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2021

Fostering OIAs at your university

Guide of best practices in open innovation activities

Factsheet

Project number:	**2019-1-DK01-KA203-060268**
Project acronym:	INOS
Project title:	Integrating open and citizen science into active learning approaches in higher education
Title of document:	"Fostering OIAs at your university" - Guide of best practices in open innovation activities
Output:	O4A4
Due date according to contract:	30/11/2021
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Abstract:	O4A4 aims to gather lessons and best practices learnt from different use cases into an openly accessible short guide. The objective is to transfer the experiences and knowledge produced during the design, implementation, and assessment of open innovation events to other type of OS activities and other contexts and fields, and to increase the transferability and impact of project results to other HEIs and research organizations
Keyword list:	Open science; citizen science; open innovation; pedagogy; open data
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Credits

With thanks to the partners of the INOS project :

Aalborg University	AAU	Denmark
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University of Oulu	UO	Finland
University of Bordeaux	UBx	France
STICHTING LIBER	LIBER	The Netherlands

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What is open innovation in a university?

According to the European Commission (2016 p. 11), "Open Innovation is to open up the innovation process to all active players so that knowledge can circulate more freely and be transformed into products and services". Universities are positioning themselves more and more actively at the heart of societal issues as places for building knowledge and research. Open innovation activities (OIAs) if they are extracurricular or intra curricular, short or long, including socio-economic actors or not, become concrete means of taking charge of this role by becoming actors in this change. As community builders, innovation catalysts, and socio-economic actors, they organise and assess OIAs within interdisciplinary teams with the aim of transforming knowledge into innovative ideas/prototypes/artefacts.

Whether their format, these activities must be built on strong methodologies and tools. Indeed, the diversity of the roles played by the institutions implies the development of a range of new skills necessary to carry out these activities, which are characterized by their great "openness" and, therefore, the multiple objectives and dimensions they can have in various degrees. The importance of these roles, namely the innovation and learning roles (see figure on the right), can vary from one format to another. However, all these activities are important for understanding their socio-economic impacts and how they answer to the role of universities as socio-economic actors.
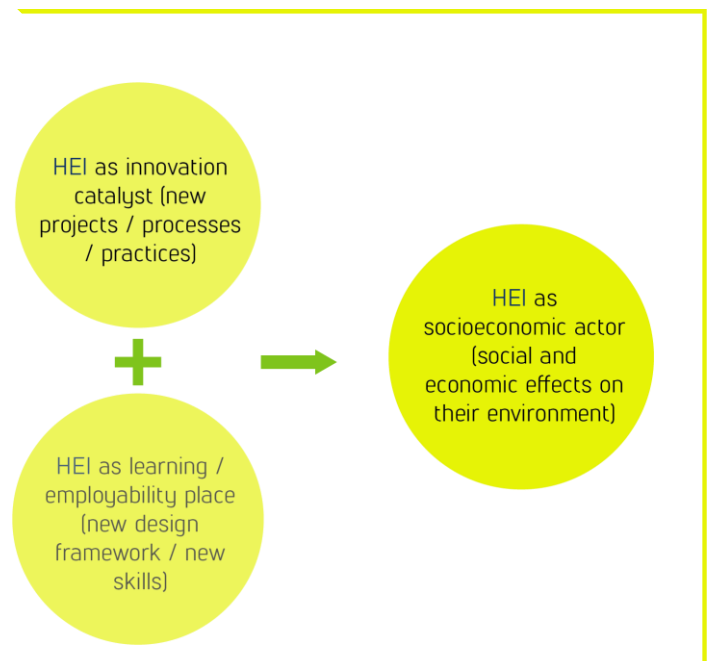
Figure 1 - The three roles of HEI in open innovation activities
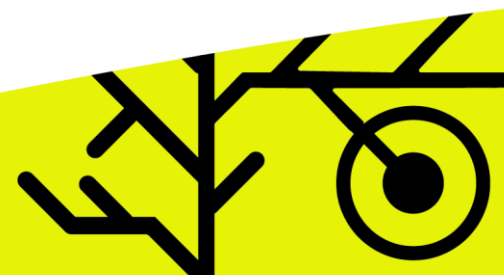
What is an open innovation activity?

Open innovation activities (OIAs) bring together academic staff and students from different disciplines (with some external stakeholders) to engage them in the transformation of knowledge to innovative solutions. Together, they co-reflect, co-develop and apply their knowledge to address a technical challenge or social problem drawn from observation or previous knowledge, following an iterative methodology, which often involves tangible artefacts prototyped in collaborative spaces (fablab, maker lab, gamelab…). Therefore, these activities have different facets. They are i) collaborative events, ii) project-based learning activities and finally iii) open science activities (see figure below):

Open Innovation activities can have one or different operational objectives and focuses:

- **As innovation focus activities**, the priority may be to acculturate innovation processes/create innovative solutions or organizes networking within a community. Short activities like hackathons are often suitable for this kind of focus because they are less constraining.
- **As pedagogical focus activities**, in most cases integrated into curricula, the objective is to professionalise students and develop skills for working life. Their duration is often based on a semester. The variation is a question of the hours allocated in the establishing framework.
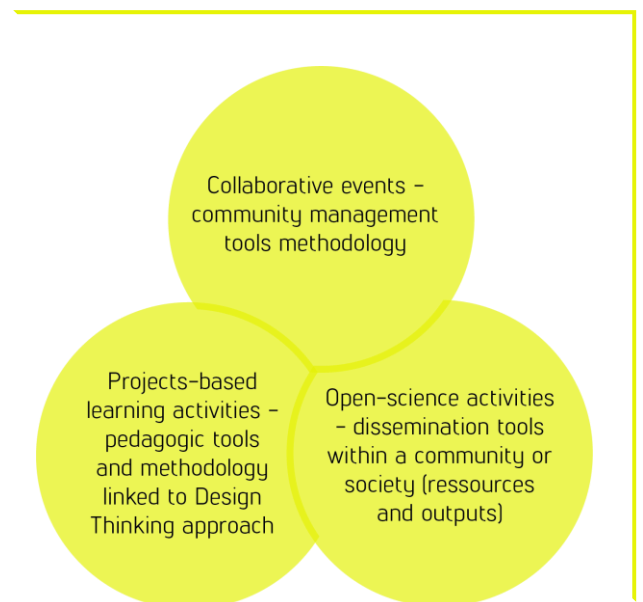
Figure 2 - The three facets of open innovation activities in HEIs
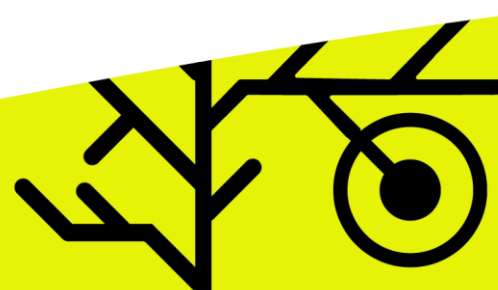
Project-based learning design process (and Design Thinking method)

Open innovation activities often refer to the Design Thinking approach, which can be defined as a human-centred approach to problem-solving. The Design Thinking method is based on collective intelligence aiming to resolve challenges and respond to users' needs. According to Stanford Design School, The Design Thinking method consists of five stages: **1/ Emphasize 2/ Define 3/Ideate 4/Prototype and 5/Test**

5 STAGES OF THE D.SCHOOL'S
DESIGN THINKING PROCESS
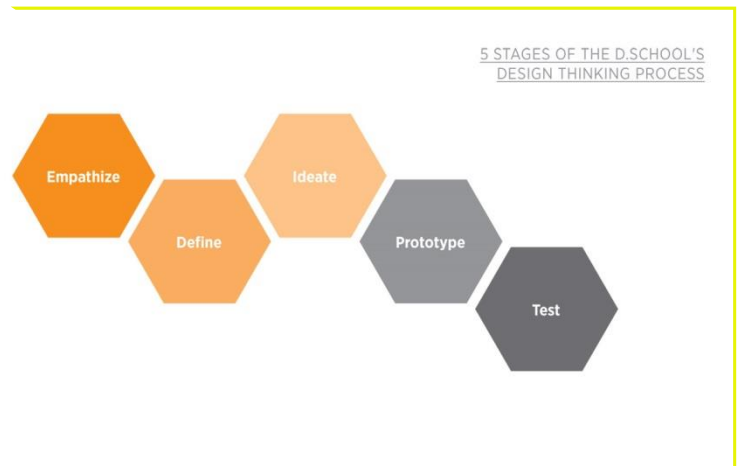
To talk about Design Thinking within HEIs and adapt this method to a pedagogical environment is one of the main issues for OIAs. Inspired by the Design Thinking method, the INOS project proposes to create a project-based learning framework designed for learning objectives. The learning process is trimmed into four main phases adaptable according to the format of the activity: each stage is exemplified with exercises.

The table next page entitled "Summary of the Project-based Learning Design Framework" proposes to going through each activity via the Design Thinking method and tools.
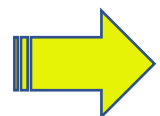
Phases	Stages and objectives	Learning tasks
IDEATION PHASE	**1- EMPATHIZE** • **topic exploration** Examples of tools: • *Frame the problematic: "speed boat"* • *Topic exploration: qualitative research (ethnographic study, observation, focus group, interview), quantitative research (analytics, customer service, surveys, investigation, panel users), contextual research (benchmark), personas, experience map, scenarii, empathy card*	• Secondary research • Observing and consultation with target end-users • Group discussion / brainstorm • Other
	2- DEFINE • **need finding and specification of the challenge (if needed)** *Examples of tools / methods: "How might we?" and inspiration wall*	
	3- IDEATE (creativity stage) • **brainstorming solution ideas** *Example of method: MOSCOW method*	• Interpretation of research results • Group discussion / brainstorm • Other
DESIGN PHASE	**4- PROTOTYPE** • **Design model(s)** • **prototype design(s)**	No Learning tasks but variety of tools to use
IMPLEMENTATION PHASE	**5- TEST** • **User testing** • **Reiterative design**	• Test runs with target users • Consultation with experts • Focus groups • Other
COMMUNICATION PHASE	**6- COMMUNICATE (additional)** • **Presentation and discussion of final outputs** • **Dissemination of final outputs for real-world application**	• Presentations • Group discussions • Peer-assessments • Consultation with experts • Documentation of project outcomes • Publication of project outcomes • Other

Table 1- Summary of the Project-based Learning Design Framework - adapted from The INOS Learning Design Framework: Fostering the educational value of Open Science, Citizen Science and Open Innovation activities (Teo, E. A.2020)

How to use this document

This guide of best practices is intended for any organizer of open innovation activities within HEIs, especially teachers.

