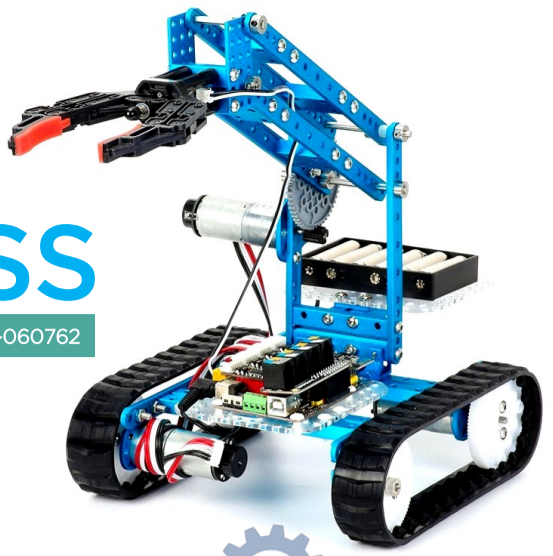


IN PROGRESS

A newsletter on Project 2019-1-PT01-KA201-060762

Issue 3
May 2022



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STEAM WORKSHOPS BY DIMITRA IN GREECE

Despite the chaos of the pandemic in 2021, DIMITRA carried out workshops in the context of the STEAM (Science, Technology, Engineering, Arts and Mathematics) in collaboration with elementary schools throughout Greece with great success.

16 students from both secondary and higher education institutions participated in the workshops. Four different experiments were conducted through four workshops. Each group consisted of four students (SEN and non-SEN students) who, assisted by their teacher, carried out the experiments, thereby putting into practice the STEAM education approach and methodology. The methodological approaches were based on Enquiry-Based Learning and Project-Based learning. The Enquiry-Based STEAM learning provided students with opportunities to investigate a real problem, search for possible solutions, make observations, ask questions, test out ideas, think creatively, and use their intuition. The Problem-Based learning approach gave students the opportunity to work in groups and to solve an open-ended problem. Both approaches are usually applied within the STEM education, which has long been lauded for the deep connections it brings to teaching and learning.

During the workshops all students were involved and engaged with great enthusiasm. They all enjoyed themselves during STEAM activities for so many reasons. They had the opportunity to adopt a collaborative approach to each issue, to understand why and not just how, and to realise this as a holistic approach to everyday life in a documented way. In other words, they were actively involved, making their own decisions rather than passive recipients.

The teachers also got the opportunity to enhance their expertise in enabling STEAM learning. They realised that STEAM lessons are hands-on experiences and can be implemented even with simple resources. They didn't use any high-end technology, instead they used low-cost or no-cost resources to create an inventive, inclusive, and happy learning environment. They also expressed their enthusiasm and mentioned that the tools are easy to use and can be helpful in their daily teaching experiences. Overall, the workshops allowed participants to engage in interesting and fruitful discussions.





If you should happen to see robots running or dancing along the corridors of IIS Federico Caffè, don't worry... it's just a STEAM class in action!

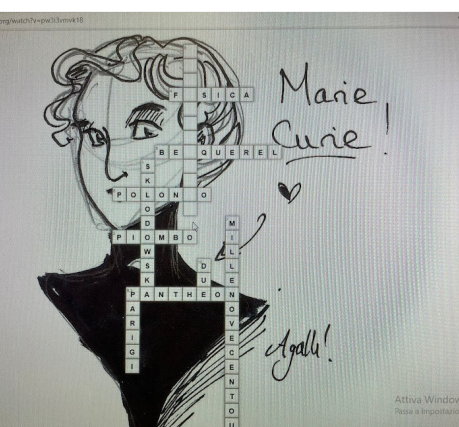
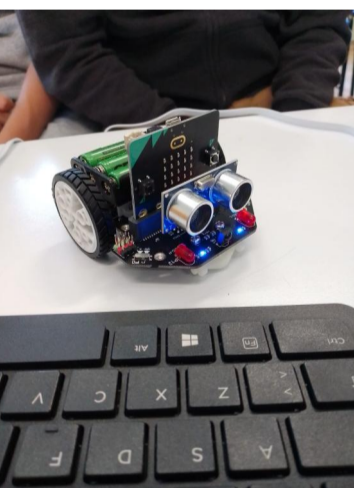
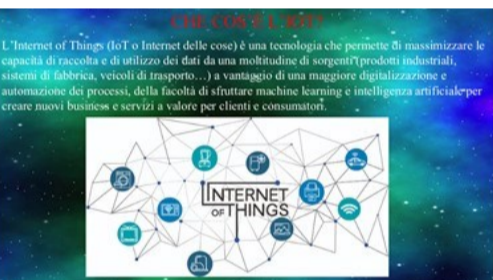
From May to October 2021 about 100 students - following Economics, IT and Surveyor courses - deployed 4 of the 56 Activities that we, as teachers, had planned before. They worked in creative spaces where they were engaged in interdisciplinary education that encouraged them to develop the skills they are going to need on the future labour market: critical thinking, curiosity, resilience, problem-solving, teamworking.... and a touch of creativity. During the sessions, teachers observed and took field notes on these skills. Participants also commented about them during a final self-evaluation and when responding to interview questions on the benefits of STEAM education. They could experience first-hand that you are never going to get a final product without going through that messy process of try-fail-start again and repeat or without an openness to try new things and to collaborate with your teammates.

