Learning Scenario

Workshop 3: Games and tools for programming

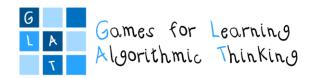|	
Learning Scenario Title	Playing and calculating up to 20
Course/Grade	Mathematics 1st grade of primary school
Learning Outcomes	*Learning outcomes focused on general subject* • Add numbers up to 20 • Subtract numbers up to 20 • Write down the calculus with a mathematical notation • Name the members in computational operations • Apply the commutative property *Learning outcomes focused on algorithmic thinking* • Recognize the possibility of using the micro: bit for game • Identify and apply basic programming concepts when designing a game in Scratch (algorithm, sequence, condition, loop, variable)
Aim, Tasks and Short Description of Activities	Apply the computational actions of summing and subtracting up to 20 in the research learning to design the numerical expressions and word-given tasks. Design and write down a computer game to practice adding and subtracting numbers up to 20.
Keywords	Addition and subtraction to 20, addends, sum, changing the order of the addends in a sum.
Correlation and Interdisciplinarity	Music – Elements of musical creativity: Tone painting Croatian language – Linguistic expression: Asking questions and giving answers Art – Flat design painting: Color - color names, basic and derived colors, color tones. Mathematics – Shapes in Space, Numbers 11 to 20 Science – Spatial orientation
Duration of Activities	90 minutes, during May
Learning and Teaching Strategy and Methods	Dialogue method Oral presentation method Method of reading and working on the text Demonstration method Writing method Game based method Problem solving method.

Teaching Forms	Frontal teaching	
	Individual work	
	Pair work	
	Group work (four students in a group)	
Tools	micro:bit, Scratch, Internet browser, You Tube	
Resources/materials for the Teacher	Scratch, Internet browser, game examples in Scratch, You Tube	
Resources/materials for the Students	micro bit game, Scratch	
Teaching summary	*Motivation-Introduction* In the motivation part, students work in pairs to play a game of computing with the micro: bit Each member of the pair plays with a programmed micro: bit to display numbers from 1 to 10. By shaking the micro bit, the first member of the pair gets a certain number. Another member of the pair is given another number by the same procedure. The values obtained should be shown as a calculation action and their total value should be calculated. After calculating their common value, students should also apply the commutative property of the sum. The guided conversation follows: How did you feel while you were using micro:bit? What did the micro:bit remind you of? In which social game could it be applied? How often do you play games? What are your favorite games? Who makes the games? The introduction of the activity based on a fairy tale. Listening to the audio fairy tale "Sleeping Beauty" https://www.youtube.com/watch?v=9MIsZBhsQtA OBJECTIVE ANNOUNCEMENT: Today you will be the creators of a computer game.	Duration 30 minutes
	Implementation Research Question: How could we add a little math to a fairy tale? What would the main character do, how would he/she get to Sleeping Beauty? Which way would he/she go? What would he/she do on his/her way? (Students cite examples) Now let's look at one example of a game in Scratch: https://scratch.mit.edu/projects/270953940/ The subsequent part is group work with a goal to design computational tasks in a set of numbers up to 20. The students are divided into four groups of four students each.	30 minutes

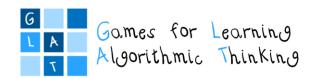|		
	Group 1 has a task to design 5 numerical expressions with addition and subtraction up to 10.	
	Group 2 has a task to design 5 numerical expressions with addition and subtraction up to 20.	
	Group 3 has a task to design 5 word-given tasks in a set of numbers up to 20 with addition.	
	Group 4 has a task to design 5 word-given tasks in a set of numbers up to 20 with subtraction.	
	Reflection and evaluation - playing the designed game - satisfaction questionnaire for the conducted activity	30 minutes
Annexes	Learning scenario in LePlanner: https://beta.leplanner.net/#/scenario/5d727c6b80a288cd3abb871e Story/game scenario	
Examples and game references	Developed Scratch game – Computational Castle https://scratch.mit.edu/projects/326503995/ (30.7.2019.) Sleeping Beauty - Audio Tale (in Croatian): https://www.youtube.com/watch?v=9MIsZBhsQtA (30.8.2019.) Scratch – Story/game Snow White: https://scratch.mit.edu/projects/270953940/ (30.7.2019.)	

Game/story scenario

Title of the game	Computational Castle
Type	Scratch story with game elements
Course/ Grade	Mathematics - Adding and subtracting numbers up to 20 1st grade
Learning outcomes	• Independently sum and subtract numbers from 1 to 10 (1st level) • Independently sum and subtract numbers up to 20 (2nd level) • Independently solve simple word problems (3rd level)
Goal of the game	Solve tasks of addition and subtraction of numbers up to 20.
Characters and their roles	The king's vassal, the supporting character: the proclaimer Young Prince, the main character: solves the tasks King, the supporting character: golden key bearer Fairy, the supporting character: gives the instructions Princess, the supporting character: happily get out of the castle.
Description of the game flow	The king's vassal makes a proclamation promising to give the princess to the one who comes to the golden key. If the young Prince correctly solves the tasks, he will get a golden key that unlocks the castle door and meet the princess, otherwise he becomes a dog and returns to the beginning of the game.
List of scenes / backgrounds	1. The king's vassal make a proclamation - a settlement with a square 2. Road to the castle with hidden tasks 3. Castle on the hill 4. The interior of the castle Note: Scene for inaccurate solutions - turning Prince into a dog
Logical mini-games within the story	1. task: Prince has to collect a certain number of apples or watermelons. Number is set with numerical expressions of addition or subtraction. Each correct answer is one point. To pass the level player must collect 10 points. 2. task: The maze - Prince moves around the maze and collects 5 diamonds. When Prince reaches the diamond, he must correctly answer the calculus to collect it. Prince exits the maze trough the yellow door which opens only if all diamonds are collected. 3. task: The King asks the final question. If Prince answers correctly, he will get the princess, otherwise the King turns him into a dog and you lose the game.
End of the game	The game ends when Prince gets the golden key to unlock the castle and meet the princess.

Satisfaction questionnaire

1. HOW DID I FEEL IN TODAY'S MATHEMATICS?

| POOR | GOOD | EXCELLENT |

2. HOW DID YOU LIKE WORKING IN THE GROUP?

| POOR | GOOD | EXCELLENT |

3. HOW DO YOU LIKE WORKING WITH COMPUTERS?

| DON'T LIKE | LIKE IT | GREAT |