It is built on one question: **how to foster openness in open innovation activities?**

In one of the previous deliverables of the INOS project, Teo (2020) suggested, referring to the study of Cronin (2017), that open education includes the following four interpretations of "openness": 1) open admission, 2) open as free, 3) open educational resources, and 4) open educational practices. Thanks to the practice and the observation of multiple examples of open innovation activities in HEIs, the Learning Design Framework finally recognizes the five practical elements of openness, which are the compass for the organisation of an open-innovation activity:

- The incorporation of open, cross-boundary participation and collaboration
- the use of open innovation tools and resources
- the training of soft and technical skills necessary for Open Science and Open Innovation practices
- the generation of activity outputs that are made open access
- the activity's availability as an education resource

These elements are the five facets of openness for an activity that HEIs can foster according to their needs and means. Each facet can be seen as a work package, structured into a chapter, including some best practices to be integrated before, during, and after the activity. It has to be noted that each facet/chapter will be opened with an introduction spotlighting the impacts/benefits and constraints. A keynote based on the INOS experience will also be given.

This structure presented in the following scheme was designed to meet three major needs that organizers may have:

- I need to improve an existing activity (I can go straight to one of the five chapters)
- I need to frame an activity from A to Z (I can start from the beginning. The document is built using a chronology)
- I need to get inspired and to see different examples (see Table 3)

Warning: It is important to note that there are no perfect activities with a maximum level of openness. All the activities deal with multiple contexts within the institution (pedagogical model or political orientation) and ecosystems (partnerships and/or socio-economic aspects). That is why the document has to be considered a "guide" in the full sense of the word.

As the key tool, the Learning Design Framework for project-based learning activities accompanies the guide. (see appendix).

Chapter 2 : Use open innovation tools and ressources

Key tool tips and tools to encourage active learning

KEY NOTE Accessibility and equality in online learning contexts : autonomy as a teaching principle

Before Prepare the accessibility of tools and resources

During Adapt the use of the tools and resources

After Encourage open data & open access culture

Chapter 3 : Foster the training of soft and technical skills necessary to Open Science and Open Innovation practices

Key tool Table of skills developend in OIAs and socio economic evaluation grid

KEY NOTE To link open innovation skills and socio professional skills. Open innovation activites as springboards for the professionnl world

Before Work on the expectations of empowerment of the group

During Encourage the self-monitoring of the empowerment

After Make visible the acquired skills with socioeconomic criteria

Chapter 4 : Generate activity outputs that are made open access (or as opened as possible)

Key tool The levels of dissemination and valorization of innovation outputs

KEY NOTE Anticipate the nature of the artefact and prevent valorization of innovation outputs

Before Prepare the accessibility of tools and resources

During Adapt the use of the tools and resources

After Encourage open data & open access culture

Chapter 1 : Incorporate open, crossboundary paricipation and collaboration

Key tool Canvas to co-design a challenge

KEY NOTE How to create a community around a sustainable activity and to make it evolve ?

Before Communicate broadly by knowing your participants

During Maintain the engagement along the process and the alignment of the group

After Create communities and organise conditions of networking

Chapter 5 : Make the activity available as an open educational resource

Key tool The INOS cartography of resources

KEY NOTE Accessibility and equality in online learning contexts : autonomy as a teaching principle

Before Elaborate the cartography of the learning

During Document the Learning Design Framework along the process

After Work on a pedagogical community

Foster open innovation step by step – overview of the chapters

1 Incorporate open, cross boundary participation and collaboration

Issues and keywords: communication, engagement, alignment, networking

Key Tools: communication and community management tools

✓ What are the main benefits?

Hackathons and similar innovation challenges are opportunities to gather multiple perspectives for problem-solving. The more the profiles, the more perspectives you have to build the challenge and to valorise the outputs as original and transferable solutions.

✗ What are the main constraints?

For many years, HEIs have been more and more acculturated to interdisciplinary work, especially in research. In training, breaking down silos can still be an issue, and the relationships with socio-economic actors can be interpersonal or difficult to maintain. These factors are why building on existing communities (ALUMNI, pedagogical communities, challenge-based communities) can be a solution.

⧗ What are the long-term impacts?

Open innovation Activities often have social change aspirations, such as improved inclusivity in science/innovation, the improved social relevance of science/innovation, improved relationships between non-experts and experts, and improved awareness of causes. In time, the final impact is the empowerment of citizens with the knowledge to encourage fact-based societal change.

Photo credits: Alexandre Taube / Léonard Blondel

How to create a community around a sustainable activity and to make it evolve?
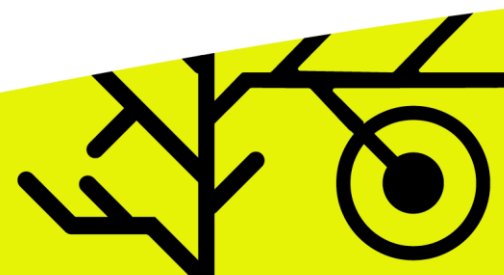
The main requirement for creating a community based on diverse perspectives and interests with interdisciplinary and diverse stakeholders is to involve the participants from the beginning of the learning or innovation process to be developed.

The main challenge of this type of community is that each party can find its own entry point to the problem and the process, which requires bringing together and articulating visions from an epistemological point of view and the point of view of interests and values.

Thus, knowledge and innovation communities achieve much greater stability when they install an open approach from the moment of "problematisation", that is, from the moment in which participants build a shared definition and understanding of the problem and jointly establish the scope and degree of complexity they are willing to assume.

The open and transparent involvement of all stakeholders at this starting point will ensure an inclusive working scenario in terms of the perspectives and capacities involved while ensuring that legitimate expectations and interests of the community are considered.

Once a shared problem definition has been achieved, a collaborative work plan can be drawn up in which each participant finds meaning in what they can contribute and the outcome or benefit they will gain from the process.

Transparency in defining roles, contributions, and expectations will help the collaborative process to be horizontal and create better conditions for sustainably working in open science mode.

Contributor: Julieta Barrenechea

What are the long term effects induced directly and indirectly by the solutions do we wish to see ?

What is the concrete change we want to achieve directly through the solutions created ? (It shoulds be measurable)

4 – Impact 3 – Outcome

1 – Input 2 – Output

What resources are needed or can be provided for creating solutions ? Resources, expertise, data

What do we expect to create in the process ? Think about solutions that could help but don't design them

Figure 3 - Key tool: challenge-building canvas (source: DigiEduHack toolbox - powered by industryhack_)
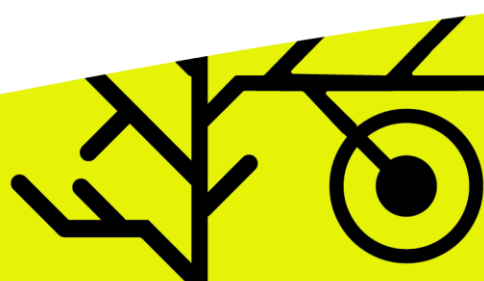
Communicate broadly by knowing your participants

As challenge-based learning activities, open innovation activities often tackle social challenges, which lead to concrete solutions. It can be linked to the sustainable development goals, for instance, and to the personal interest of the community. To be sure to meet the interests of your participants and to have the broadest community possible, you can test your challenge before launching it. The main objective of that dynamic is to be sure that the experience will give some inputs/outputs/outcomes/impacts (cf. canvas above).

In a curricular context, the profiles of participants can be limited by the pedagogical aspect: student groups can have the same profiles, and the inclusivity indicator can be difficult to optimise.

1. If you already have a community to work on, you can enlarge the profiles of participants by inviting actors as mentors. Socio-economic partners, ALUMNI, administrative personnel … can be good experts. Your activity will gain a networking dimension with original and transferable outputs.

2. Whether the activity is a one-off event or an already existing community, the important thing is to know the participants and make it possible to meet their interests while mixing up the profiles as much as possible.

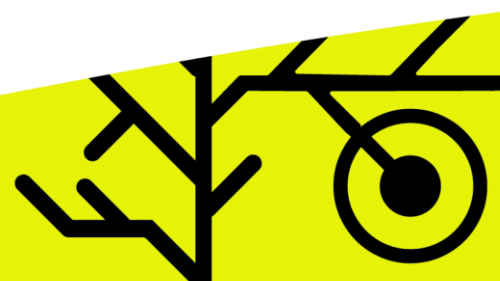More generally, co-design the activity with your community: it is important to involve the participants as early as possible (cf. keynote).

TIP

The importance of the workshop #0

Before the activity, launch a call for applications or a pre-event survey to collect data and test the challenge while mixing up the groups.

If you have more time, you can also organise a speed meeting session or a pre-event meeting.

Maintain the engagement along the process and the alignment of the group

When you have a lot of different profiles and backgrounds, and when people do not know each other, the alignment of the group can be a real issue. On the contrary, stimulation may be necessary when people know them too much (curriculum context). According to the context, the mentors, who can be the teachers or external persons, have important facilitator and community manager roles. They prevent and reduce dropouts, set up conviviality (and fun) moments and encourage communication within and among groups. Nevertheless, they need help with tools, especially in an online context.

Depending on the context:

1. Mentors can be external actors: they are often chosen because they have expertise on the topic, but most of all, they should be chosen based on their ability to communicate and encourage collaborations.

2. Teachers are often mentors: they have an identified pedagogical role. They should be before all team builders accompanying the dynamic. That means that they encourage connections within and among groups, but, at the same time, they have to let the group be autonomous, if possible.

More generally, understanding the mentor role is fundamental for all the activity stakeholders and the community.

TIP

The icebreaker moment(s) and "reflection" sessions

If mentors are external, be clear on their role. Have an icebreaker session or a first immersive phase to encourage the interactions and give the floor to each participant, even mentors. The longer the activity, the more you can have « regulation » sessions, which are moments to re-evaluate the activity by collecting feedback, and to adjust it if needed.

There can be regular appointments to follow up the project (at the beginning of each session/each week/each month, it's depending on the length of the activity), or you can create a common board to follow up with the progress of the project. .
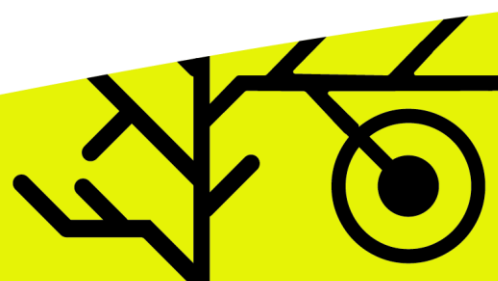
Create communities and organise conditions of networking

Open innovation activities can and must be sometimes punctual events. The necessity of results and outputs can reunify short-lived communities in a specific moment to answer to a specific challenge. For the participants, it is still an important moment of networking. Nevertheless, the more sustainable the community is, the more the socio-economic impact is measurable and perceptible. Building on a community linked by common needs is a way to increase the social impact of activities and HEIs, more generally.

Teachers are the key resources in a pedagogical context (intracurricular) because they link the different editions: an interdisciplinary pedagogical group is a real resource. Some external partners can also be included as "guests/mentors" like ALUMNI or socio-economic partners. Common needs, for instance, community needs, help co-develop the community feeling and networking dimension and create more impacts on employability (internships, concrete actions…)

More concretely, discussion sessions are networking moments. Especially, the discussion at the end of the activity, which reunifies all the stakeholders around the presentation of the outputs, creates networking conditions by assessing the results and the impacts. This moment has to be convivial and open. As a facilitator, you create the conditions and not necessarily operationalize them.

TIP

Institutional dissemination or social networks are easy tools to animate communities:

The sustainability of the community depends on means and needs. Even if you don't have time or possibilities to broadly disseminate the outputs of the activity, at least the first action to take is to resume the results/solutions/and to disseminate them within the participants. If you have more means, you can use social networks to animate the community in the long run. Departments, projects or megaprojects can have social channels and their own networks.
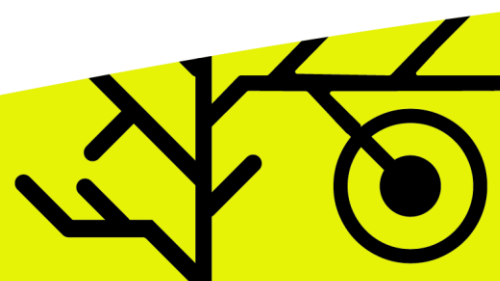
Use open innovation tools and resources

✓ What are the main benefits?

OS/CS/OI tools often imply no financial costs. They are well-suited for online-based, home-based and distance learning. OS/CS/OI Learning Activities often take advantage of online resources that are openly accessible, which can be used as at-home learning tools and resources. Real scientific tools and data encourage a genuine experience and satisfy participants.

⧗ What are the long-term impacts?

Open tools and resources encourage the learners' autonomy during and after the activity. Once the tools are mastered, they can be reused in other contexts and purposes. Open resources such as open data mean direct access to knowledge and data valuable for participants and society to avoid misinformation.

✗ What are the main constraints?

The accessibility can be complex: the choice of the proper tool, as its adaptability is an issue. Again, active pedagogy is a new mindset and may need acculturation for some participants/students. The HEIs' politics should drive the appropriation of these tools and methodology: RGPD, data storage, software licenses, etc.
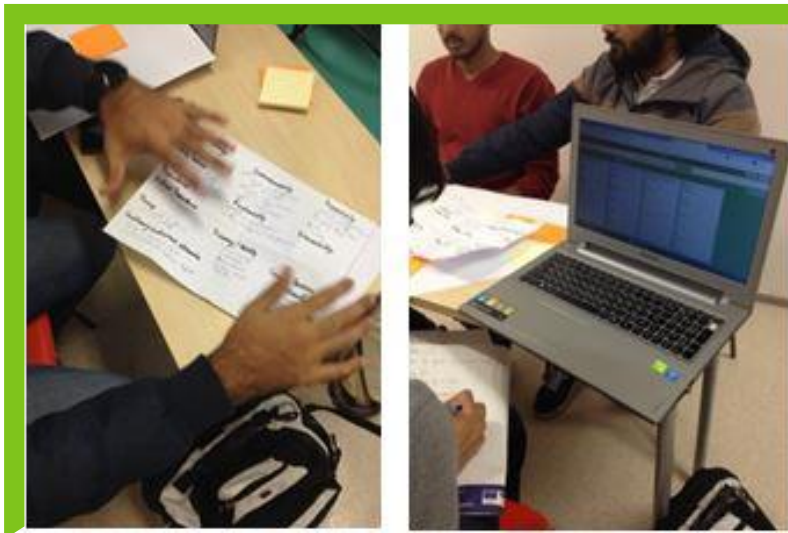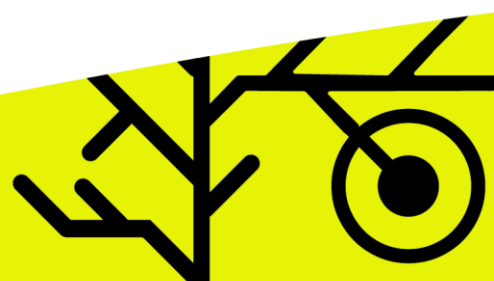

Photo credits: Kai Pata

Accessibility and equity in online learning contexts: autonomy as a teaching principle

The frame of OIAs based on the Design Thinking method promotes equity in learning and contributes to modernizing learning practices by designing investigations, developing explanations, and arguing from evidence. Based on recent scholarship, viewing science as engagement in practice is a more authentic alternative to the common notion of "science as the accumulation of knowledge." By teaching practices, we mean the recurring professional work devoted to planning, enacting, and reflecting on instruction. We emphasize teaching as a way to acknowledge students' participation. Learning currently is mediated more directly by teacher decisions about the kinds of tasks, talks, and tools used in the classroom.

Despite their differences (formats, topics...), OIAs share an equity learning atmosphere where all students (1) can achieve equal learning outcomes as their institutions and their faculty support them in the learning process. All students are given access to appropriate and effective learning opportunities (open data, open tools) and instructional resources, activities, interactions, and evaluative assessments, differentiated according to their unique sets of characteristics and needs.

(1) Margaret Aker Concordia , *Back to the future: The implications of service and problem-based learning in the language, literacy, and cultural acquisition of ESOL students in the 21st century* University, Chicago,2018

(2) *Diversity, Equity, and Inclusion*, Melissa Mallon Pages 319-325, 2019

The criteria of equity (2) are:

1. *The accessibility of materials (shareable, printable and compatible)*

2. *The adequacy of digital technologies*

3. *The fact that the lectures are available asynchronously*

4. *The inclusivity. All experiences and profiles are valorised.*

Contributor: Raoudha Brini

Tip 1 : Maximizing visualization

HOW ?
– Collaborative tool such as klaxoon, Miro, Mural
– Mindmapping tools such as Coggle.it
– Storyboard tools such as WonderUnit
– Or any tools specialized in classroom supports such as Sutori or Design Thinking such as Uxpressia

Tip 2 : Encouraging self-motivation via student-generated data

HOW ?
– Real-life dataset : participants can generate data during the course thanks to immerse exercices such as inquiries, empathy map or benchmarking
– Invitation of experts during the immersive phase (Q:A sessions for instance)
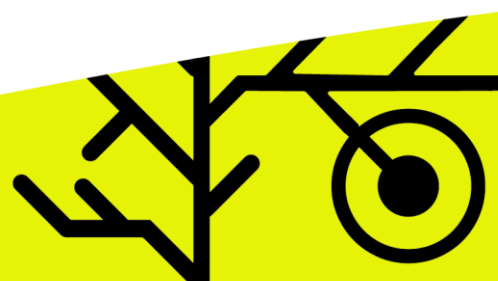
Tip 3 : Using active learning methods

HOW ?
– Role-playing exercises (examples : interviews, user testing position)
– Case studies or written exercises if time allows it

Tip 4 : Creating instant feedback and interactive checks

HOW ?
– Organise small tests on theorical parts with vote tools such as Wooclap or Tricider

Figure 4 – Five tips to foster active learning in OIAs

Prepare the accessibility of tools and resources

The choice of the tools and resources depends on two main factors: the format of the activity, of course (online/hybrid/face-to-face) and the level of your participants. If the format is online, you will need some basic communication tools.

Regarding online and hybrid formats, collaboration tools can be used for workshops or during the whole process to ideate, design, communicate, collect and store. In HEIs, the question of EdTech is central. Indeed, digital platforms and tools are no longer considered as simple supports but as real learning experiences strengthening access to data, resources and project management in general. Therefore, the reflections of HEIs focus more on their form than on their usefulness as such: one centralized tool? Many tools? Many resources? It depends on the framework, but the essential thing remains to organize the availability of the tools and resources during all the processes regarding the needs of the participants.

1. Regarding the diversity of the formats, the essential is to have one space for collaboration (a common space for all participants) and one for communication between individuals (online if needed).

2. A lot of collaboration tools available are linked to Design Thinking. They can be prepared with strong canvas and are easy to handle Miro, Klaxoon, etc. Participants can also use their own tools and learn from each other. It depends on the levels and expectations. The advantage of sharing tools is the accessibility within the group which is an informal way to learn and collaborate. All boards can be opened to all participants, even if they are not in the same groups.

3. One collaboration tool can also be an option, but it needs to be a good practice at the community scale.

More generally, the accessibility of materials and tools is an issue. The materials should be easily shared, printed, and compatible with assistive technologies. Digital technologies should be supported by the IT departments of the HEIs, if possible. The mastering of tools is a requirement, especially by the mentors.

TIP

Ask your participants to self-evaluate themselves

Especially if you choose to use innovative tools, which can be helpful (using tools is very satisfying regarding empowerment), ask your participants to evaluate their level and prepare a training session for the participants and for the mentors as well if needed.
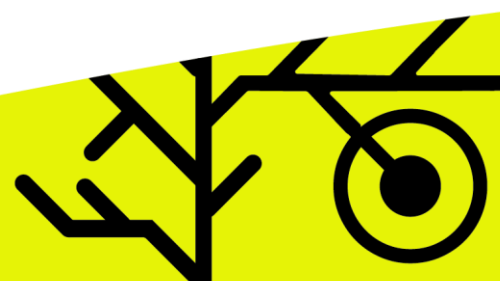
Adapt the use of the tools and resources

Regardless of the initial choice of tools and resources, it is possible that for various reasons, these choices are no longer suitable, for instance, when some learners do not understand the tools and resources, or they do not have the same technical background to allow them to use the tools fully. The question of the appropriation of the tools by all the learners, and implicitly behind it the alignment of the group, remains central. Indeed, if the group does not self-regulate by equal involvement, deviations or misunderstandings can crystallize.

