

Islands Diversity for Science Education

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Activity Template – with guidelines

Created in the framework of Intellectual Output 1



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1. INTRODUCTION

This document explains the four steps of the **Design Thinking methodology** used in IDiverSE activities as well as the rationale behind it including guidelines on how to create an activity. Each activity will be organized in relation to the 4 steps of the Design Thinking methodology, through which the work for and with the community will be guided and registered.

1.1. Inquiry-Based Learning and Design Thinking

It is important for any author to understand that the methodology of Design Thinking used in IDiverSE respects the principles of any Inquiry-Based activity. For this reason, when students are following the four steps of the Design Thinking, they are automatically experiencing Inquiry-Based Learning. In IDiverSE, we approach Inquiry as a series of practices that a teacher should have, instead of limiting it as a cycle. These components form the Inquiry Under the Microscope toolkit, which you can access and learn more about it [here](#). Below you can see a table that shows how the different Inquiry Components can help the teachers in each phase of Design Thinking

Design Thinking Step	Most relevant Inquiry Components
Feel	IC1: Setting the scene IC3: Wondering about how something works IC5: Doing research and collecting data IC6: Interpreting data and drawing conclusions IC7: Comparing conclusions to hypothesis and existing theory IC9: Discussing and connecting with everyday life
Imagine	IC2: Refreshing prior knowledge IC3: Wondering about how something works IC4: Thinking about how to test hypotheses IC8: Reviewing and reflecting on what has been done
Create	IC2: Refreshing prior knowledge IC5: Doing research and collecting data IC6: Interpreting data and drawing conclusions IC7: Comparing conclusions to hypothesis and existing theory IC8: Reviewing and reflecting on what has been done
Share	IC1: Setting the scene IC2: Refreshing prior knowledge IC8: Reviewing and reflecting on what has been done IC9: Discussing and connecting with everyday life



1.2. Working with the community

All the activities created in the framework of IDiverSE should bring the student close to his/her community, involving topics that are relevant for the community, taking the student to the community, taking the community to the school, and creating a final result with the help of the community and with benefit for the community.

1.3. Collaborative Inquiry

All the IDiverSE activities accommodate a collaborative component, where students from the different islands of the world follow the same protocol to collect data in order to compare the results and make a global analysis in a collaborative way. Although following a protocol is not usually considered in an Inquiry activity, this is the key-point in enabling the comparison between the data collected in the different islands. However, it becomes Inquiry as students will have a question, collect data and then organize it, analyse it and extract conclusions by themselves. Additionally, only a small portion of the data collection is done through a protocol, as students are invited to create and add their own experimental designs throughout the activities.

When creating your activity, you can choose to use one of the existing protocols in a collaborative platform, like [Globallab](#) or to create a new one.

In each activity this data collection can be presented in a different Design Thinking phase, as it will fit the activity best. As an author, in case you want to include collaborative Inquiry in your activity, you should reflect for each activity individually, in which moment you want to accommodate this component.



2. GENERAL GUIDELINES

In each step of this document you will see guidelines and tips for the teacher that can be useful during any activity. However, throughout the activity please consider including the following:

- When choosing videos, make sure they come from different backgrounds and highlight both men and women in the job world;
- Choose pictures that respect gender balance and show students how both genders have an important role;
- Make sure you pay attention to all students and promote discussions where both girls and boys participate;
- Invite all students to participate in the discussion;
- Help shy and introvert students to express their opinions and views without being interrupted;
- Promote an environment of tolerance and respect where judging other is not allowed;
- Accept students' mistakes as a natural part of learning. Is it from the mistakes that they will learn the most;
- Promote collaboration between students and groups instead of competition;
- Don't avoid groups "copying" from each other. If groups collaborate and exchange ideas, their works will be enriched.



3. SKILLS AND COMPETENCES

During the IDiverSE activities, students will be developing different skills and competences. In each phase of the activity, you should include which skills and competences you consider the students to be developing. Each activity will call upon different skills.

