Orientation

Age-group: 3 to 6 years old

Number of hours: 6 hours

Short description of activity: (max. 4 sentences)

In these activities students will have the opportunity to discuss various problems related to the theme "orientation" and solve them, in group, using tangible programming or robots. It is suggested that the activities be carried out with children aged between 5 and 6 years, and with more support from teachers, students aged between 3 and 5 years should be able to respond to them. With these activities, it is expected with students to develop CT-competences such as:

- Data collection;
- Data analysis;
- Data representation;
- Problem decomposition;
- Pattern recognition

Goals

(summary of the most obvious goals in clear language)

It is intended with these activities to create opportunities for children to integrate a set of experiences, knowledge and processes, giving it new meanings. This implies finding proper ways of solving problems, developing skills related to programmatic logic, simulation and algorithms.

Objectives to be achieved taking into account different areas of work:

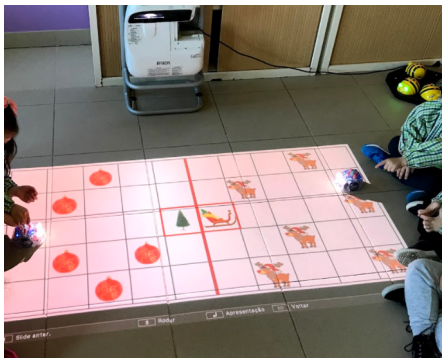
- **Democratic coexistence and citizenship**: Develop respect for the other and for their opinions, in an attitude of sharing and social responsibility.
- **Knowledge of the world:** Take ownership of the process of developing scientific methodology in its different stages: questioning, making hypotheses, predicting how to find answers, selecting and collecting information, organizing and analyzing information to download and communicate it.
- **Numbers and operations:** Identify quantities through different forms of representation (counts, drawings, symbols, writing numbers, estimation, etc.) and; Solve everyday problems involving small amounts, using addition and subtraction.
- **Data organization and processing:** Collect relevant information to answer questions raised, using appropriate methodologies (listings, drawings, etc.) and; Use simple charts and tables to organize the collected information and interpret them in order to answer the questions asked.

- **Geometry:** Find objects in a familiar environment, using orientation concepts; Identify site recognition points and use simple maps and; Take the point of view of others, being able to say what can and cannot be seen from a certain position.
- **Technological world and use of technologies**: Recognize the technological resources of your environment and explain its functions and advantages; Use different technological supports in the activities of your daily life, with care and safety and; Develop a critical attitude towards the technologies you know and use.

Realistic STEAM-context

(short description including problem(s) to be tackled)
Starting from a micro approach to a macro, it is intended to carry out a work with students based on games and problems enhancing the exploration of the objectives and skills outlined.
Starting with a classroom context, challenges will be launched for students to move between different points in the classroom, inside the school and in the school space with different orientations given by the teacher (move from point A to point B; from point A to point B passing through ...). After this first approach, simple maps of the school space will be explored with the children. Then, and through the level of knowledge of the students (each teacher must evaluate the scope of what he can propose), by projecting a map (county, district, country or Europe) with integrated ruler (see image below) to work with robots, students will be challenged to answer different questions that involve as an answer to their programming for moving between different points.
Finally, students will be asked in groups to create a challenge / problem to present to other groups that will necessarily have to imply guidelines such as:

- proceed towards point X;
- turn left / right, ...;
- the point of arrival (with details of the same);
- ...



(short justification of STEAM-integration)

Questioning, hypothesizing, predicting how to find answers, experimenting, organizing and analyzing information
Present conclusions

Use technology to respond to problems
Be critical in using technology

Find objects
Use simple maps
Know how to position yourself and explain what you can do and not observe
Gather information
Using simple tables
Identify quantities
Solve everyday problems

Consciously experimenting, recognizing, implementing and making creative use of spatial relationships

Methodology

Based on learning by doing (with different levels: from imitation to creation)

Part	Description	Timing
1	**How to respond to a problem using programmatic logic?** Students will be challenged to move between different points within the classroom, inside the school building and in the school space.	90’
2	**Find a treasure with tangible programming elements.** Students with a map and a registration board should look for a "treasure"	90’
3	**Program robots to respond to problems.** Students will be challenged to use robots like Bee-Bot and Blue-Bot to answer different questions through maps.	90’
4	**Create paths for a concrete problem.** Students will be challenged to create problems to present to colleagues that they should be answered with robot programming.	90’
Total		6 hours

These activities are part of a sequence that is intended for students to develop learning in terms of orientation and programmatic logic. Given the different work rates and ages of the students, it may be necessary to adapt some sessions to streamline the entire planning presented in the previous table.

Previous / starting context: In order to explore this theme in 4 parts, it is essential to start from a context, if possible real and close to the students, in order to enhance the motivation of young children. Thus, it is suggested to read and explore a story related to COVID-19 - "My grandmother has coronavirus".