Students designed and planned IOT solutions and tools (IOT Design Activity n.52), narrated biographies of famous scientists through the making of a poster and a website (*Tell Me a Story Activity n. 49*), created radio-controlled cars (*Move-closer Tool, Activity n. 47*) and dancing robots (*Let's go Dancing Activity 48*) exploring all the steps of the process, from planning to building.

We have never seen all our students so involved and highly performing. All of them demonstrated a high commitment to the program and its goals: they were passionate about developing their ideas with creativity, had an open-minded attitude and were willing to learn from their teammates. We experimented a positive, inclusive, and meaningful education environment while observing students turning from consumers into creators as they transformed theoretical concepts into concrete and feasible ideas.

Also, we teachers had the opportunity to further build confidence and competence toward facilitating STEAM learning: we discovered that STEAM lessons are hands-on experiences that just require simple materials and flexible spaces for building and inventing. We didn't buy the latest high-tech gadget but used cheap or free recycled materials to provide innovative, inclusive, and positive learning environment. More important than the tool was the curriculum driving the lesson and the learning that took place while they were creating!

These activities appeared to extend students' engagement beyond simple and quick explorations of robots, programming software and fabrication tools and enhanced their overall learning experience, making the experience deep and more meaningful.



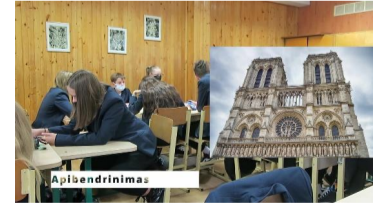
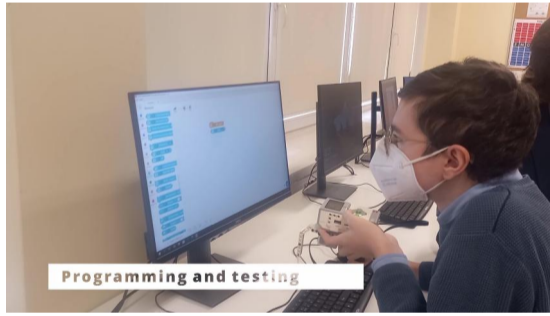
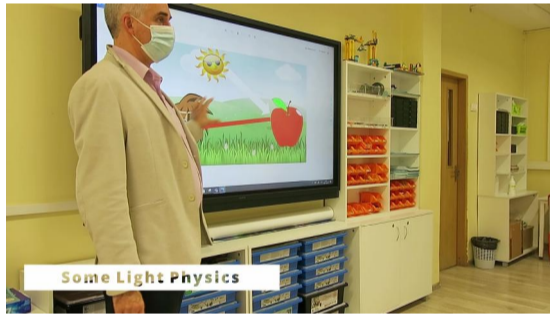
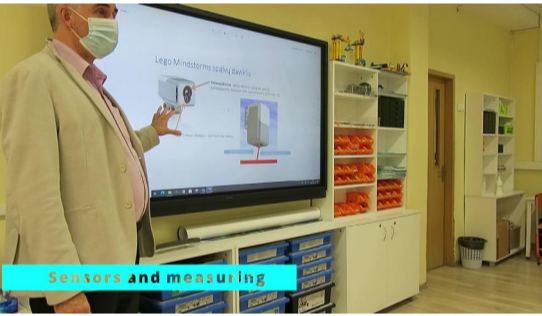
STEAM WORKSHOPS BY KSDP IN LITHUANIA

