INTELLECTUAL OUTPUT 03

SCENTIFIC CREATIVITY

4 Creativities Project
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Co-funded by the
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INTRODUCTION

The aim of FCREATIVITIES project is to improve the teachers' abilities to generate a creative education, leading to the creation of students who are able to think, analyze and solve daily problems. We ***will develop new scientific skills*** and competencies through the incorporation of new proposals, spaces, methodologies, and resources that will increase the students' ability, creativity and the skills for innovation. These activities will be used ***with 10 to 12 years old students,*** promoting their motivation and creativity. The activities will be composed for ***six working activities*** which will contain the different activities that we will elaborate with our students.

With the **scientific creativity** promotion we will improve the thinking capacity of our students and the ability to go from basic notions to more complex ones; they will learn to resolve problems in a real situation; they will practice the construction of their own learning; they will train their **deductive capacity** and this will take them to create strategies and solutions of their own and they will get better with their physical environment and their appreciation from different spaces, shapes, parts and the group in general. Scientific creativity will take place inside the classroom through scientific experiments workshops.

All the **experiments** will be presented in an experiment manual. The format will be a paper card, it will contain all the material that we will need to accomplish the experiment, how you do it, **how it is related to everyday life** and other relevant details.

The experiments that will conform the manual will be the following ones: **bacteria everywhere. Cells. Let's make a periscope. Light and air. Prehistoric illumination. Can we imitate a heart? Global warming.**

Scientific activity will be **boosted through observation, manipulation and research.** That will lead students to discover their immediate environment. Experimental and research activities will offer students the opportunity for learning in an independent and significant way.

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Title of the experiment

Number Patterns

Description and application in everyday life

*Describe the experiment and its **practical application** in everyday life…*

In this lesson, students are challenged to discover the relationship among six numbers. The objective of this activity is to engage students in a problem-solving situation in which they practice aspects of the process of the scientific method: observation, conversation, questioning, developing expectations/predictions, formulating explanations, testing their ideas; modifying their initial ideas, and sharing their results with others.

Students are then asked to reflect on whether they were doing science. This activity can serve as an effective introduction to or reminder about the process of science, as well as provide an opportunity for students to reflect on the basic characteristics that help delimit the scientific enterprise.

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Aims

Please list the objectives you want to achieve…

- *The process of science involves observation, exploration, discovery, testing, communication, and application.*
- *Scientists try to come up with many different natural explanations (i.e., multiple hypotheses) for the patterns they observe.*
- *Scientists test their ideas using multiple lines of evidence.*
- *Test results sometimes cause scientists to revise their hypotheses.*
- *Scientists are creative and curious.*
- *Scientists work together and share their ideas.*

Steps we must follow

Detailed description *of the different steps to carry out the experiment…*

1. *Place 6 lines on the whiteboard and explain to students that you are going to fill in the first three blanks and their job is to fill in the last three, one at a time. There is a relationship among all six numbers. Their job is to figure out what that relationship is.*

   __ __ __ __ __ __

2. *Fill in the first three numbers as follows:*

   2 4 6 __ __ __

3. *Ask students to predict what the next number is. They should talk with members of their team and decide what it should be, then write the number on the whiteboard and hold it up for you to see. Most students will suggest an 8. Once all groups have a paper raised, reveal the next number as follows:*

   2 4 6 4 __ __

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4. *After the groans have died down, ask the students: Based on what you see now, what do you think the 5th number will be? Proceed as above and when all groups have a whiteboard raised, reveal the 5th number as follows:*

2	*4*	*6*	*4*	*2*	

5. *Do not worry if there is some frustration at this point. And maybe some students will have guessed right! Just continue to be positive, and ask the students: Based on what you see now, what do you think the last number will be? Proceed as above and when all groups have a whiteboard raised, reveal the 6th number as follows:*

2	*4*	*6*	*4*	*2*	*0*

6. *At this point, reassure the students that they will eventually figure this out and you will help them by giving them another set of three numbers. The same relationship will hold true. So just as before, you will give them the first three numbers and they are to figure out the 4th, then the 5th, then the 6th. You can go with any three numbers, but the following works well:*

3	*5*	*7*			

Followed by:

3	*5*	*7*	*4*		

Followed by:

3	*5*	*7*	*4*	*2*	

Followed by:

3	*5*	*7*	*4*	*2*	*0*

7. *For the 3rd round, you can go with any three numbers, but something like the following works well:*

5	*8*	*11*			

Followed by:

5	*8*	*11*	*6*		

Followed by:

5	*8*	*11*	*6*	*3*	

Followed by:

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5	8	11	6	3	0

8. *Continue with any three numbers. As the rounds proceed, eventually a group or two will think they have the relationship... but don't let them tell the whole class. At that point, ask one of those groups how they could test their idea. This encourages students to think about how ideas are tested. Students may need help here, but you can prompt them: Thus far, I have been giving the first three numbers, what would happen if you give the first three numbers? How could that act as a test? Let them know that they can give you any three whole numbers, but not to make it too hard on you! Ask the group to make a prediction at this point: what do they expect to happen based on their idea? Proceed exactly as above, using their three numbers and let the entire class participate. If they were correct or incorrect, find out if any other group thinks they know the relationship, and let them test their idea with three numbers. Eventually as more groups "get it," ask a group to explain the relationship. Then ask another group to suggest three numbers that would provide a good test for that idea. And proceed as above.*

9. *Eventually the relationship will be revealed and you can express it as follows:*

a	b	c	c-a	c-b	c-c

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Materials needed

In order the teacher to be prepared for the proper implementation make a list of all needed materials and resources needed.

- *Mini whiteboards*
- *Whiteboard markers*
- *Timer*

Tips

If you have any recommendations for the teachers, please share them here. Please include any measures that must be taken to carry out the experiment safely!

Get your students to reflect on what they were doing that scientists do. This could be prompted by the questions: "Were you doing science? What were you doing that was like what scientists do?" Discussion should reflect the concepts listed above.

If this activity is used as an introduction to the nature and process of science, then it would be helpful to use students' comments to initiate a list of what scientists do as they engage in scientific investigations. This list can then be referenced as they read about scientists and their work or as the students participate in future investigations.

This activity could be completed online using jamboard /spiral ac and/or breakout rooms.

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