Here is a list that you can consider:

4 C's of the 21 Century Skills

- Communication
- Collaboration
- Creativity
- Critical Thinking and Problem Solving

Other Skills

Below you have a list of skills with some examples to help you understand them. These were adapted from the document [“profile of the students when leaving compulsory schooling”](#) by the Portuguese Ministry of education and are in line with the 4 C's of the 21st Century Skills (Communication, Collaboration, Creativity and Critical Thinking and Problem Solving).

- Language and texts
 - To use different languages and symbols related to language, music, art, technology, maths and science;
 - To apply these languages adequately to different communication, digital and analogic environments;
 - To dominate nuclear understanding abilities of expression in oral, visual, writing and multimodal modalities.
- Information and Communication
 - To use and dominate diverse ways of research, describe, evaluate, validate and mobilize information in an autonomous and critical way, verifying different sources and their credibility;
 - To transform information in knowledge;
 - To collaborate in different communication contexts, in a secure and adequate way, using different types of tools (digital and analogic), based on the conduct rules appropriate for each environment.



▪ Reasoning and Problem Solving

- To interpret information, plan and lead researches;
- To manage projects and make decisions to solve problems;
- To develop projects that lead to the construction of products of knowledge, using diverse resources.

▪ Critical and Creative Thinking

- To think in a deep and embracing way, in a logical perspective, observing and analysing information, experiences and ideas and arguing using implicit and explicit criteria to take a reasoned position;
- To call upon different knowledge of scientific and humanistic nature, using different methodologies and tools to think critically;
- To predict and evaluate the impact of personal decisions;
- To develop new ideas and solutions in an imaginative and innovative way, as a result of the interaction with others or of personal reflection, applying them in different contexts and learning areas.

▪ Interpersonal relations

- To adequate behaviours in cooperation, sharing, collaboration and competition contexts;
- To work in team and use different ways to communicate in person or in a network;
- To interact with tolerance, empathy and responsibility, reason, negotiate and accept different points of view, developing new ways of being, looking and participating in society.

▪ Autonomy and personal development

- To establish relations between knowledge, emotions and behavior;
- To identify areas of interest and of need of acquiring new competences;
- To consolidate and deepen the competences they already have in a perspective of a life-time learning;
- To establish goals, make plans and implement projects with a sense of responsibility and autonomy.

▪ Wellbeing, Health and Environment

- To adopt behaviours that promote health and wellbeing, namely in daily habits, food, consumption, physical exercise, sexuality and relationship with environment and society;
- To understand unbalances and weaknesses of the natural world in the adoption of behaviours that respond to the big challenges of the global environment;
- To manifest social and environmental awareness and responsibility, working collaborative for the common good, aiming for the construction of a sustainable future.



▪ Aesthetical and artistic sensitivity

- To recognize the specificities and intentions of the different cultural manifestations;
- To experience processes of different forms of art;
- To critically appreciate the artistic realities, in different technological supports, by contacting with the diverse cultural universes;
- To value the role of the various ways of artistic expression and of the material and immaterial heritage in life and in the culture of the communities.

▪ Scientific, technical and technological knowledge

- To understand the processes and scientific phenomena that allow decision-making and the participation in citizenship forums;
- To manipulate and handle diverse materials and instruments to control, use, transform, imagine and create products and systems;
- To execute technical operations, following an adequate work methodology to achieve a goal or draw a reasoned decision or conclusion, adapting the material and technical means to the expressed idea or intention;
- To adequate the action of transformation and creation of products to the different natural, technological and sociocultural contexts in experimental activities, projects and practical applications developed in physical and digital environments.

▪ Awareness and mastery of the body

- To preform motor, locomotor, non-locomotor and manipulative activities, integrated in the different circumstances experienced in the relationship with the own body and with space;
- To dominate the perceptual-motor capacity (body image, directionality, perceptual thinning and spatial and temporal structuring);
- To be aware of self on an emotional, cognitive, psychosocial, aesthetic and moral level in order to establish with themselves and with others a harmonious and salutary relationship.