The narratives to be created for each activity presented below, may be based on the story previously explored. For example, in one of the activities to be carried out, students will have to look for a treasure. This could be a vaccine / medicine to help fight COVID-19, thus creating an opportunity to discuss the issue with children.

Organization

Materials:

- Rulers with integrated maps
- Material for programming tangible use
- Robots: Bee-bot; Blue-bot; other similar...
- ...

Use of ICT: (only mention when relevant)

Opening of classroom: (only mention when relevant)

Methodology/Coaching

Methodology and useful questions:

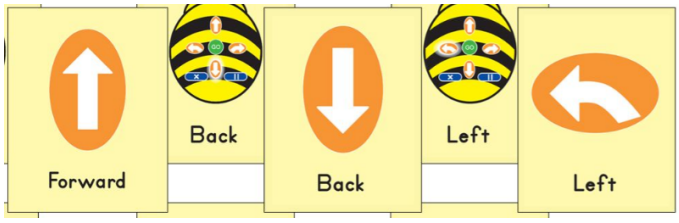
Part 1 of methodology - How to respond to a problem using programmatic logic?

- Students should undertake a series of courses to work specifically on "orientation" from the classroom context. As a suggestion, start the activity by asking some students (5 or 6 children) to move in the classroom from point A to point B. You can start with simple guidelines (move from A to B) and then increase the degree of complexity (move from A to B passing through X, turning left, move on, ...). It is suggested that the indications are objective and that they comprise a maximum of 4 or 5 orientations (IN FRONT, LEFT, ...).

Possible questions

- What were the places you went to from point A to point B?
- How many times have you turned right / left?
- Could you go the other way?
- ...

- The teacher then asks other students to repeat the movement between different points and presents tangible programming elements (see example in the following image) such as cards and arrows.



In view of these, the teacher asks students about the elements that may represent the path taken, enhancing the beginning of the development of programmatic logic.

Possible questions

- (the teacher presents different cards) On the route you took, did you ever turn left? If yes, we select this card (card with arrow indicating left turn)!
- (the teacher presents different cards) On the route you took, did you go ahead? If yes, we select this card (card with arrow indicating forward)!
- ...

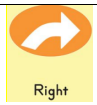
Deleted: left turn

The selected cards must be representative of the path taken by the students. The teacher must repeat this process 3 or 4 times for the students to consolidate the learning in question. After exemplifying some simpler courses in the classroom, the teacher should ask students to take courses that involve responding to problems of departure and, in response, schedule the realization of courses. For example, asking children to move from the classroom to the school cafeteria.

Part 2 of methodology - Looking for treasure

- The teacher presents simple maps of the classroom where different points are marked. Students should be able to identify the different points. Then, the teacher presents a map of the school space (pondering a larger and different space, close to the classroom, such as the leisure room, cafeteria, etc.) which contain different points marked. In the face of this, the teacher asks the students if they recognize the places where the points are marked.
- Then, it presents a map of the classroom with a marked point that represents the place where a "treasure" is found to simulate the "treasure hunt". In order to exemplify the execution of the task, the teacher creates a group of 3/4 students, hands the map to one student, a record board (see example below) to another, asks them to look for the rest and record the route to be taken.

Example:

From one point of the room to the treasure..			
1.º	X		
2.ª		X	
3.º	X		
4.º		X	
5.º	X		
Total	3	2	0

For this task, students must mark in order the directions taken along the route (for example, from the classroom to the school cafeteria / WC / social room / plastic room). To do so, it also provides them with printed arrows to stick on the map as they travel the map. The group created performs the task with the help of the teacher, then discusses in a large group to clarify any doubts about the task to be performed next.

- After the example / simulation, divide the class into 4 groups and distribute all the material mentioned by the other groups so that everyone can look for the treasure.

It is important to note that each group will have an equal map with the treasure marked in different places. In addition, the teacher must tell each group (or large group) what the treasure is (object, image, photo, piece of fruit, ...) so that students know what to look for.

- All groups perform the task simultaneously so that the teacher can supervise with the help of another specialist(s) in education.
- After finding the treasure, everyone returns to the classroom and presents the results (data collection).

Part 3 of methodology - Program robots to respond to problems.

- Students using robots such as bee-bot or blue-bot should perform a series of routes to work on specific orientation. To do this, you will need to use a specific ruler (projected or physical – see following examples) and images that are in line with themes that you are addressing when performing the activity.

- For an active involvement of students in carrying out tasks, it is suggested to create small groups with different functions: 1 student supervises the performance of the task of colleagues, others (s) perform,... They may go on changing roles.
- Students solve the problems presented and respond to them using the referred robots or similar. It is important that the teacher formulates questions that compel students to think about the themes they are addressing and that they use robots to answer them.

