# IDiverSE- Creating Science Trails

**School:** none
**Teacher:** NUCLIO
**No of students participated:** 1000
**Subject domain:** Science, Astronomy, Biology,
Chemistry, Environmental Education, Geography and
Earth Science, Physics

**Contact info**

## Feel

During this activity students will work together to create a final science trail for their community. Teachers from the school can gather and work in an interdisciplinary way with the students. By the end of the process, the school should have created one science trail with the collaboration of all involved students. Each class or group inside the class should be responsible for one station, for example. Groups of students can be composed of students from the same class or students from different classes and grades. There is no particular rule in how this should be organized, provided the school creates only 1 science trail with as many stations as desired.

Students will begin by deciding on which topics they will like to work on, to create the stations of the science trail, research those topics in depth, collaborate with the community, experts, and any other important stakeholders to collect data and come up with solutions, choose where the science trail will be created, create the stations and then, finally share.

**Throughout their process, students should register every detail of their journey with pictures and videos in their project here in the Portal so that by the end they have a complete report to share with other.**

Teachers should create one copy of this accelerator for each group. Teachers will then be able to fully edit their copies and adjust them to their students needs and level of understanding. Teachers should make sure that they include all the proper guidelines for their students in the project, before they share them.

## 1. Choosing the topics

The first step of the creation of a Science Trail is the reflection about where we are and the community around us. For this reason, the first step of the process will be to promote the reflection about the place of each students in his/her community and what are the main aspects that should be focused on when creating a science trail for and with the community.

In order to begin this reflection, we propose an artistic exercise that will help students look deep into their life and discover what is relevant for them. This is called the Personal Geography mapping and it begins with the reflection:

**"Me in my island, my island in me"**

[Click here to download guidelines](#) on how to introduce this method to your students and how to guide them into creating their personal geography maps.



(personal geography map created by Eleftheria Tsourlidaki)

To see a description of the concepts explored in this picture [click here](#)

Through the Personal Geography mapping, in this context, it is important to guide students into highlighting not only the main problems that should be addressed in their community but also the strong points about their culture, history and local society. In a science trail, these should also be represented.

After creating their drawings (following the project's methodology guidelines), each student should identify the most important features of their islands, from their perspective. Teachers can use a [Padlet](#), [Mentimeter,](#) or any other tool like post-it notes, for example, that students glue to a wall or board. After each student has identified his/her most important topics, the whole class should discuss about what are the most common ideas among them and if they feel the same or not. Each student should have room to argue why he/she thinks that the chosen topics are important.

After this, the class should be divided into groups (as many groups as pretended stations of the science trail) and each group should choose one (or more) topics to work in to create one (or more) station for the science trail.

## 2. Defining the physical trail and the target community

After each group has decided on what topic they are going to focus, the number of stations of the science trail should be defined. In principle the number of stations will be equivalent to the number of working groups. However, this is flexible and each school should decide on what is best.

A station of a science trail is a physical stop where the visitor goes through an interactive activity/game that will serve the following purposes:

 - Introduce the topic (usualy through a game, quiz, fun experiment, etc.)

 - Raise awareness to the problem (a video, another game, etc.)

 - Present the sollutions and how they can be applied

Considering this, it is important to establish from the begining what type of stations the science trail will contain:

Different types of stations can be planned:

- Self-sustainable station where the accesses a link or a QR code that leads to an online platform where the whole activity can be performed.
- Self-sustainable station created in the form of an exhibition with physical materials that are kept in place
- Stations that require the presence of at least one student to lead the visitors through the activity (this is the recommended for at least the release of the science trail to the publick)

Having decided on what types of stations the science trail will have, the target community should be defined and the place where the science trail will be built should be chosen. This can either be inside the school, in a public garden, on a shopping mall, etc. There is no limit to the possibilities and this should be defined among the school and if necessary the city hall. After being defined, students should actualy map the trail where the stations will be exposed in a Map, marking the trail, the stations and with a proper scale.

E.g. - If the target community is the elderly population, then it makes no sense to create a trail in a forest that could be hard for this public to walk in. Maybe in this case the best place would be the city garden or even the school.

If the target public is the parent community, then the school could be a good place.

If the target is the tourist community that visits the town, then maybe it could make sense to prepare a science trail in an already existing forest trail.

Etc.