4. ACTIVITY TEMPLATE AND GUIDELINES

Name:

Main topic(s) that includes:

Local culture reference(s):

Brief description (1 to 2 paragraphs):

Subject domain(s):

Keywords:

Didactical hours:

Links to important resources (ex. Graasp):

Big Ideas of Science:

Choose the Big Ideas of Science to which this activity is related and write a brief explanation explaining the Intermediate and Small ideas that are involved. Erase the figures that don't apply to this activity. For an overview of the Big Ideas of Science and their progress from the Small and Intermediate Ideas, please visit the following [mindmap](#).





1. Feel

This is the phase where the activity begins. The first step of a successful activity is to raise your student's curiosity for the topic. If students are curious, they will feel motivated and engaged and will want to learn more.

During the Feel moment of the Design Thinking, students should learn about what they will be working on and have the opportunity to actually "feel" what the topic is. This is, how it is related to their lives and to their community, how important it is for their community, what is the state of their community related to this topic, if there were any important events happening recently or in the past, related to the topic, how does it affect their family, etc. For each different topic, different scenarios will be presented in this phase.

Begin by introducing the topic in a way that awakens student's curiosity and interest, letting them feel the need to learn more. Try making the presentation of the topic in the most interactive way possible. Here you can use simple intriguing questions, show images or a video that introduces the topic, or you can even take your students to visit a museum or any other real-life scenario related to the topic in question. You can request the students to go home and ask something to their parents, grandparents, neighbours, etc, promoting the interaction with the community straight away, which will allow for a more meaningful outcome of the activity.

You can introduce the data collection using the Globallab platform (if it makes sense) during this phase in order to introduce your students to the topic and get them in touch with their community from the beginning.

Anytime you present a question to your students, don't give them the answers. This phase is meant to create a mystery in turn of the problem or question motivating the students to seek for the answers themselves. Give them a few minutes to discuss every question and let them discover the answers by themselves throughout the activity.

This is also the phase where you and your students will recall previous knowledge. Our knowledge is stored in our minds in an organized way. Allowing students to recall the knowledge they already have will facilitate the accommodation of the new knowledge in a way that makes sense and increases the retainment of new information. You can create a



discussion where students talk about what they already know and connecting concepts, or you can ask them to create real concept maps. Ask them to get creative and find connections with topics from other subject domains or topics from their daily lives.

Some tips for the teacher:

- Introduction to the topic should be well contextualized in concrete situations that allow to portrait the reality of islands diversity and references that are specific to their island.
- Try using videos, small documentaries and images anytime you can to sparkle students' curiosity towards the topic to be studied.
- You and your students can use the 3D Interdisciplinary map of science ideas to find connections between concepts.

Useful tools and resources:

- Short online videos (YouTube, TED, Teacher Tube)
- Images and Interactive images (Picasa or Flickr)
- Animations and/or simulations - [PowToon](#) is a useful tool if you wish to make your own animations.
- A story or an event related to the subject and to students' memories or experience.
- Concept maps
- Virtual classroom walls (Padlet, Popplet)

Main skills being developed: You can choose from the skills listed in page 4 and 5 of this document. Please consider in the first place the 21st century skills and then if necessary complement with the others from the lists.

2. Imagine

After having “felt” the topic on which the students will be working on and realizing how it relates to their community, students will begin to think about how this topic/question/issue can be worked on for the benefit of the community.



If the topic of this activity concerns a problem that the community is facing, students can start thinking about why the problem exists, how did it originate and imagine possible solutions to solve it.

If the topic concerns a good example that the community presents to others, students can start analysing how this example was born, who was the main stakeholders, how it benefits the community and research the level of development of other communities (and islands) regarding this topic. In case other communities are facing an underdevelopment regarding the topic, students can imagine ways to bring good practices to those communities.

Depending on the activity, this can be a good moment to introduce globallab, if it wasn't introduced before, in order for the students to start getting in touch with their community, evaluating how their community is behaving toward the topic that was introduced before. In case your students have already proceeded with the data collection in the "feel" phase, they can now return to the platform to look to the data collected by their colleagues from other island and compare their community to others to reflect on whether they are different and what they can do to improve their community or contribute for the development of others.