With multiple tools or one complex tool, you must accept that some participants will be disappointed. If some resources cannot be used, you need to stick to mastering the existing ones to carry out the activity.

Depending on the format, some habits can be adopted:

1. Canvas as open resources / Design Thinking method can be useful to create some markers and be sure that everyone is at the same level. Setting benchmarks at key moments with easy-to-fill documents can prevent dropouts for technical issues.

2. Concerning the use of open tools, you can also have some practices in your institution already that facilitate the appropriation of common tools. These practices are ways to save precious time and to capitalize on the sustainability of the activities.

3. If you choose to stick to new tools, which can be a pedagogical choice, demonstrations and training sessions are always useful.

4. Do not forget to take care of data and its accessibility. Open innovation is also about access to knowledge: if the data is provided by external people (experts, users), make sure that the participants are in direct contact.

TIP

Monitor the activity

Monitoring the activity can be simple and a good way to move from one stage to another and adapt the pedagogical process with some testing or feedback sessions.

In long activities, you can even adjust the open tool mastering by organising a second training session.

In short activities, a permanent help desk (a dedicated channel on slack for instance) helps to make asking questions and mentor support as easy as possible. If possible, the IT Department can be a support to train the mentors, for instance, or back up the activity.
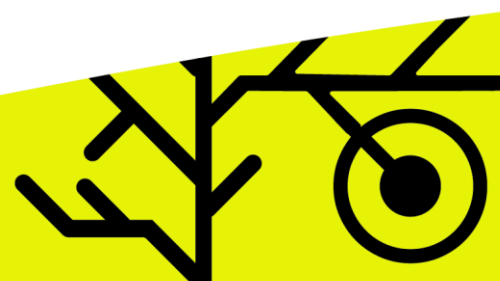
Encourage open data & open access culture

Open data culture is an issue, especially for HEIs. The open data culture is developing itself in universities in different ways. Accessibility to resources can take various forms: tools, of course, and other resources in the broad sense of the term. By resources, we are talking about data, real infrastructure, and tools such as FabLab, creativity lab or design lab. Many resources can be available for participants in HEIs (training courses, documentation and publications from Libraries). Involving these resources is a good way to participate in open data culture.

Concerning online format, some resources can be created to be available during the activity, like webinars. The creation of new resources can be part of the co-design process of the activity. For instance, a group of participants can make specific materials, especially used during the immersion part of the Design Thinking process (such as researchers).

This **discussion-based learning (see Learning Design Framework)** activity inside the project-based learning activity may be reused in another context and serve the open data culture and the transfer of knowledge from the HEI to civic society.

TIP

Show the multiple applications of tools and resources, and encourage the asynchronization of the activity

Record lectures, and caption videos and audio content. Ensure the asynchronous availability of lectures; facilitate the accessibility of these lectures or any other video or audio contents through captioning formats.

In the long run, the community will appropriate itself with these best practices and participate in the acculturation of the establishment with open access culture.
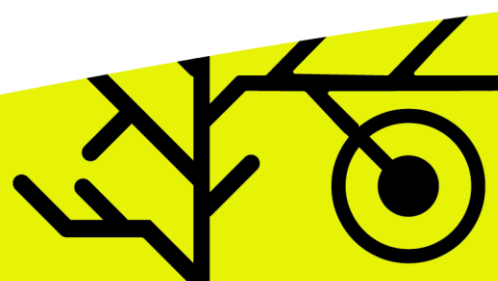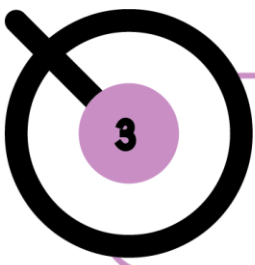
Foster the training of soft and technical skills necessary to Open Science and Open Innovation practices

3

Keywords: skills, open innovation practices, open collaboration

Key Tools: surveys, evaluation tools

✓ What are the main benefits?

From short to long activities, the open innovation dynamic will always be supposed to work on soft skills such as communication skills or technical skills if the Design Thinking method is used. The longer the activity is, the more you can play on the empowerment feeling on skills. Active pedagogy is a key concept to understanding the empowerment dimension of OIAs. As in a professional context, the learner is responsible for his own empowerment and aware of these effects.

## ✗ What are the main constraints?

The recognition of skills linked to innovation is the first barrier. The experience shows that even for teachers, it is very difficult to know the required skill sets because there are many different typologies, and they are always moving or changing. Moreover, in the curriculum framework, the evaluation is an issue and can require fundamental work on accreditation on the institutional scale and with transversal skills in general.

⧖ What are the long-term impacts?

By their content, often linked to actuality and open data, or their form based on collaboration, open innovation activities are opportunities to raise awareness on certain issues or promote technical and soft skills in innovation work (Charosky et al., 2018; Li & Johnson, 2015). By clearly showing the link between the resolution of complex problems and application in the real world, the learner is fully aware of the increase in skills in this type of activity. This work greatly contributes to the awareness of the usefulness of these skills in a socio-professional context.

Photo credits: Alexandre Taube / Léonard Blondel
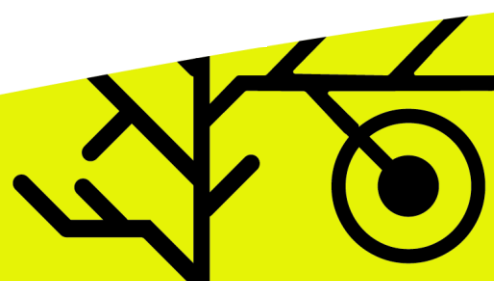
To link open innovation skills and socio professional skills. Open innovation activities as springboards for the professional world

The ESCO (European Skills/Competences, qualifications and Occupations) identifies one competency referring to innovation: the knowledge of innovation processes defined as "the techniques, models, methods and strategies which contribute to the promotion of steps towards innovation".

Taking this into account, making innovation requires a knowledge of its methods plus a set of skills and capacities not directly linked to their innovative aspects such as project management or interpersonal skills. In open innovation activities, the development of the "innovation processes skill" is fostered using the Design Thinking method, which characterizes this process in many project-based learning activities.

For longer activities, participants will also develop technical skills depending on the matter and on the format of the activity. Online formats will enhance the skills applied to a numeric environment, called "Digital skills". As noted by UNESCO, Digital skills, "defined as a range of abilities to use digital devices, communication applications, and networks to access and manage information", have moved from "optional" to "critical" in the actual context.

More generally, whether long or short, open innovation activities imply the acquisition of so-called "soft skills", considered transverse skills because they can be mobilized in multiple professional contexts. First and foremost, the communication skills: they embrace the oral and written communication and the collaboration and teamwork aspect of the activities. These skills are the basis of any type of OIA that, as a reminder, are built on cross-boundary collaboration and cooperation principles. Then, to different degrees, other organisations and reflection skills can be mobilized like adaptability. The longer the activity is, the more these organizational or reflective skills are in demand, particularly project management, which requires autonomy, self-regulation and coordination between participants.

According to the world economic forum's Future of Jobs Report, here are the top ten skills of tomorrow (see table 1). It has to be noted that all these skills are at least requested in open innovation activities: their depth depends on the duration and intensity of the activities.

Contributor: Samuel Bonnet

| Criteria	Max. Score
Quality	20
Relevance	20
Originality	20
Feasability	20
Transferability	10
Sunstainability	10
Total	100

Table 2 The main socio-economic criteria used to evaluate an OIA - source Evaluation grid used in DigiEduHack

Table 3 - Top 10 skills of 2025 according to the World Economic Forum - see the source below

Problem Solving	Self-management	Working with people	Technology use and developpement
Analytical thinking and innovation	Active learning and learning strategies	Leadership and social influence	Technology use, monitoring and control
Complex problem-solving	Resilience, stress tolerance and flexibility		Technology design and programming
Critical thinking and analysis			
Creativity, originality and initiative			
Reasoning, problem-solving and ideation			
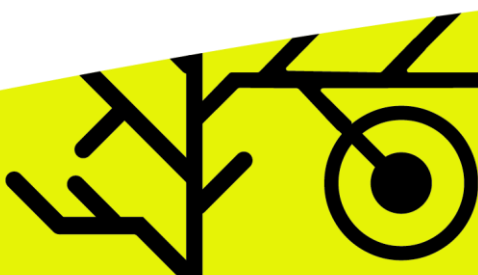
Work on the expectations of empowerment of the group

Open innovation activities have various formats with various topics, including some actual challenges such as climate change or the future of pedagogy. The topic is attractive, and participants can have expectations regarding personal learning on a specific topic or challenge. However, sometimes the "plus-value" of open innovation activities as a catalyst of empowerment, making learners autonomous and active individuals by developing new skills, is not obvious.

As a transparent and regulated method, the Design Thinking method can increase this empowerment by assessing the acquisition of soft and technical skills, especially communication and digital ones.

It is important to consider that Design Thinking is already an innovative skill through the technique and the know-how that its practice brings. Consequently, taking time to name and introduce the approach and its benefits is useful for any kind of activity:

1. Co-design from the beginning of the activity can be complex in short activities, but a small presentation on this method is the first step to underline it.

2. Then, notify the skills acquired during the activity before starting: to know about empowerment is very important in an active pedagogy context.

TIP

Show up the expectations / the gains regarding the activity

It's indeed important to put forward the kind of soft and technical skills stimulated by the activity. This can be done in the presentation of the training just before starting the activity or even in the communication (announcement of the training for instance)

An evaluation in a pre-event survey can be also a good tool to collect the expectations and the abilities: associated with a post-event survey, it allows to measure empowerment.
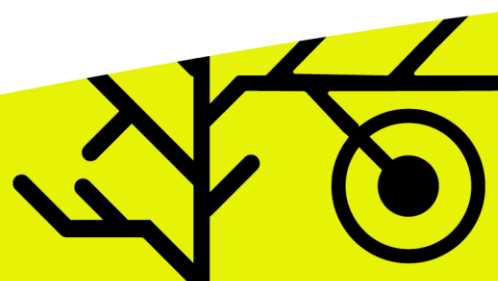
Encourage the self-monitoring of the acquisition of new skills

In the continuity of the previous stage (announce the skills requested within the framework of the activity), it is important to refer to the common skills and reusing them in the professional world. The empowerment of learners (see definition above) is, of course, linked to the use of the tools, a skill by itself, and the collaboration dimension of the activity. The role of the mentor is to underline that aspect throughout the activity.

It has to be noted that you can assess some organisational and reflection skills with longer activities. The impression of project management empowerment depends on the length of the activity: carrying out a project over a long period often comes to develop other skills grappling with organizational issues, for example.

1. Remember that open collaboration is a skill itself. By providing an introduction or, if needed, a training session to the Design Thinking method and its different phases described below, you arm the learners by giving them the keys to access collective intelligence. The mentors can play that role as well. The consciousness of the method is important to increase the empowerment feeling: based on iteration, the Design Thinking method allows the participants to retain that learning.

2. The feeling of fun increases empowerment. Having informal moments to discuss the question of assessment of the acquired skills or the motivation to pursue the activity can also be a good way to show the learner the rise in skills (for instance, vote or informal competition).

TIP

Propose a post event survey to encourage the self-monitoring of the empowerment, or organize a session dedicated to the self-evaluation of the skills during the learning process.

Even if the topic is the first expectation, the design thinking as a method can become very attractive along the process.

Make visible the empowerment with socio-economic criteria

Open innovation activities deal with challenges based on socio-economic issues. The very notion of innovation presupposes a form of response to a cyclical problem. After naming and self-monitoring, the skills according to the activity's format and nature, assessing the skills is the final step. Moreover, this goes through the evaluation of the solution and its impacts.

Mentors or socio-economic actors can provide the necessary expertise by underlining the importance of transferability and originality criteria, thus empowering the learner by confronting him with the "real world". Their contribution, notably during the prototyping session, is very helpful to avoid the lack of originality that can be a common trap in certain challenges. They are also providers of adapted technical support, leading to unexpected empowerment. They often represent the final user, meaning they can traduce society's needs. Some moments are more suitable than others:

1. As the final session, the testing sessions are part of the Design Thinking process and are the best moments to discuss the impacts of the solutions on society.

2. The communication session is organized as a pitch and then a discussion with the whole community (including possible socio-economic actors,) summons skills such as communication or critical spirit.

TIP

Use assessment tools like evaluation grids, feedback notes and open badges

To enlighten the empowerment dimension of the activity, and to underline the relevance of the activity within a socio-economic context, are very valuable and attractive for participants. A common template (for instance the evaluation grid provided below) is very helpful to compare the results (self-empowerment) and the feedback of experts on skills as well (valorisation).

Some canvas can be used (evaluation grids) and are available on certain megaprojects websites.
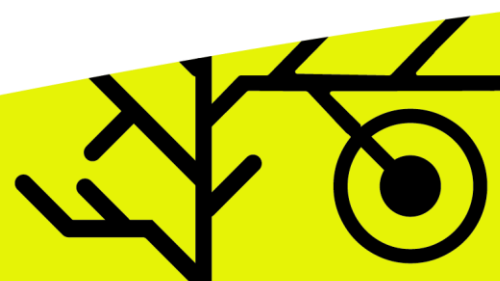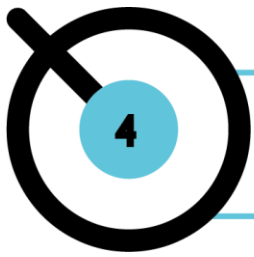
Open up activity's outputs (and make them open access if possible)

Keywords: open outputs, open documentation, intellectual property, dissemination
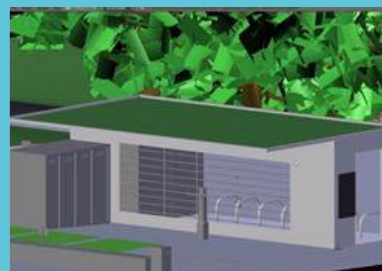
Key tools: rules, dissemination tools

✓ What are the main benefits?

Open access implies the promotion of solutions to the public and concrete results of solutions. Participants appreciate having real-world impact via their participation. In innovation-based projects, having students cater to their target end-users or their own communities also enables directly seeing the usefulness of their work in the real world.

✗ What are the main constraints?

Opening up outputs works on their dissemination. It is not always possible for many reasons, especially in strict pedagogical contexts. Indeed, it implies knowing about the media, having support from the innovative ecosystem of the HEIs and finally having means and resources (human resource and funding). Moreover, in certain contexts involving external partners and/or announcing the implementation of solutions (prototyping and documentation, work on the action plan), the question of intellectual property rights can be raised and thorny if not anticipated. We can cite, for instance, extracurricular and open events such as hackathons.

⧗ What are the long-term impacts?

Overall, openness improves the quality of scientific and innovation outputs, especially in the face of complex multidimensional issues that benefit from holistic problem solving (Hautamäki & Oksanen, 2016; Sanz et al., 2014). OS/CS/OI also promote public engagement with science and technology, openness and active citizenship. Citizenship is more and more a priority for HEI as socio-economic actors. By realizing that open innovation activities can create innovative and applicable outputs transformative for the society, the HEIs can take an important role in society and enrich the culture of innovation of its communities.

Anticipate the nature of the artefact and prevent valorisation issues (IP Rules)

participants (see Table 2-1 - comparison of intellectual property management scenarios in Guidelines).

Many Hackathons set rules before the activity takes place.

OIAs can produce some very successful solutions depending on their lengths and targeted results. The valorisation issues must be anticipated as they tackle real-life issues and may imply some external partners.

The first way to anticipate the valuation of outputs is to imagine them by putting yourself in the shoes of the participants (the canvas presented in the first chapter can be useful for that purpose) and then by considering the dissemination and their valorisation. The intellectual property issue is not a priority for HEIs since the activities often have mainly educational objectives. Therefore, the process often stops with the generation of ideas and, unfortunately, does not go as far as prototyping ("test and learn"). An idea alone is not patentable, but if the artefact is defined and documented, which is very interesting in innovation processes skills, it can be. The experience shows that "HEIs will generally not seek to bring solutions to the market and might favour the two scenarios where participants retain all rights (and where standard rules for the invention of their staff applies) or the work is under permissive license" (cf. Guidelines). With the development of the open-access culture in universities (with the appearance of the fablab culture, for example), learning and communicating about open documentation and dissemination in open innovation networks can be the first way to acculturate communities to open innovation processes and to valorisation of the outputs. Nevertheless, in the context of hackathons, with prizes and partners, a good knowledge of intellectual property management scenarios may be necessary to adapt the rules and make a clear level of valorisation for all the
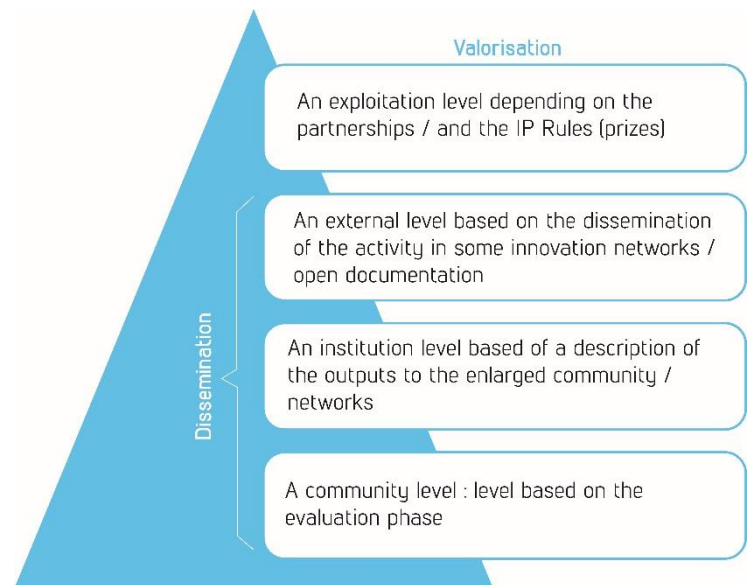
Figure 5 - The levels of dissemination and valorization of the outputs in OIAs

Anticipate the valorisation of the outputs (format and dissemination)

The nature of the challenge, as the length of the activity, can lead to a diversity of outputs. Indeed, the time dedicated to the Design Thinking method, and each of its phases, guides the format of the prototypes that will be presented at the end of the allotted time. It can be challenging to frame and anticipate the valorisation, notably with the preparatory canvas described previously (cf. figure 1), which can be a good way to prevent some difficulties.

Between intensive and non-intensive activities (running along one semester), this anticipation work can vary and need some adaptations:

1. Some hackathons engage with a common canvas to organize the dissemination and the plurality of the results (cf. megaprojects). It encourages the comparison of projects and makes the expectations clear.

2. In longer activities, especially the ones lasting one semester, the process is longer. You will need to be flexible and adapt to the conditions.
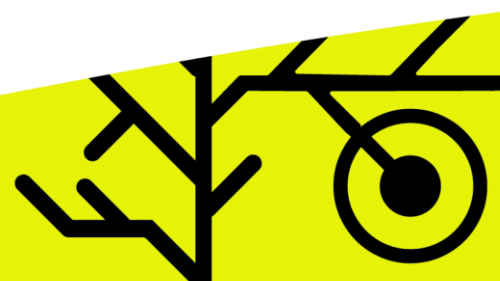
Less intensity can lead to a non-predictable result: to have some "deliverable" along the process may help monitor the nature of the results or just the general framework.

TIP

Give general instructions/frameworks or even rules if needed

General instructions such as the time for presentations and evaluation conditions are important and should be announced to the participants.

The prize or the announcement of the concretisation of the process is a means to anticipate the artefacts by considering the economic aspect of the solutions. The important thing is to make this step clear beforehand by establishing clear rules to avoid disappointment.

Make the outputs and the ongoing data visible between the participants

Open innovation happens when the data are opened. The visibility of outputs and data in general with tools, supports, and final presentations are important. The use of open tools and common storage spaces means making all the innovation processes visible until the pitching session.

Some good practices can help to disseminate the productions throughout the community of participants:

1. The process is an output by itself, especially in long activities. Documenting the process is part of the activity in Design Thinking practices, and it is tricky when a lot of the work is made into groups. Rhythming the activity with shared moments is key, notably in long-term activity by organising workshops and inviting external and socio-economic partners (it is a return on investments for them).

2. In short activities, a common board where all the teams are working at the same time is a good practice.

3. More generally, common storage space is fundamental for all kinds of activities. Beyond the collaborative aspect, this good practice allows participants to access any resource creation fully, encouraging collaboration between teams or groups.

TIP

During the learning process, **use a common canvas and organise common discussions to make progress points with the different participants/groups.** Design Thinking is useful to support the visualization of collaborative processes. All participants should be on the same track to understand the outputs.

Valorise the diversity of the outputs, which is important in all innovation processes (originality) and encourage different formats of presentation.
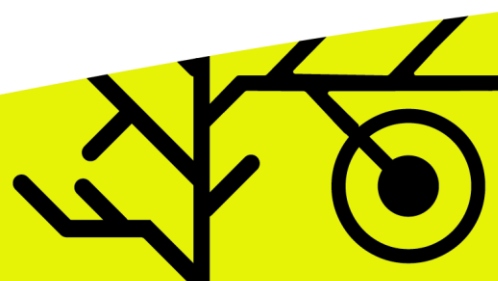
Make the data visible and understandable beyond the participants

According to their level of finalisation, you can help disseminate the outputs, in their socio-economic value, for instance (patents or publications), and encourage the innovative culture within a community, an institution or even a network or an ecosystem. It depends on the means you have and the duration of the prototyping process. According to the degrees, the minimum is to present the outputs within the community of participants to meet the participants' expectations and satisfy them.

Documenting the artefact makes the solution understandable and impactful by responding to 3 questions: how the idea is supposed to work? (description) What is needed to make it work? (technical aspects and environment) How could it be adapted to different settings? (transferability)

Some good practices according to the formats can be useful:

1. In very small activities (half a day or a day format), disseminating the prototypes as a takeaway resource is the first support. It can be done just by disseminating the final board of the Design Thinking method with the participants.

2. The innovation dimension is often not a priority in long activities, but the community aspect can increase the dissemination by showing the results. As a professionalisation activity, the work in the interest of your community and the impacts of the results. Think about the

results as open access data and a good way to enrich the activity in the long run.

TIP

Imagine innovative and convivial ways to disseminate like video, notably with socioeconomic partners or mentors.

You can also organise convivial final moments, or a feedback event to encourage the sustainability of outputs, making the community stronger.

Think about "intermediary dissemination" with short-lived communities: social networks can be interesting tools to create some unexpected results from the outputs.

Examples of tools: Docsify, GitBook, Docusaurus, Opendoc or do doc
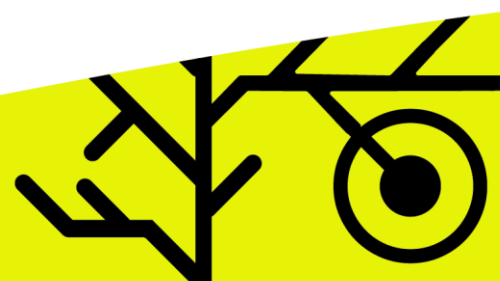
Make the activity available as an open educational resource

Key tool: learning design framework

✓ What are the main benefits?

OS/CS/OI Learning Activities often take advantage of online resources that are openly accessible. They can be used as home learning tools and resources, including open educational resources. Open innovation activities are more and more frequent in universities, but teachers need a framework to share best practices in a pedagogical community. Having common practices is a gain of time that allows the activity to be replicable.

✗ What are the constraints?

The learning and pedagogical resources have not been developed presently. Each institution has to build the toolbox materials. The culture regarding Design Thinking needs to be deepened as the training of the trainers.
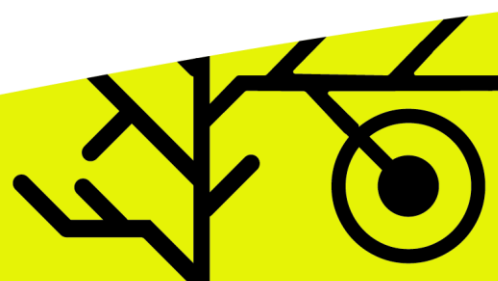
⧖ What are the long-term impacts?

Sharing resources is a way to improve innovation culture and learn from experiences. It is also important to build" a knowledge society" and have social impacts.

Photo credits: Alexandre Taube / Léonard Blondel

What are open educational resources?

First of all, it is important to note the distinction between resources, tools, outputs, and educational resources:

- Resources and tools are materials made available "in a raw way" before the activity.
- Outputs are the artefacts/results produced by the participants. Their outcome varies depending on the duration and objectives of the activity.
- Educational resources are all the pedagogical materials produced by the organizers which are partially or completely transferable after the activity.

The term designates a wide typology of media which forms disparate material: whole courses, course materials, modules, textbooks, documents, and collections of files, case studies, streaming videos, tests and quizzes, digital images, software tools, audio, other educational tools, materials, techniques, or practices.

The more digitized the resources are, the more shareable they are. The INOS project experience proposes the classification of the learning resources to facilitate their opening. It has to be noted that the Learning Design Framework, which aims to ground OIAs in solid pedagogy, has to be considered as the master tool to monitor, evaluate, and participate in a culture of innovation within an establishment.

Table 4 - Key tool: The INOS cartography of resources

|	
Learning resources : resources produced or updated by the teacher(s)/organizer(s) along the learning process	Presentations or courses : after each break (intensive format) or between each workshop / course. Materials : Design Thinking canvas, boards and softwares or practices but also video, audio, images, files and use cases, studies, benchmark… Evaluation supports : grids, canvas, tests and quizzes
General framework resources (INOS inputs) : monitoring and evaluating the activity to replicate it	Learning Design Framework (see annex) Surveys for participants (cf. pre and post event surveys used INOS project in Report on open innovation activities, annexes)
Planning resources (if needed in extracurricular context)	Communication resources (mailing, one landing page social networks and communication tools) IP rules and guidelines Icebreakers
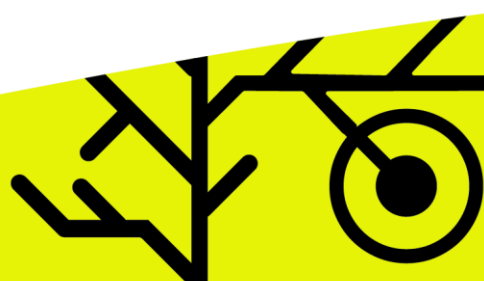
Elaborate the cartography of the learning resources

Open innovation implies a lot of different supports which can be used. The variety of tools, especially regarding the Design Thinking method, permits the creation of many pedagogical materials, sometimes without noticing it. Many canvases may be used as design thinking supports, for instance, or are already available in open access. Nevertheless, these canvases can also be created and publicly shared.

1. In short activities, planning resources are important. They are not learning supports, but they can form the organisers' experience. With short and intensive hackathons, you will have a lot of communication support and short presentations, toolboxes, and support/canvas. The first step is to map them to have an overview of the pedagogical impact of open innovation activities. (See Table 3).

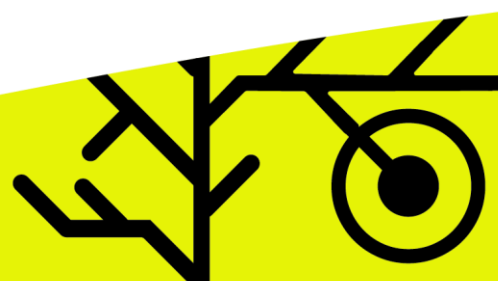2. In long activities, the learning design process is very important.

You can build on the Design Thinking method and its toolbox and methodologies in both cases.

Concerning data and resources notably used during the immersion phase, you can collect student-generated data using real-life datasets or ask participants to produce these data thanks to focus group or interview methods.

TIP

Create a common folder to store your resources (except planning resources). Think of your activity as a toolbox which you are going to evaluate with the process and the reproduction of the activity.

"Take away resources" may be very interesting to the pedagogical aspect of the activity.

Document the Learning Design Framework along the process

The INOS Project proposes that the overall educational, scientific, innovative, and social impact of OS/CS/OI activities would be optimised if the learning components were grounded in solid pedagogy. To this end, we have developed the INOS Learning Design Framework (LDF) as a resource for organisers to improve the educational value of their OS/CS/OI Learning Activities. The LDF allows organisers to make informed decisions about creating new or adapting existing activities and provide guidance on organising, implementing, and assessing the activities to ensure their sustainability.

Therefore, it is highly recommended to document the Learning Design Framework and consider it an open educational resource. The LDF is presented as a form template (see annexe), which activity organisers progressively fill to develop their activities. The aim is to strengthen the pedagogical value, but it is also a way to « format » the activity and make it replicable.

It is a good start to work on the process and document it with learning resources, especially for open innovation activities categorised as project-based learning activities.

TIP

The document can appear as long and fastidious, but it can be filled progressively, at multiple moments.

Moreover, the LDF is designed as a reiterative process. At any point, organisers may return to an earlier step of the LDF to refine or add elements. The checkboxes give some inputs to classify the resources. Once it is done, it can be a very valuable resource at the establishment scale.
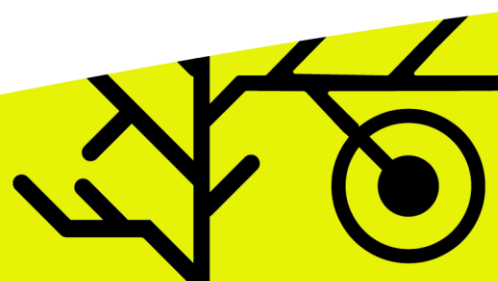
Work on a pedagogical community

It is very difficult to know where to find the proper frame to valorise the materials and make your activity an open educational learning activity.

Moreover, open innovation activities are linked with external partnerships, and sometimes the valorisation can go beyond the institution level. Open data culture supposes that the best practices are shared broadly within pedagogical networks, implying some efforts and acculturation to some new and innovative practices.

First, a pedagogical community within the HEI is an important first step and allows time to identify progressively more large communities.

1. Open innovation is about interdisciplinarity: it permits creating open communities within HEI by breaking down silos and building on themes or fields. This dynamic encourages the writing of publications and the participation of external networks.

2. External events (like international hackathons on a topic) are a good way to participate for the first time in an open innovation network and to have access to open educational resources.

TIP

In HEI, you can work on the dynamic with the library department /or pedagogical development department/ or innovation department. It is important to centralize the information to update the data and encourage innovation in pedagogy.
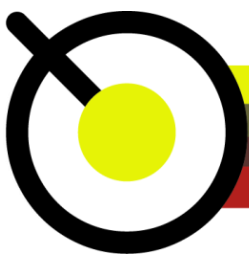
Open innovation activities and practices are a long and slow process of acculturation to innovation. Active pedagogy is not firmly anchored in certain countries and establishments even if project-based learning activities and open innovation activities, in general, begin to gain credence in HEIs.

Therefore, it is important to consider that:

1. It is possible to acculturate communities to innovation with short activities/workshops: active pedagogy must be experimented with and grounded within communities. The INOS experience shows that besides acculturation to some basics, these events are also networking moments that can have interesting long-term impacts and improve the consideration of HEIs as socio-economic actors.

2. Sustainability and replication of the activities are consolidated with working groups and pedagogical communities. Many basics depend on the politics and some departments' expertise (RGPD, choice of tools and financial resources) such as Libraries, laboratories, and maker labs. That is why project-based learning activities have to be recognized as a method.

3. The methodology has to be grounded by training. It is important to consider t raining the trainers. Design Thinking has to become a best practice

4. And finally, all the openness culture, including the five dimensions, is not only a pedagogical business and has to be thought of as strategic development of the HEIs.

Learning Design Framework is more than a tool in that context. It can be a way to communicate within an establishment and be the starter of acculturating to open innovation.
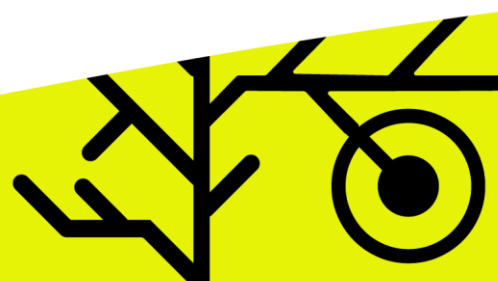
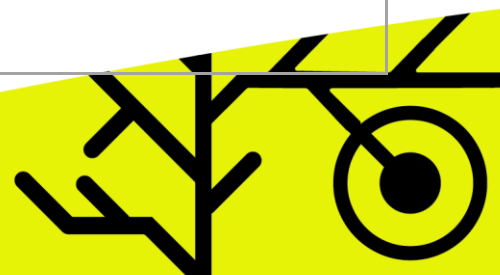# Appendix 1: Learning Design Framework for project-based learning activity

Source: *The INOS Learning Design Framework: Fostering the educational value of Open Science, Citizen Science and Open Innovation activities (Teo, E. A.2020)*

Table 5 Project-based learning design framework (detailed version)

Step 1: Goal Setting

As the foundation to inform further pedagogical decisions, this Step establishes the key background information and the overarching goals of the activity. Details may be added or altered during design reiterations.

STEP 1: GOAL SETTING	
BASIC INFORMATION	
Name of event	
Topic	
Duration	
Main venue/platform	• Physical venue • Online platform • Mixed
Important resources	Important factors affect the design of the activity, e.g., budget, space capacity etc.
Similar activities	Similar activities are for reference and inspiration during the learning design process.
KNOW YOUR PARTICIPANTS	
Description of participants	Important characteristics affect learning, e.g., age, community group etc.

Participants' pre-activity knowledge of the topic	- Limited (e.g., little to no knowledge of the topic) - Basic (e.g., have heard of the topic before and understand basic concepts) - Intermediate (e.g., high school-level knowledge of the topic) - Advanced (e.g., university-level knowledge of the topic)
Participant input on learning design and learning expectations of event	Participant input is gathered via: - Consultation/Focus group - Survey - Feedback from past activity - Co-design of activity with participants - Other: _____ Information to gather: - What do participants expect to learn from the activity? - What are their topic interests? - What motivates participation in the activity?
OVERARCHING ACTIVITY GOALS	
Learning goals	Develop learning goals that consider participant backgrounds, knowledge, inputs, and expectations. Learning goals refer to higher-order, overall learning outcomes[1].
Research/innovation goals (optional)	If relevant, list any research/innovation outputs that will be generated from the activity.
Elements of openness integrated into the learning activity	The activity will: - Use open access tools and resources for learning - Open data - Open software - Open hardware
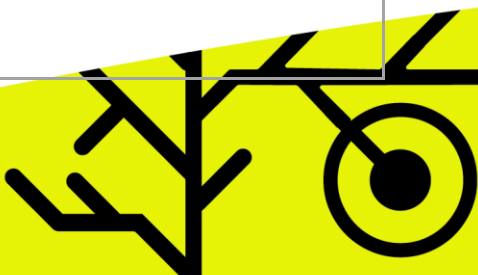
	o Other: _____

	• Involve diversity and cross-boundary collaboration and participation
	  o Participant
	  o groups: _____

	• Train participants with soft and technical skills relevant to overall Open Science and Open Innovation practice.
	  o Describe:
	  _____

	• Generate outputs (e.g., research, innovation, pedagogical data) that are made open access.
	  o Describe:
	  _____

	• Be available as an open educational resource.
	  o Describe:
	  _____

	• Other: _____
UN Sustainable Development Goals – circle relevant	Information on each goal: https://www.un.org/sustainabledevelopment/sustainable-development-goals/

Additional resources:

[1] For more information about writing learning goals and learning objectives:

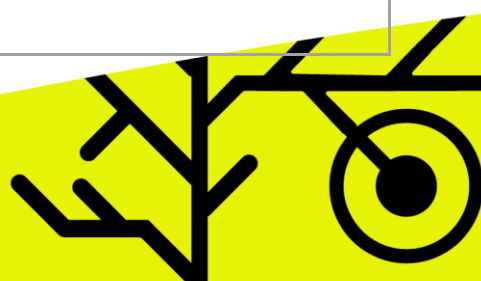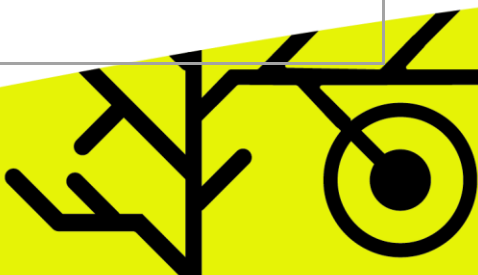The Derek Bok Center for Teaching and Learning. (2020). *On Learning Goals and Learning Objectives*. The Derek Bok Center for Teaching and Learning. https://bokcenter.harvard.edu/learning-goals-and-learning-objectives
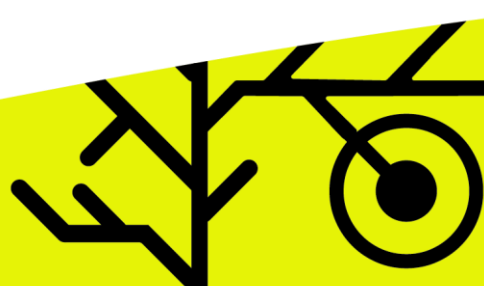
Step 2b Activity development

In Problem-Based Learning Activities, cross-border groups of participants innovate a solution towards a problem.

STEP 2b OPTION: PROBLEM-BASED LEARNING COMPONENT	
PARTICIPANTS' DIVERSITY	
Collaborators	Number of collaborators per group: _____ Collaborators include: • Academic researchers • University postgraduate students • University undergraduate students • High/Secondary school students • Younger school students • Citizens/General public/Non-experts • Private sector • Government sector • Other: _____
Type of cross-border collaboration	Diversity between collaborators are: • Interdisciplinary • Inter-sectoral • Inter-cultural • Inter-community • Experts with non-experts • Other: _____
LEARNING TASK	
Learning objectives	Learning objectives are the specific, measurable competencies to assess if your learning goals have been met.[1]
Ideation	Setting: • Physical venue: _____ • Online: _____

	The problem is:
	- Provided by the organiser(s) - Developed by the participant - Chosen by participants from a domain provided by the organiser(s) Task objectives: 1. Topic exploration, need-finding 2. Defining a problem 3. Brainstorming solution ideas Task options: - Secondary research (literature, websites, open data) - Observing/consultations with target end-users - Group discussions/brainstorms - Other: _____ Describe learning tasks further:
Design	Setting: - Physical venue: _____ - Online: _____ Task objectives: 1. Design model(s) 2. Prototype design(s) Describe learning tasks further:
Implementation	Setting: - Physical venue: _____ - Online: _____

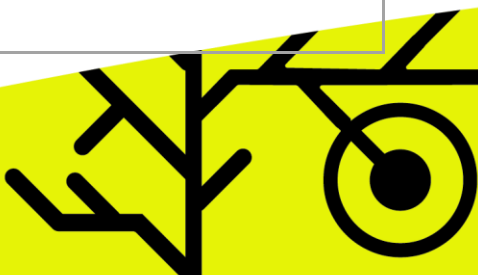|	
44	Task objectives: 1. User testing 2. Reiterative design Task options: - Test runs with target users - Focus groups - Consultation with experts - Other: _____ Describe learning tasks further:
Communication	Setting: - Physical venue: _____ - Online: _____ Task objectives: 1. The presentation and discussion of final outputs 2. The dissemination of final output for real-world application Task options: - Presentations - Group discussions - Peer-assessments - Consultations with experts - Documentation of project outcomes - Publication of project outcomes - Other: _____ Describe learning tasks further:
TOOLS AND RESOURCES	
For collaboration:	

- Physical space for discussion
- Web conferencing software
- Collaboration and file-sharing software
- Other: _____

Resources for design/prototyping:

- Makerspaces/fablabs
- Virtual reality platforms
- Specialised (open) tools/hardware
- Design software
- Other: _____

LEARNING EVALUATION DESIGN	
Learning evaluation information and data	This information is needed to determine if the learning objectives have been achieved (select and add relevantly): • Participant numbers and demographics • Participant engagement during the event • Participant-identified level of interest • Number of participants who completed activity • Participant learning from the event • Comparison of pre-and post-event knowledge of the topic • Quality of questions and discussions • Evidence of advanced thinking in learning tasks • Innovative value of the project outputs • Participant suggestions for improvement and general feedback • Other information and data:
Evaluation method	Describe the method to gather the above evaluation data. • Live feedback from participants • Data analytics (e.g., online activity data) • Assessment (e.g., quiz) • Evaluation (e.g., event survey) • Other: _____ Describe method further:

+ ENHANCING EDUCATIONAL VALUE

- The problem is chosen by, developed by and personally relevant to the participants. Personal relevance has been found to highly motivate learning.
- Provide support as needed to participants to conduct their projects, such as via expertise and guidance.
- Communication with participants throughout the activity is important to create more engagement and learning.
- Design the activity together with educators (e.g., school teachers) to ensure synergy between learning goals/objectives and activity tasks. Create a meaningful and socially relevant activity.
- Document pedagogical information and learning outcomes with open access sharing.

+ ENHANCING OPENNESS

- Consider multiple dimensions of diversifying participants in a group.
- Encourage direct interaction between participants and their project end-users throughout the project, to maximise real-world application of their project.
- Use of open-source software and hardware in tasks.
- The project topic is relevant and meaningful to participants' lives.
- Project outcomes are made open access to the public.
- Increase the diversity of the participants, especially to underrepresented groups. Consider how the activity's design may affect participant demographics.

NEXT STEP: DESIGN REITERATION* OR *RUN ACTIVITY

Notes:

[1] For more information about writing learning goals and learning objectives:

The Derek Bok Center for Teaching and Learning. (2020). *On Learning Goals and Learning Objectives*. The Derek Bok Center for Teaching and Learning. https://bokcenter.harvard.edu/learning-goals-and-learning-objectives
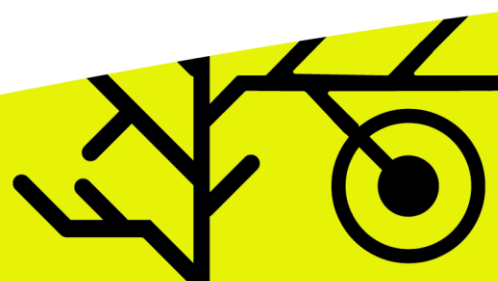
Step 3: Run Activity

This Step, which occurs during the activity, is of equal importance to the other Steps of learning design, as activities are often spontaneously adapted during the event. Table 7 acts as a checklist of tasks for organisers when running the activity and engaging with participants – it should be read before the activity so that organisers are aware of tasks to carry out during the activity. Table 8 may be filled out during or immediately after the activity to document any changes made while the activity was running.

STEP 3: RUN ACTIVITY	
TASKS FOR ORGANISERS	
Pre-activity	- Ensure learning tools and resources are available - Demonstrators are trained/prepared to carry out the activity and are aware of the design elements developed in Step 2b. - Ensure demonstrators are aware of the learning evaluation methods and tools - Ensure demonstrators are aware of the methods and tools for communication with participants
Run activity and engage with participants	- Ensure learning tools and resources are available to all participants - Ensure participants receive sufficient instructions/briefings/pre-training - Engage with participants during the activity to determine if the activity is effective in delivering learning goals and objectives. - Monitor progress of participants as they carry out learning tasks - Receive live feedback from participants
Activity design adjustments (during the activity)	- Based on live feedback and observations, identify challenges affecting learning, such as: - Sufficiency/clarity of guidance and support for students - Group dynamics/sizes - Technological challenges - Logistical challenges - Other: _____ - If able, discuss adjustments to the design of the activity and implement them. Record all changes and outcomes. Continue to observe participants and receive feedback. See Activity Design Adjustments (During Activity) - Table 4.10.
Learning evaluation	Collect learning evaluation information, as designed in Step 2b.
NEXT STEP: REFLECTION AND FUTURE PLANNING	

ACTIVITY DESIGN ADJUSTMENTS (DURING ACTIVITY)		
Challenges	Adjustments	Outcomes of adjustment
Example 1: Participants were confused about how to conduct a data analysis task.	Participants were given additional instruction. You may need to consider pre-training in future iterations of the activity.	Participants were able to conduct the task, but a lot of activity time was wasted to deliver additional instruction.
Example 2: Certain group members were unable to participate in discussions.	Groups were reorganised, and group sizes were reduced.	Improved group dynamics.

Step 4: Reflection and Future Planning

After the activity, a checklist of tasks for organisers for reflection and future planning. This Step encourages organisers to collate and share their pedagogical findings, to improve future iterations of the activity and to develop the field further.

STEP 4: REFLECTION AND FUTURE PLANNING	
TASKS FOR ORGANISERS	

Reflection (post-activity)	Gather all activity evaluation information. including:
	
	• Learning evaluation information and data
	• Testimonials and observations from demonstrators
	• Records of live feedback from and observations of participants
	• Records of challenges, interventions and outcomes during the activity (Table 4.12)
	• Discuss and analyse activity evaluation information to identify:
	• Strengths of activity design to deliver learning goals/objectives
	• Weaknesses of activity design to deliver learning goals/objectives
	• Interventions during the activity that were successful or unsuccessful
	• Difficulties organisers/demonstrators faced in facilitating the activity
	• Technical or logistical difficulties
	• Discuss and establish strategies for improving future activities
	• Alterations and additions to the activity's design
	• Contingency plans for possible challenges in future activities
	• Professional development activities for organisers/demonstrators to address difficulties and challenges when facilitating the activity, such as via:
	   o Professional development courses/training
	   o Gaining additional personal experience
	   o Learning from the experience of organisers of other similar activities

Communication and field development	• Identify key pedagogical findings from your experience • Record and share pedagogical findings via: • Publishing in a relevant open access journal • Publishing open access documents available online • Posting an article/blog post on the project/event website • Linking above resources and sharing key findings on social media (e.g., Twitter hashtag, LinkedIn, Academia.edu, ResearchGate). Ensure findings are accessible to other OS/CS/OI Learning Activities organisers. • Participate and present findings in relevant conferences and workshops • Organise (online) conferences and workshops that enable discussion of pedagogy in OS/CS/OI Learning Activities

50	• Personally share experiences with other organisers of OS/CS/OI Learning Activities • Conduct training for other activity organisers • Other: _____

NEXT STEP: DESIGN REITERATION

REFLECTION AND FUTURE PLANNING TEMPLATE (POST-ACTIVITY)
STRENGTHS OF ACTIVITY

Strengths	Elements to keep for next activity

CHALLENGES OF ACTIVITY

Challenges	Strategies to manage challenges for next activity
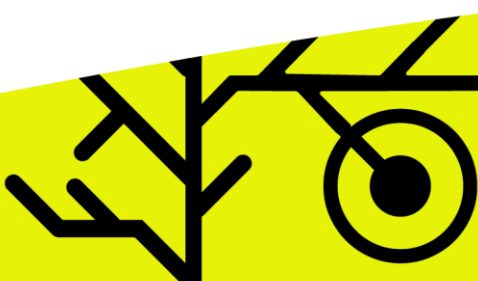
Overview of the INOS use cases

Name	Format	Participants	Tools and resources	Innovation skills (without soft and technical)	Outputs	Pedagogical resources
SPIRIT (UO) - intracurricular	3 hours workshop - ½ day	LET students, external participants and ALUMNI (mentors)	Jamboard	Innovation process and cross border teamwork	Solutions (after ideation phase) /take-away jamboards	Slide presentations and jamboards
DigiEduHack (AAU) - extracurricular	2 days non-stop - 9am to 5pm) - international event	Students, teachers, innovators from different universities or externals and teachers (mentors)	Padlet Zoom and slack Open-resources: DigiEduHack resources	Innovation process and cross border teamwork	Solutions/prototypes (written description/canvas) and evaluation (prizes)/DigiEduHack website	4 slide presentations (before each session) (+ open planning resources)
Climackathon (UBx) - extracurricular	One day + ½ day	Students, administrative, academics inside the university and socio-economic partners (mentors)	Klaxoon Zoom Internal resources and studies	Innovation process	Solutions/ prototypes (tools chosen by the participants) and discussions /institution website	2 slide presentations Klaxoon boards
Civic Engagement (TU) - extracurricular	10 days non-stop	Students, teachers, external participants and socio-economic partners (mentors)	Trello, Mural, Answergarden, Sutori Google drive Zoom Open data (mentors)	Innovation process	Solutions/documented prototypes (PDF canvas) and evaluation (mentors)/ social networks	Lessons and canvas published on the institution website
Megaprojects (AAU) - intracurricular	One semester: 3 seminars and weekly supports	Students from 2 disciplines (same university), socio-economic partners and teachers (mentors)	Microsoft teams Challenges and data (Socio-economic partners)	Innovation process and cross border teamwork	Solutions/prototypes and presentation (socioeconomic partners) and evaluation (mentors)/ project's website	A method Publication of an article

Ocean I3(UBx / UPV / Euskampus) extracurricular	One semester: 5 workshops and exercises on a digital platform	Students from many disciplines and two universities, socio-economic partners (experts) and teachers (mentors)	Oktonine platform Challenges and data (socio-economic partners)	Innovation process, cross border teamwork and identification of professional skills ("blue skills")	Solutions and presentation (socio-economic partners) / civic activities Project's community	Canvas (toolbox) A method: publications and conferences
Cultural data (TU) - intracurricular	Three-week course	Students (one course), socio-economic partner and teacher (mentor)	Trello, Coggle.it, Tricider, Uxpressia, Sutori, Radas.smartzoos, actionbound, goosechase Google drive, google maps, google forms Zoom	Design thinking with online digital tools	Solutions/documented and opened prototypes/ auto-evaluation between students Published on open access (cf. tools)	Google classrooms Activity tracks

Project number:	**2019-1-DK01-KA203-060268**
Project acronym:	INOS
Project title:	Integrating open and citizen science into active learning approaches in higher education
Title of document:	Guide of best practices in open innovation activities
Output:	O4A4
Due date according to contract:	30/11/2021
Editor(s):	Hélène Schwalm (University of Bordeaux)
Author (s)	Hélène Schwalm (University of Bordeaux)
Contributor(s):	Julieta Barrenechea, Raoudha Brini and Samuel Bonnet (University of Bordeaux) Amalia De Götzen (Aalborg University) Katerina Zourou (Web2Learn) Kai Pata (Tallinn University) Azusa Nakata (University of Oulu) Tatsiana Yankelevich and Rosie Allison (STICHTING LIBER)
Reviewer(s):	Azusa Nakata (University of Oulu)
Approved by:	All partners
Abstract:	O4A4 aims to gather lessons and best practices learnt from different use cases into an openly accessible short guide. The objective is to transfer the experiences and knowledge produced during the design, implementation, and assessment of open innovation events to other type of OS activities and other contexts and fields, and to increase the transferability and impact of project results to other HEIs and research organizations
Keyword list:	Open science; citizen science; open innovation; pedagogy; open data
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