See an example of a science trail created and maintained by students in Principe Island:

## 3. Research about the topic and the community

After having decided in what topic they will focus, students should carry out a research activity related to the topic at hands and discover how the community relates to the topic.

## 3.1. Learning how to learn (optional but recommended)

As suggested in the description of this project, the most effective way to teach students how to do this, is to lead them to an example activity that guides them through the whole methodology.

As such, at this point, students should explore the [IDiverSE activities](#) list and see if they discover an activity related to their chosen topic. If none of the activities relates to their topic, they should choose one to implement nonetheless, in order to get acquainted with the methodology and gain experience to proceed with the creation of their station.

In case students found an activity that they want to implement and that could be used for the creation of their station, then they can take advantage of it and use their results to optimize their work and create a station with their final output.

## 3.2. Time for action

After being acquainted with Inquiry and Design Thinking, students should take leadership of their progress and begin their own explorations about the topic on focus.

Students should first plan how they are going to research their topic. They should follow the steps of a proper scientific research:

1. Begin with one or more question
2. Make hypothesis
3. Plan how they are going to test their hypothesis
4. Put their plans into action and collect their data
5. Organize and analyse their data
6. Draw conclusions

The main dimensions that students should cover when doing their research are:

1. What do I know about the topic and how can I learn more?
2. How does this topic relate to my community?
3. How does my community relate to the topic?
4. What stakeholders should I involve in my process?

For this, students should include in their plans the involvement of the community and visits to the field. They should talk to experts, to their families, maybe interview their community, etc. whatever necessary to extract the information they need about the topic to then proceed with developing solutions to improve it (in case it is a problem) or to highlight it in case it is a strong point about the community).

# 4. From local to global



This part can either be done after or during the students' research about their topic(s). One of the most important aspects of IDiverSE is the collaboration overseas. Students should know that they live in a place that is unique and special but that they are also connected to other students all over the world. In today's world, isolation becomes less relevant as we are one click away from many other people that feel the same things that we do.

So, students should consider a way of collaborating with students from other places of the world in order to collect the same kind of data and in the same way. Students can explore the Globallab platform to see if there is any relevant project already created about their topic, or they can register and create their own project. If this is the case, teachers should communicate with each other (through the IDiverSE website or any other means desired) and exchange their students' projects so that they can collaborate. Alternatively, teachers should begin collaborating with each other even before their students start their projects and prepare communication channels for their students.

The goal of this collaboration is to learn about:

1. How does the topic relate to other communities around the world?

2. How do other communities around the world relate to the topic?

3. What good examples can I bring to my community from other community(ies) around the world?

4. What good examples can my community give to others around the world?

Students can also communicate to exchange thoughts and ideas and bring some cultural diversity into their projects.

NOTE: Make sure that each group establishes a collaboration with at least one student/group from another country.

After students finalize their research and feel that they have collected all the information they wanted, they can proceed to the "Imagine" phase of their project.

At this point students are experts on the topic they are working on. They are now aware of the problems or strong points in their community, related to the topic and they have a good idea of how communities around the world relate to this topic. Students have also established a collaboration with students from other places of the world.



# 1. Discovering solutions

Students should gather all their information and all their conclusions to begin their search for solutions. If students are focusing on a strong point of their community, they should think about solutions to increase awareness related to those strong points and how this strong point can be used to promote a sustainable development of the community and to bring progress to it. If students are focusing on problems, they should start thinking about solutions to minimize, prevent and even eradicate the problem. In both cases, students should also think about with to promote awareness for the importance of their solutions so that they become more effective.

This can trigger a second round of research repeating the previous 6 points:

1. Begin with one or more question
2. Make hypothesis
3. Plan how they are going to test their hypothesis
4. Put their plans into action and collect their data
5. Organize and analyse their data
6. Draw conclusions

However, this time, the dimensions of focus are slightly different, as for example:

1. What solutions exist around the world that could be implemented in my community?
2. What other solutions can I create for my community?
3. What solutions is my community ready/available/whiling to implement?
4. How can I raise my communities' awareness so that they will accept my solutions?
5. What solutions do my community member suggest?
6. How can I transform this solution into a station of a science trail?

This process can lead to a second round of communication and involvement with the community. Students should begin by thinking about possible solutions but then they should always involve the community in the process. They should collect their communities' ideas and thoughts of solutions and they should always take into account what their community is able to do.