Teachers can collaborate to promote conversations between students from the different islands in the exchange of ideas and in a collaborative data analysis. Students and teachers can be creative in collaborating in the way they want and in collecting the data in the most relevant way for them. Teachers and students know their communities better than stranger authors of activities so here there should be space for freedom and creativity regarding the field work.

Students can do a field trip to their community in this phase, take pictures, make drawings, write notes, make interviews to their community members to retrieve important information to help them imagine good solutions that are practicable and of great value to the own community.

Important: One major strength of the Design Thinking methodology is that the solutions are created with the collaboration of all the involved parties. This means that instead of imagining solutions without knowing the field in depth, students will be challenged to go out of the classroom environment and visit the real people that experience the topic at hands



every day, listen to what they have to say, ask them of how they think the problem could be solved and then start creating solutions accordingly.

Some tips for the teacher:

- Encourage your students to register all their ideas and the conversations with their community members. They can use a recorder to record their conversations and use [Padlet](#), or any other tool they can have access to during the whole activity to take their notes.
- Let your students come up with their own ideas but guide them into respecting and valuing the opinions and thoughts of their community members. Make key questions to make them reflect on how their plans are suitable or not for their community. Allow your students to reach conclusions for themselves.

Useful tools and resources:

- Concept Maps
- Virtual classroom walls (Padlet, Popplet)
- Calculators
- Observation sheets
- Recorder
- Camera (or smartphone camera)

Main skills being developed: You can choose from the skills listed in page 4 and 5 of this document. Please consider in the first place the 21st century skills and then if necessary complement with the others from the lists.

3. Create

After having collected all the information they need from their communities and imagining possible solutions or ways of action, it is time to out hands on action and start creating the final result of their work.

This result should be the creation of something of value for the community. It can be a leaflet that they will distribute, it can be an exhibition with pictures and awareness raising materials. It can be a theatre or a song. It can be a slow motion or any other type of video. It can be



the building of a station that will be permanently accessible to all community members, students can decide to create a proposal for the improvement of any given situation and deliver it to the city hall including a real budget and risk analysis, etc.

Students and teachers should be creative in this part and decide what would be the most effective product to offer to their communities or to the other communities with which they have worked.

Some tips for the teacher:

- During the creation, students should have an active attitude always. The teacher will only be a pillar for support and guidance when needed.
- Allow your students to make mistakes and correct them. Let them be creative.
- Be patient if you note that your students are feeling insecure. They might not be used to such activities. Offer them words of confidence and support and encourage them to keep motivated and put energy into their researches.

Useful tools and resources:

- Research tools (wikipedia, wolfram)
- Manipulating data, making graphs (Spreadsheets)
- Create programs to manipulate data or simulate models (scratch)
- Online collaboration documents for sharing input and ideas (Google docs)
- Shared space (Dropbox)
- Managing group tools (wiggio)
- Polling and survey tools (Doodle, Survey monkey, kahoot)

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4. Share

This is the last phase of the activity where the student's creations will be shared with the community. The teacher should make sure that the students disseminate their work well and



that the community understands that voices were heard and taken into consideration when creating the final results.

This is the moment when the whole work that students have gone through is made worth and can be shared nationally and internationally with their colleagues from other islands of the world.

Some tips for the teacher:

- Let your students know from the beginning of the activity that they will create something to share with the community.
- Allow students to present their work in whatever way they want, but with quality.

Main skills being developed: You can choose from the skills listed in page 4 and 5 of this document. Please consider in the first place the 21st century skills and then if necessary complement with the others from the lists.



Annex A

Activity template - Blank



Name:

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1. Feel

Description:

Tips for the teacher:

Useful tools and resources:

Main skills being developed:



2. Imagine

Description:

Tips for the teacher:

Useful tools and resources:

Main skills being developed:

3. Create

Description:

Tips for the teacher:

Useful tools and resources:

Main skills being developed:

4. Share

Description:

Tips for the teacher:

Useful tools and resources:

Main skills being developed: