**Integrate** **project compostability into higher education training programs. A few ideas for easier implementation.**

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Type of submission

Point of view

Summary

Project compostability is an innovative concept that emphasizes the need to manage projects in a way that promotes their recycling once completed. The idea was born from an observation: although we are aware of the need to recycle our waste, we do not act in the same way with our projects. In line with the current issues of ecological transition, this new concept requires the qualities to be integrated into a training program. At the same time, project-based learning and the competency-based approach, widespread in higher education, are entirely appropriate pedagogical frameworks for its application. They allow students to understand the criteria and major challenges of this idea by putting them into practice in real projects and learning through experience. Based on a study of project compostability, this article aims to explore its potential for integration into higher education.

Key words

Project compostability, project management, environmental and societal transition, project-based pedagogy (PBL), skill-based education

# Introduction

Project compostability is an idea that was born from observing our efforts to reduce our waste. It was introduced in 2015 by Laurent Marseault ( Marseault , 2015) who was then leading a reflection on the means of not wasting the energy invested in a project once it is finished and on the imitation of cycles of the nature. Concretely, this consists of certain specific actions to be carried out before, during and at the end of the project. It is a question of deciding on a method to keep as many traces as possible of what the life of the project will have been (data produced, documents, organization, environment, narration, etc.) and to make them available to any interested person. Once the project is finished, we are generally focused on the final deliverables while the intermediate documents, the methodology and the history of the project are often valuable data if they can be reused. In associations and universities (teaching, research) the awareness of the loss and non-reusability of these riches has led a community of practice to form and adopt compostability, its supporters finding both advantages for them themselves but also for the community.

In essence, this concept, still emerging, has the potential to quickly and radically change mindsets to promote cooperation and reappropriation on a large scale and limit the waste of time, resources and energy. It is also perfectly adapted to the change that is currently taking place in higher education programs in which courses to raise awareness of energy, ecological and social transitions (EEST) have been introduced. These issues are also linked to economic, social and societal issues (sharing, cooperation, commons, etc.) and as such could undoubtedly be easily studied in social science, economics or management courses. Project compostability is, by nature, immediately integrable within the framework of project management training. In addition, project-based learning and the competency-based approach are appropriate pedagogical frameworks to teach project composting because they can allow students to understand the major issues of this idea by putting them into practice in real projects and by learning by experience.

From insights on the concept of compostability and examples of concrete implementation, the objective of this communication is to point out the possibilities of integrating the learning of project compostability within the training courses of the Higher Education. After a detailed analysis of this new concept, this study will endeavor to explore methods and milestones allowing the deployment of project compostability to be envisaged on the scale of a course in a training project. An opening onto broader perspectives will make it possible to propose avenues for reflection in favor of the integration of project compostability within a course or an establishment.

# Understanding project compostability

## A nascent concept

### Historical

The neologism “project compostability” was initially introduced in 2015 by Laurent Marseault (Marseault , 2015). Its reflection is formed from the observation of our efforts to limit the impact and the amount of waste that we produce. We deploy treasures of imagination and energy to recycle physical objects or compost our food waste in an ecological concern. But Laurent Marseault notes that we have not sufficiently realized that our projects eventually die out and that we do not work hard enough to recycle them. By project we mean a series of organized and planned actions (tasks) aimed at achieving a specific objective. Each action is a link in the chain leading to the finality of the project. The death of a project is the end of its life cycle. This means that all stages of the project have been completed and the objectives have been achieved or it has been stopped due to insurmountable difficulties. In other words, if it is correctly anticipated and prepared for, the death of a project should be able to facilitate the emergence of new projects.

This notion of compostability was taken up and developed in 2018 by Romain Lalande in collaboration with Laurent Marseault (Lalande and Marseault , 2018) on a page of the vecam.com website [[1]](#footnote-1). Their work has truly made it possible to lay the first foundations for a concrete and constructed approach to the concept of compostability. Their proposal presents the great potential of this notion and, insofar as the latter promotes cooperation and reappropriation, concludes with its dissemination in the social field. A compostable project is a project that has been planned so that, when it dies, traces of it remain freely exploitable and easily available . Ideally, the compostability of a project is anticipated from the design of the project to optimize the production of exploitable traces. However, it is always possible to compost a project that is ending even if you haven't prepared the thing. Simply, there will remain only the elements that we will find and these will perhaps be neither freely nor easily exploitable.