At Kaunas Simonas Daukantas Progymnasium, the sessions created in the framework of the Erasmus project STEAM4SEN were tried out during the week of STEAM between 15th and 19th November. Teachers were selected from mathematics, art, chemistry and IT to carry out the activities. Naturally, all the activities picked were related to the taught subjects: Activity 37 *Where can I discover symmetry* (Maths), Activity 36 *Colour Scanner* (IT), Activity 40 *Let me know your idea* (IT), and Activity 38 *Colour Specifications of different types of teas* (Arts).

The goal was to try the activities with different ages, therefore students from the 6th, 7th and 8th grades were chosen.

Both teachers and students were happy and enthusiastic to participate. Although, some of the activities seemed a bit too easy, they gave a chance for SEN students to understand the topic easier and naturally, to become more interested in STEAM subjects.

We are happy with the results, and willing to accept new challenges.



ACTIVITY 1: THE RELATIONSHIP BETWEEN EMOTIONS AND TECHNOLOGY

On 21st April, a few days after the reopening of Bulgarian schools, a practical session was held with students from the 9th grade at the Vocational School of Chemical and Food Technologies in Pazardzhik.

The activity is part of the laboratory work with students, including SEN students within the context of Intellectual Output 2 ([O2 - A2 #STEAM4SEN project](#)).



15 students were engaged in a discussion about the technological development and its relation to emotions, the real feelings in today's highly digitalised world, the benefits and risks of the widespread use of humanoid robots, and artificial intelligence.

ACTIVITY 2: EXPLORE THE COLOURS

On 7th June a practical lesson was held with students from the 5th, 6th and 7th grade at Primary School Vasil Levski in Sofia. This workshop was carried out as part of the STEAM4SEN project organised by the National Association of Resource Teachers (BG). The activity is part of the Educational Toolkit IO1-A3, developed by the STEAM4SEN partners and is dedicated to the study of the spectrum and the decomposition of light. The students discovered the effects of colour overlap and their interaction. The students were involved in a discussion about the basic colours and the result of mixing them. They experimented with colour filters and images as they learnt about the relationship between the light spectrum and the visible colours of different combinations of colour images. Students discussed how colour filters change white light.

After completing the activity, students made their own research projects on the shades and combinations of favourite colours. The projects were prepared and carried out during the art classes.



ACTIVITY 3: CAN A PERSON MAKE A DIFFERENCE?

The third activity organised by NART representatives was held on 14th June 2021 at Secondary School Ivan Bogorov in Sofia with students from the 8th grade. The school is a long-term partner of NART and actively implements educational innovations in the learning process.

The students researched the connection between the people and the environment, and discussed the factors (physical and chemical) that affect human health and well-being. The participants worked on two cases related to environmental pollution, consequences and possible solutions to current problems.

This activity provides a link between human health, the environment and the curriculum in physics, chemistry, geography and biology. The content of the activity is focused on noise and air pollution. They are related to different types of waves (physics), liquid particles / aerosols - and some gasses (chemistry), and how they affect nature (biology and geography) and humans (biology).

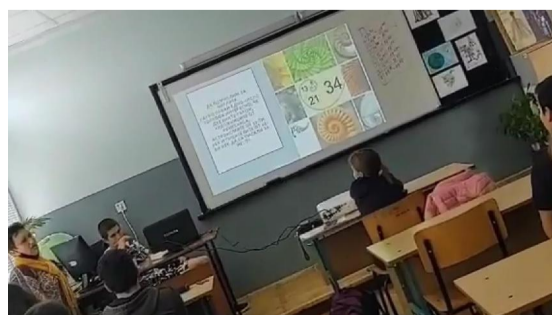
The practical lesson is part of the project output O2-A2 Implementation of Laboratory work and the activity was developed within the product IO1 A2 Elaboration of a methodological approach and instruments for defining the Educational Kit.