Creating solutions that no one can implement will lead to the waste of the students' efforts. So teachers should always remember students to Listen carefully to their community and always involve them in the process. This can be done by inviting parents to the school, bringing surveys home to interview their families, creating a survey and spreading it through emails or Facebook, etc.

Students should also invite experts to the school or visit experts in the field, who can help them figure out solutions and promote a collaboration with mutual benefits.

As a teacher, you should promote communication both with male and female experts in order to ensure a proper representation of both genders in the world of science or any other involved field.
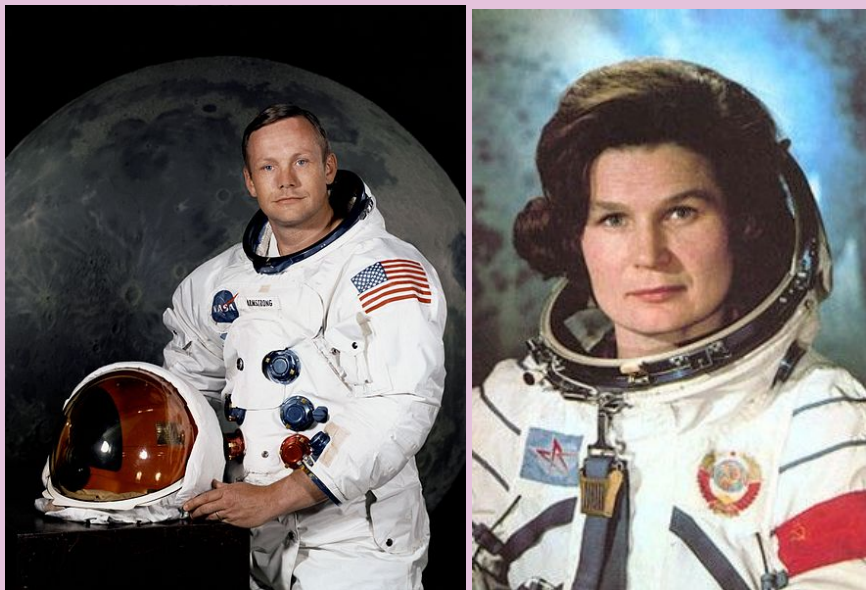


## Interdisciplinarity

It is also very important that during the students' journey, they contact with as many subject domains possible. Teachers from different subject domains should collaborate and support students from their various perspectives from all science fields to arts, language, history, psychology, etc. Teachers from the different subject domains can use the students' projects as context to promote learning experiences of the school content, if these are not automatically involved in the student's work.

Students should register all their questions, hypothesis, plans, experiments, etc. They should also be able to make mistakes and correct them on their own as this is one of the most effective ways of learning something.

## Collaboration

Students should be encouraged to create a positive working environment in their group and to collaborate with other groups. They shouldn't think that copying is a bad thing if it will help them achieve a better result. Instead they should think about cooperating with eachother so that their final trail is the best it can be.

Also, throughout this phase, collaboration with the colleagues of other countries should be promoted as they can have similar problems or share better of solutions. Different cultures bring different perspectives and some times different perspectives originate brilliant sollutions!

After students have concluded what are the best solutions for their community, it is time to jump to the "Create" phase where they will put hands into action and create their stations for the science trails.

After finalizing the "Imagine" phase, students should start thinking about how their solutions can be incorporated in a station of the science trail.



# 1. Overview of the station features

In order to be able to effectively plan the creation of their station, students should create an overview of all the features of the station. Some considerations are presented below:

 - Location of the trail (indoors, outdoors, etc)

 - Place of their station in the trail (beginning, middle, end, slippery pavement, moody floor, etc.)

- How much time people should spend in their station

- What are the most important things to include in the station

- What type of station they will create (online activity, physical activity on-the-spot, combination between online and on-the-spot, etc.)

Example of two on-the-spot activity type of stations:

## 2. Plan the creation

After having an overview of how their station should look like, students should start designing and planning what and how they will create. For this they can consider requiring the support of experts, family member, etc. They can invite these stakeholders to the school and work together in their creations.

The school can promote an open day to the community where anyone (parents, friends, families, etc.) can go to the school and help the students in their creations.