Possible questions

- Looking at the checkerboard ruler, what path can the robot take to move from point A to B?
- Can't you take another route and reach the same point?

Part 4 of methodology - Create paths to a concrete problem.

- Discussion of a real (and local) problem, such as rules to be taken into account during the COVID-19 period.
- Brainstorming on possible questions to ask.

Possible questions

- Because of the virus (COVID-19) we must avoid being too close to each other. How can we take off from point A to point B, avoiding close contact with colleagues?
- How should our circulation be here at school? Should we go all the same routes or should we look for alternatives??

- Put students in groups to create a “ruler” to use with Bee-bot and Blue-bot for a specific problem explored, which may be more restricted (school space, street, neighborhood, locality) or more extensive (other areas of the country, other countries).

It is important to note that students will only have to imagine a certain route and mention the starting point, arrival point and some crossing points. Then, they will have to draw / represent these same points for the teacher to create / place the images under the squares (see example in the following image).

Example:

- Each group must have at least 3 different routes as its solution.

Possible questions

- To move from point A to point B, what alternatives are there?
- Can they use only one route to move the robot from point A to point B?
- …

Depending on the level of the students, the teacher may provide 4 or 5 different maps and ask them to draw paths on them.

Possible questions

- which is the longest route?
- which route do we take the longest to get from point A to point B?

- Depending on the level of the students, the teacher may place students in groups to create a "ruler" to use with Bee-bot and Blue-bot for a specific problem explored, which may be more restricted (school space, street, neighborhood, location) or wider (other areas of the country, other countries).

Possibility to show Google Earth to observe routes.

Stimulation of self-management: (concrete opportunities/remarks adapted to the project)

Stimulation of cooperation: (concrete opportunities/remarks adapted to the project)

☐ Teamwork:

- Groups consist of 3/4 students.
- Competences needed in a group:
  - Cooperate
  - Discuss
  - The self-help

Formative assessment: (concrete description/summary adapted to the project)

The learning that is expected to be achieved can be observed, for example, when the child:

<u>Democratic coexistence and citizenship:</u>

- It waits for its turn in the games and the intervention in the dialogues, giving opportunities for others to intervene.
- It is progressively able to resolve conflict situations autonomously through dialogue.
- It demonstrates supportive and self-help behaviors, either on its own initiative or when requested.
- It uses different technological resources as a means of knowledge, expression and communication and knows the care to be taken.

Knowledge of the world:

- Participates in the organization and presentation of information, in order to share with others (classmates, other children and / or adults) the knowledge, results and conclusions reached.

Numbers and operations:

- Identifies, in a count, that the total amount corresponds to the last word number (term) you said.
- Uses the terms "more than" and "less than" in the comparison of quantities.
- Uses the name of the numbers.

Data organization and processing:

- Participates in the organization of the information collected using tables, etc.
- It seeks to interpret the data presented in tables, identifying the modal category, as corresponding to the highest frequency.

Geometry:

- In a wheel with other children, it identifies relative positions (Who is "next", "in front", "behind", "two places on the right", "between Maria and Manuel", etc.).
- You can follow a path that is described to you orally by another child or by the educator.
- It represents and describes routes, through drawings and using representations of important landmarks [on a map].

Technological world and use of technologies:

- It talks about technological resources in its midst, revealing some knowledge about its usefulness (traffic lights, washing machines and dishes, binoculars, cinema, camera, etc.).
- It respects safety rules both in the use of technological resources (robots, etc.) [...] .
- Imagine and create, in two or three dimensions, 'machines', robots or instruments with a specific purpose.

Simple rubrics can be created for day-to-day use from a perspective of Present / Not Present such as:

Learning to be achieved for "Democratic coexistence and citizenship"	Verification log*	
	Present	Not Present
It waits for its turn in the realization of games and in the intervention in the dialogues, giving opportunities to others to intervene.		
It is progressively able to resolve conflict situations autonomously, through dialogue.		
Demonstrates supportive and self-help behaviors, on their own initiative or when requested.		
It uses different technological resources, as means of knowledge, expression and communication and knows the care to be taken.		

*Place a √ in the appropriate column whenever a certain learning is present or not

Adaptations

- General ideas:
- Ideas with younger/older children: (3-6 <-> 6-9 / 9-12 <-> 12-15)

Tips & tricks

(only mention when relevant, e.g. background information, …)

References

- http://www.tangin.eu/pt-pt/
- https://www.dge.mec.pt/sites/default/files/Noticias_Imagens/ocepe_abril2016.pdf

  preschool guidance document
- https://3a0fd263-ca04-4a4f-a013-e91c7f1a26a6.filesusr.com/ugd/778303_ff16929446a24e8187df436febaa895b.pdf