ACTIVITY 4: GOLDEN RATIO

The fourth activity in Bulgaria was carried out with students from the 7th grade at Secondary School Ivan Bogorov in Sofia. The practical activity is part of the project output O2-A2 Implementation of Laboratory work.

The students had the opportunity to choose teams to work and research areas to study the principle of the golden section. The research directions chosen by the students to discover the principle of the golden section were: geometry, space, nature, art, and architecture in significant cultural achievements of mankind.



This activity provides a link between human health, the environment and the curriculum in physics, chemistry, geography and biology.

SEE MORE at <https://www.steam4sen.eu/en/news-en.html>

STEAM WORKSHOPS BY AEEN IN PORTUGAL

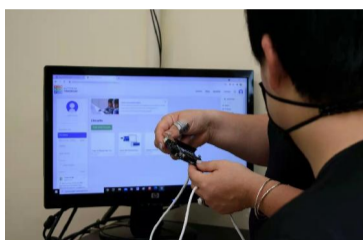
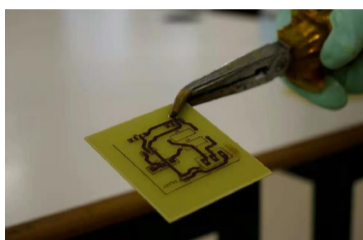
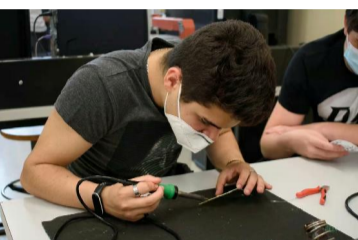
All projects aim at linking themes to reality and respond to concrete problems, leading students to seek answers to them. Students achieve this by combining the knowledge and skills they already possess with a whole world that they can still discover when investigating, experimenting, discussing, questioning, and materialising through collaborative work.

ACTIVITY 1: LIGHTING EFFECTS CONTROL

The goal of this activity was for students to create an object and to highlight it with a RGB LED strip, which will make it change colour sequentially, using electronic technology projected by themselves.

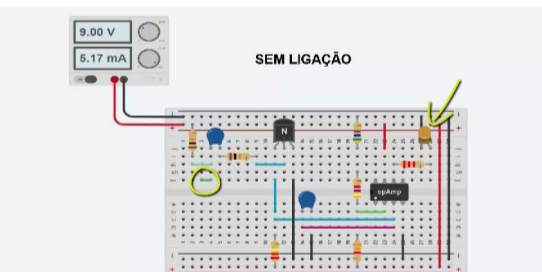
There was an interdisciplinarity with the citizenship course, which had the theme of multiculturalism and integration. Since the class is composed of students with origins in several continents, the students decided to represent the world map, with their photos and traditional sentences from the countries of their origin or ancestry. Throughout the map, several sentences that represent Portugal's effort to be an increasingly inclusive country were written by the students.

After designing the layout, students applied mathematics to implement the accurate scale to the map, electronics and programming for the Arduino to control colour changes, and technology to use the PCB design software and to produce a PCB.

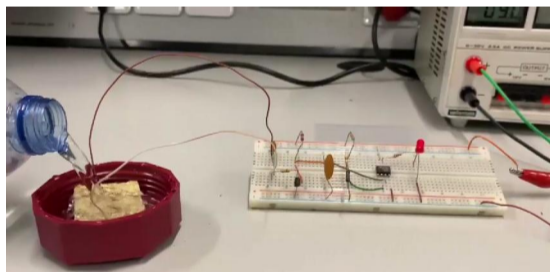


ACTIVITY 2: WATER WASTE CONTROL - INTELLIGENT IRRIGATION CIRCUIT

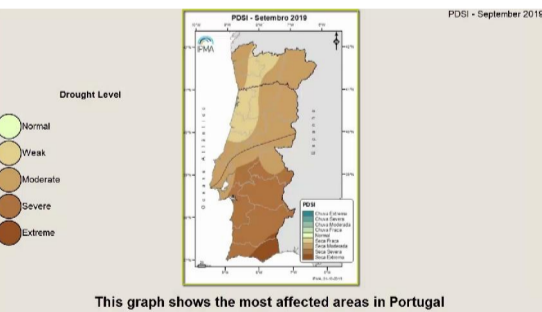
After conducting a research work to better understand the national and global scarcity of fresh water, students thought of possible ways for each of us to rationally manage water expenditure and set up an intelligent irrigation circuit - only activated by the absence of moisture in the soil. Through this circuit they will study important electronic components such as the operational amplifier. This circuit was firstly tested in a simulation software (Tinkercad) and then in a stripboard with real components.