Some communities in the voluntary sector have already composted projects or even integrated project compostability into their activities (Marseault , personal communication , 2023). The OSONS and Animacoop collectives or the LPED Laboratory [[2]](#footnote-2)carry out projects integrating compostability from their design. Other associations discovered the principle just before the end of a project but still wanted to compost them (Vecam association , #Les Jours Joyeux association [[3]](#footnote-3)). However, the concept is so recent that there is still little documentation of such feedback. Also, project compostability therefore remains an innovation that is still confidential and needs to be consolidated. But, because it is aimed at projects of all sizes and of all kinds, it has great potential for application in all sectors of society (individuals, associations, the world of education and research , companies, etc.).

### Links with other movements

The interest of being able to compost projects is justified by intentions of openness, sharing and cooperation, but also by the need to save time and resources. It makes it possible to share the knowledge and experiences acquired during a project to facilitate its reuse by other people or organizations. This approach thus contributes to enriching a culture of the sharing economy and cooperation that is increasingly present in movements such as FAIR data (FAIR data, 2021), decentralization, the archipelago[[4]](#footnote-4), lowtech or even common (Parange , 2014). These movements often use Creative Commons Licenses and emphasize collaboration, transparency, and active participation to achieve common goals. The community of practice that has formed around project compostability is part of this same logic by making it possible to recycle the productions and experiences of past projects for the benefit of future projects.

## Extensions of the concept

The interest of the concept of compostability is not limited to that of the specific movements within which it emerged. Indeed, this concept also contains notions which enrich it and which are specific to it and whose presentation is necessary to acquire a detailed understanding of it.

One of these notions is that of “grain”, which makes it possible to measure the “fineness” of intermediate productions as well as their ease of reuse. The more a piece of data is easily reusable, the more open it is. This "fineness" therefore corresponds to the degree of openness of the information that will be shared and is not linked to the volume of exploitable data. Thus, for example, copyright-free productions will be more easily reusable than copyrighted data. In short, the finer the grain of a resource, the greater the number of projects that can potentially reuse it. Similarly, well-commented data will be more easily reusable than raw data (for example, lines of code are easier to use when they are commented; it is difficult to use raw data without an explanatory note; etc.). In this sense, we can say that the more the data is commented, the easier it is sto reuse and therefore has a fine grain.

Ideally, the grain is expected to be as fine as possible because we want the widest possible opening. But, for various reasons, this may not be possible or it may be a voluntary choice. The data that will be included in the composting thus has a grain that can be determined upstream of the project.

The data included in the composting of the project are, on closer inspection, information obtained at the end of a transitional work (one of the many links leading to the finality of the project). These are important traces having, for the compostability of the project, the value of intermediate achievements. These “intermediate works” are numerous. Discrimination between those that will be included in the compost and those that will disappear will be guided by the choice of grain size decided upstream of the project.

Another very important notion is that of “central station” proposed by the interpole collective [[5]](#footnote-5). He proposes the following (very general) definition: “The central station is a space for sharing information, physical or virtual, which makes visible all the elements useful to the members of a collective to act there in collaboration”. Also, practically, the central station can be considered as a place of deposit of the physical or digital productions created during a project. The metaphor is well chosen because the central station of a project can also fulfill the function of referral center to other decentralized storage places (in the archipelago) which are the central stations of other projects. Concretely, what is hidden behind this notion can take several forms and is quite correlated with the size of the community that can potentially use the information deposited. Theoretically, if the data to be composted are material, a physical place may be relevant (which can range from a simple table to an archive building), if they are digital, it is necessary to move towards a computer repository (from a simple Raspberry server to a big server on the web). In fact, we work mostly with digital data and digitization often makes it possible to overcome physical media. We can thus consider that a central station is often digital . Wiki farms [[6]](#footnote-6)are quite relevant for this type of use. However, physical central stations can exist and can take several forms.

Finally, what makes a project is also its history, and not just the results. Thus, the methodology used, the context of decision-making, the organization, the chronology of events are often lost when the project has delivered its results. Composting a project therefore also means leaving traces linked to this “narrative” (which therefore includes the methodology). For example, the Animacoop collective ( Animacoop , 2023) collects the following data for each of its projects:

* The history of the collective in order to be able to soak up its culture and the main stages of its development in order to anchor the project;
* The various reports, as a restitution of the actions of each and as a living memory of the action;
* Decision statements that avoid asking the same questions several times and making the choices made effective.