If so, students should include these events in their plans. Students should include the following in their plans:

1. Who will participate in the creation?
2. Necessary materials

3. Expected time length of the creation
4. Can the creation be fully made inside the school?
5. Possible obstacles and solutions
6. What involvement of the community will be necessary for the creation of the station?
7. etc.

Their plans, as well as any other relevant details should be fully registered in their projects, here in the portal.

# 3. Create

When the plans have been defined, it is time to put hands into action! Making sure they have everything they need, students should then implement their designs. If they discover that something doesn't work, let them know that it is OK and that they can redesign their creations.



**Important tips:** Students should create stations that are fun and interactive for the public. They should involve knowledge from different domains, creating something holistic and interdisciplinary that will spark the visitor's curiosity and will to learn more. Let your students be creative and always think about who they are targeting in their creations so as to adjust their creativity to the publics' needs.

Teachers should make sure that the process of creation is registered in the students' projects through the upload of pictures and videos.

If possible, teachers can contact the local newspaper and invite them to report the happening, since it will be something for the benefit of the whole community.

After the stations have been created is time to complete the final step of the project, which is to share with the public!

# I can! Now you can too!

This is where all the students' work comes to its maximum reach and they become true change makers in their community! It is time to share the Science Trail.

Students should understand that their work can really make a difference where they live and inspire others to improve their lives as well. We never know the full extent of the impact of our actions so this is the time to give all that they can and the best that they can.

This is where they pass on to others their knew knowledge and their awareness.



## 1. Prepare to answer questions

Students should be prepared to fully present their ideas and run all the activities with the visitors. They should be well equipped with theory to answer questions and prepared to say that they don't know something but will investigate to be able to answer. Students should also be able to explain why they chose such topic and what is the impact that they want to have with their station.

Make sure that both genders are well represented in each station, either in the students that run it as in the characters chosen for pictures, role models, etc.

## 2. Dissemination strategy

Students and teachers should define when they will open their science trail to the community and in which days they will be there presenting it. Once the date is settled, a dissemination strategy should be

defined. This is a great moment to introduce students to the world of Marketing. If they create a great marketing around their science trail, they will attract a larger public. This is a skill for life, so make sure that they have time to research on the best marketing strategy for their science trail.

Schools can think about creating flyers, sending emails to the families of the students, creating an event and a page on Facebook to spread in social media, use Instagram, create a Youtube video, etc. Whatever way the school sees fit.

After this, dissemination should begin to ensure a maximum reach.

School boards can contact newspapers and local media to report the event and even create a press release to disseminate it and attract a wider public.

If the target public is the senior community, then maybe Facebook isn't the best channel to spread. In this case students can distribute flyers around the centre of the town, contact the senior homes, etc.

Each strategy should be adjusted to the target public.



## 3. Define what any visitor will need

Prior to the event, students should think about what materials the visitors will need and make them ready. For example, visitors might need a map to know where the stations are and in what order they should visit them (if there is one). The trail can be a straight line that visitors follow or can be spread with no apparent order. Furthermore, the trail can be followed through a hint game or any other fun activity the students can think of.

Whatever way, always have in mind the target public and make sure that the strategies are adjusted to the needs and make sure that all participants arrive prepared.

## 4. Reporting the work - get a certificate

After presenting the Science trail to the community it is time for the students to finalize their projects. Here they should add a selection of pictures, videos, etc they have collected. If their projects appeared on local news, they should add here any public reference of their work.

After finishing, students should read their projects and make sure that they have registered all the parts of the process and that anyone who reads it afterwards will fully understand their journey and learn what they have learned.

Once they feel that their project is complete, they should mark it as public and final. Their project will appear in the Portal projects list as well as in the personal area of the teacher who created them and in the community where they were created.

It is likely that not all schools using this accelerator are part of the IDiverSE school network. However, **all schools who create a science trail following this methodology are invited to submit their work and teachers and students can receive a certification**. The student report takes less than 5 minutes to answer. The Teacher report (mandatory for certification) takes about 5 to 10 minutes.

**Students**

After students present their station to the public, each group should submit their report through the following form:

**STUDENTS STATION REPORT FORM**

Note: this report should be filled in

**Teachers**

After the presentation of the science trail to the community, one teacher should submit the Science Trail report through the following form

**SCHOOL'S SCIENCE TRAIL REPORT FORM**

Congratulations for your excelent work! Because together we make the World a better place!