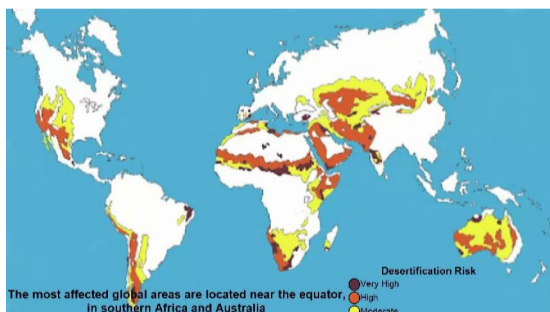
The objective is to activate an irrigation system only when there is no conduction between the two electrodes that will be buried.



between the electrodes, since water is conductive, it will lead the transistor to saturation, causing that the inverting input of AmPOP has a higher voltage, which causes it to negatively saturate by putting at the 0V output, then the LED would be off.



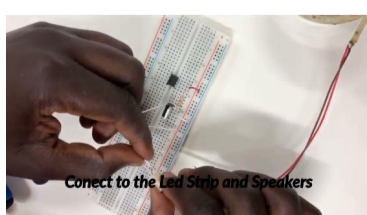
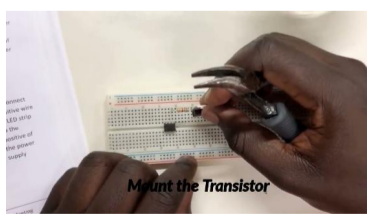
This graph shows the most affected areas in Portugal



The most affected global areas are located near the equator in southern Africa and Australia

ACTIVITY 3: CONTROLLING A LED LIGHT STRIP WITH MUSIC RHYTHM

The main goal of this activity was to encourage students to study a variety of electronic components, especially an opto-coupler, by engaging with something young people like: music and lighting effects. The teacher provided the circuit scheme for the students to study the function of each component represented. They then mounted the circuit in a breadboard, tested it and verified its correct performance.



ACTIVITY 4: COMPUTERS REPAIRING

During this activity the students repair computers. They start with the possibilities for that problem and after that, they try to solve the issue. This was a very interesting activity because they had to solve many different problems. In this way, they had to put in practice not just the IT skills, but many others to find and solve the problem.



STEAM WORKSHOPS BY MCAST IN MALTA

ACTIVITY 1: WHY DO WE NEED MATHEMATICS IN REAL LIFE?

The activity was carried out with Diploma in Engineering (Electronics) students. Following a brief discussion about Pythagoras the students watched a video about Pythagoras' observations. Further explanation was delivered coupled with another video demonstrating the validity of the theorem. Nothing was mentioned about the size of the right-angled triangle. Students were then asked to draw two different right-angled triangles according to the measures provided. The teacher marked the shorter sides and the students measured the third side of the triangle using a ruler.

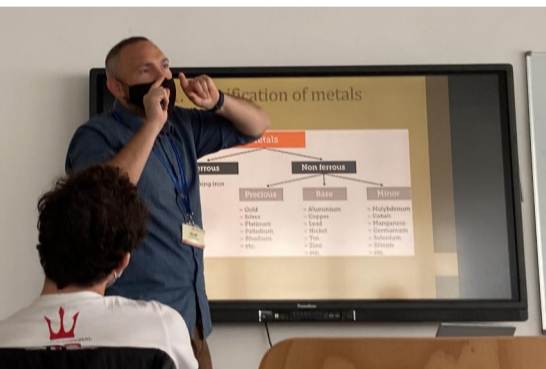
Students compared the measured length with the answer obtained using Pythagoras theorem. They could clearly see that the hypotenuse obtained using the theorem was equal to the measured length. They also concluded that Pythagoras theorem works for any size of right-angled triangles. Students then were required to find real-life examples where Pythagoras' theorem is used and realised this concept is widely used. Students were then required to produce a video on Pythagoras theorem and applications of mathematics in real-life. As a team, they discussed ideas, explored applied topics covered in mathematics, and found images to include in their video.

