyday life (healthy habits and wellbeing).** **Introducing robots (Bee bots) and basic coding.** **Creating minefield maze.** Different kind of movement. Development of motor skill (coordination). Team work and team building. Orientation in space by using spatial relations.	Students learn about algorithms and coding. They are introduced to some basic computational concepts (sequencing, repetition, conditional logic). Students use spatial relations (left, right, forward, backward, up, down) for orientation in space. Science: mozda nesto u vezi rutina kao higijena, zdrave navike koje se ponavljaju ili slicno (npr. Zivotni ciklus, gusenica, leptir itd). Students learn to work in pairs. Students develop coordination. Students construct different kind of mazes	Students use and recognize algorithms in everyday life. Students improve spatial abilities and orientation in space. Students improve coordination. **Students learn how to build different maze structures using available equipment and materials.**

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			(minefield game) by using PE equipment.	
2	**Engineering, & Arts, Physical education, Mathematics**	Creating drawings and drawing instructions. **Creating trap maze.** Different kind of movement. Development of motor skill (coordination), concentration and balance. Team work and team building. Orientation in space by using spatial relations.	Students use their creativity to create the drawing. Students write drawing instructions. Students construct trap maze. Students use spatial relations (left, right, forward, backward, up, down) for orientation in space. The students are physically active and they develop their physical skills. Students learn to work in the team and maintain focus and concentration.	Likovno Students improve orientation in space. Students improve coordination, concentration. **Student learn how to build different maze structures.** Students are more active and healthy. Improving their motor skills.

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INSTRUCTIONAL PLAN BY LESSON (COPY AS MANY TIMES AS NEEDED)

LESSON Grade 3-4 Science, Engineering, Physical Education, Art (Language) and Mathematics

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION **(5 – 10 minutes)**	Introducing students to algorithms. Giving examples of using algorithms in everyday life (step-by-step process of tying a shoe, following a recipe to make a	Watching video https://www.youtube.com/watch?v=Da5TOXCwLSg PowerPoint, slides 2 – 6	**Students learn about algorithms and coding.** **They are introduced to some basic computational concepts (sequencing, repetition, conditional logic).** **Science: mozda nesto u vezi rutina kao higijena, zdrave navike koje se**

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	cake, bedtime routines, brushing teeth etc). Using picture cards to create algorithm of some everyday activities. Exploring important computational concepts like repetition (brush bottom left teeth five times), sequencing (put cereal in bowl and then put in milk), and conditional logic (if the bowl is empty, stop eating).		ponavljaju ili slicno (npr. Zivotni ciklus, gusenica, leptir itd).
LEARNING ACTIVITIES (60-70 minutes)	Explaining the algorithms (i.e. step-by-step instructions that tell a computer or a person what steps to take to solve a problem or complete a task).	PowerPoint, slides 7 – 10	**Students use spatial relations (left, right, forward, backward, up, down) for orientation in space.**

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	Introducing and using Bee bots (alternatively teachers can use Android/iOs coding app for kids, i.e. Hop Scotch or). Getting to know basic Bee bot commands and how to code it (Approx. 5 minutes) In this part students create algorithms using arrow cards and test it with Bee bots. The aim is to make Bee bot go from Start to Finish avoiding obstacles on grid (Approx. 20 minutes). **Minefield game** (offline coding activity) (Approx. 30 minutes)	PowerPoint, slides 11 – 12	**Students learn to work in pairs.** **Students develop coordination.**

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	Students are divided in pairs, one student is "programmer" and the other is "robot". In this activity the "programmer" gives the "robot" a set of instructions to guide blindfolded "robot" through the minefield maze. Maze is made with the matresses and other safe (soft) object used in sport gym. Sequencing refers to the order of steps in an algorithm. In order to make it safe for "robot" to go through minefield maze, the "programmer" has to give steps in the correct order.		**Students construct different kind of mazes (minefield game) by using PE equipment.**

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	Example of instructions: 1. Step forward 3 steps 2. Turn right 3. Step forward 1 step. Etc. Programmer can give one step at the time or multiple steps at once (extra challenge). If the "robot" hits the obstacle, the programmer has a chance to debug the code (or the robot and programmer start from beginning). Alternative is to use game in slide 12 instead (Blindfold ball collections).	PowerPoint, slides 13 – 14	Students use their creativity to create the drawing. Students write drawing instructions.

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	Art coding (group work). Students are divided in 6 groups. They create algorithms for drawing a picture by using the grid. Students get the worksheet and has task to check if the given algorithm for drawing a picture is correct (Picture 1). They correct the instructions (Approx. 10 minutes). They create their own picture by using the empty grid (Picture 2) and then write algorithm. They exchange the instructions with another group. The		Students use spatial relations (left, right, forward, backward, up, down) for orientation in space.

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	group tests the algorithm (Approx. 15 minutes).		
WRAP-UP & EVALUATION **(15-20 minutes)**	Maze trap (group work). Using the previously made algorithm students are trying the game of Maze trap. All the students in the group need to pass the maze steping only on safe (correct and previously set) steps. If the students step on the wrong spot (out of algorthm pattern) they have to return to the beginning.	PowerPoint, slides 15 – 16	**Students construct trap maze.** **Students use spatial relations (left, right, forward, backward, up, down) for orientation in space.** **The students are physically active and they develop their physical skills. Students learn to work in the team and maintain focus and concentration.**

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EVALUATION PLAN BY LESSON

LESSON	EVALUATION CRITERIA	EVALUATION METHOD
1, 2	**whether students can make and use algorithms**	Demonstration
	Did the student presented creativity in creating mazes?	Observation and evaluation of creativity (technics), comparing
	Did the student presented creativity in creating drawings? Did they makes clear drawing instructions (algorithm)?	**Observation and demonstration**
	Did the students cooperate with each other in the pairs and groups	Observation, self-evaluation of groups / students.
	Are the students able to recognize algorithm m in everyday life?	Give example
	Homework done and uploaded in padlet	Observation & peer-review

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HOMEWORK

Students have the task to create algorithm for chosen everyday activity and create cards of those activities. For example. students will have the task of making six different stages in everyday life that could be connected and putted in algorithm. The completed task should be posted to the padlet.

NOTES –

ACTIVITY SHEETS TO BE LINKED -

EVALUATION MATERIALS TO BE LINKED -

REFERENCES / SUPPORTING MATERIALS TO BE LINKED

PDF / PPT slides:

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