The students worked very well together and were very engaged. Since this was during the beginning of the year, the students got to know each other much better. The SEN student's comment that he realised he could work with others rather than by himself demonstrates that he integrated well with the group.



ACTIVITY 2: INVESTIGATING DIFFERENT MATERIALS

A mix of six Construction and Engineering students at EQF Level 1 participated in this activity. In the first session (the theoretical part) different properties of various materials were highlighted. Students were highly engaged and actively participating. In the second session students split into three groups and were provided with three different materials: metal, aluminium, and wood. For each material, the groups had to find the density by measuring the mass and volume. In the third session, students were provided with small aluminium sheets and produced cut-outs in the shape of a car body, which they joined together using a glue gun. The students noted the various properties of aluminium when used for car bodies including malleability and strength. Students were engaged in all the three sessions especially in the last part where they discussed how to assemble the car with aluminium sheets.



ACTIVITY 3: DESIGN AND ADVERTISEMENT

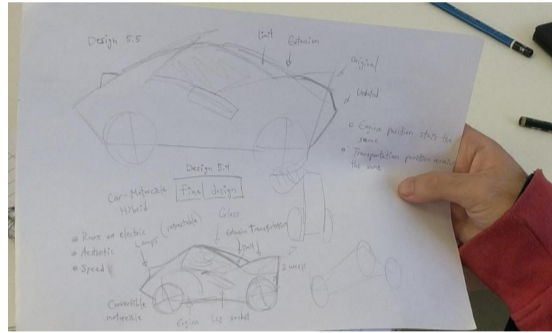
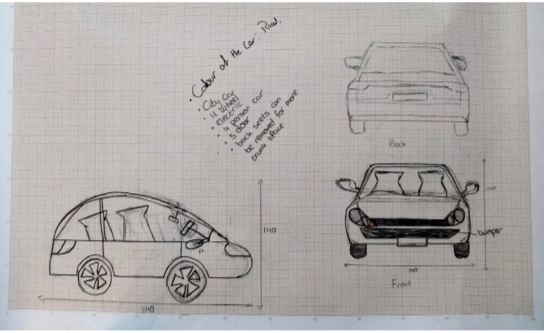
The activity spanned over three Fridays with Diploma in Creative Arts students and took place in an art studio at the Institute for Creative Arts. The topic related to technology and the design of a means of transportation as well as science and engineering concepts. The activity aimed at an understanding of the relevance of mathematics in everyday life. Both SEN students with ADHD, dyslexia, learning difficulties, and traits of autism, as well as non-SEN students participated voluntarily. The fact that the activity itself made use of design as its main concept, appealed to the students who ultimately chose to participate.

A brief introduction was delivered about the development and advances of current technology using a presentation and various videos. Students were also introduced to a history of transportation design and guided to discuss the link between the advances in technology and the transportation design itself.

In the second session, students split into three groups of two. Groups were composed of a mix of SEN and non-SEN students. The groups were provided with paper and writing/drawing materials and were asked to come up with an original design for a means of land transportation. The teacher guided the students to work as a group, without limiting their creativity and encouraged them to be creative but also practical in their respective designs. The groups included a short description of their design along with the mathematical rationale behind it. In the end, the design of a motor bike was merged to that of what was initially a sports car to create a three-wheel motorcycle or trike!

During the third meeting the groups had to pass their own design to the other groups. Each group had five minutes to analyse the designs in front of them, add their own ideas to the sketches, improve the design, and justify their changes in a short sentence.

In the last session students had to finish off a complete and detailed design using engineering paper, rulers, flexible curves, French curves, and other geometric tools to draw a final accurate version of their initial sketch.



ACTIVITY 4: SUSTAINABILITY THROUGH THE ENVIRONMENT

Nine Introductory Certificate in Art and Design students participated in the activity to gain a better awareness of choosing sustainable solutions and the effect on the environment.

The activities took place in a garden located behind the campus with various ecosystems and habitats. The view from the garden allowed students to see the human impact on nature on a wide scale.

Over a span of three sessions, students had the opportunity to experience nature and the human impact. They then had time to come up with solutions through brainstorming sessions and create posters to present in the larger group.