The traces corresponding to the constitution of the data linked to the deliverables of the project will be said to be vertical as opposed to those, horizontal, which describe the narrative. In the central station we will find these two types of data which can be matched so that they mutually enrich each other (narrative data informing about the context of vertical data, e.g. history of the collective, records of decisions, reports) . For example, at the start of the Animacoop work sessions that he leads, Laurent Marseault asks for the mood of each participant (“the weather of the day”) and notes it in the minutes. This information makes it possible to know the context in which the results of the session are achieved.

## Concrete implementation

### Choices and actions

The management of a project's compostability corresponds to all the choices, actions, rhythms of actions. All the decisions and tasks to be carried out in support of the project itself have their place in a process concomitant with the progress of the project. Before the start of the project, a compostability preparation phase is necessary: choice of the grain, the central station, the method of preparation and collection of the intermediate works, as well as the choice of the mode of organization of these actions and their pace. During the project, the genesis of the works and their conservation take place continuously. Finally, at the end of the project, it remains to check the integrity of the entire composted project and possibly harmonize the documents. In the end, we make sure of the availability of compost and of the signs to it. It is also possible to have a dissemination process once the project is finished and the compost has been produced. It will then be a question, by various channels, of informing of its existence.

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| **Upstream of the project** | Choose the grain (or not: we always choose to do the best)Choose the central station (possibly create it)Choose the method of preparation and collection of intermediate works |
| **During the project** | Collect and Process intermediate productionsCooperate with the project team on compostability management |
| **When the project dies** | Ensure the consistency of the project's compost; manage signage; disseminate (by informing of its existence) |

**Table 1. Chronology of (non-exhaustive) activities required for implementation**

Concretely, how does a choice of grain take place on a resource?

Let's take an example. Suppose we want to ensure the compostability of a video asset creation project by opening it up as widely as possible. This means that we must deposit in the central station the most reusable horizontal and vertical resources possible. In this sense the grain must be as fine as possible. So, concretely, in the preparation of the compostability of the project, it is wise to keep the videos without overlays of titles, logos, subtitles or other additions reducing their potential for reuse.

If you want to further refine the grain, a good idea is to separate the elements of a video (like the soundtrack and the image) to increase the opportunities for reuse. By creating separate files for audio and video, this in fact allows them to be used independently and more easily adapted to specific needs. For example, the video can be used with a different soundtrack, or the soundtrack can be used for a different project without having to re-record.

### Limitations and apparent paradoxes

Of course, there are limits to compostability. The impossibility of distributing certain data (confidential, personal, too degraded, etc.) can sometimes oppose this approach. To limit this problem, we can set up a binding charter to avoid this type of data, but this is not always feasible. It is also possible, from the start of the project, to identify non-recyclable data and trace them to prevent them from "contaminating" the productions too much.

Finally, note also that time can be a limitation as there may be deadlines to be met for the implementation of the project, and there may be budget and resource constraints which may limit the duration of the design phase. and implementation. In the particular case of a training project, the supervisors must take into consideration the additional time that the management of its composting will require.

A paradox of compostability is that, although we are in a process of recycling and sustainability, the additional storage of intermediate works can seem counter-intuitive in terms of energy consumption. Although it has not been proven that the energy saved by the reuse of free works is greater than that spent by the operation of servers, there may still be some doubt in people's minds. However, it is possible to resolve (at the very least reduce) this paradox by adopting eco-responsible practices. The LPED laboratory is implementing solutions to limit energy consumption by using mini-servers under Raspberry Pi which are only connected to the internet when the community needs it. Similarly, some associations have reused old computers (which they call “ computers ”!) which consume less energy (sometimes without a screen) and contribute to the recycling of devices (Marseault , personal communication, 2023).

It is also interesting to note that the more traces we keep with a fine grain, the greater the number of projects that could potentially use it. Thus, a well-thought-out approach to compostability creates a balance between the consumption of resources and their reuse, encouraging the development of new projects.

# Project compostability and higher education

## New EEST training requirements

New training regulations, such as the recommendations of the Commission des Titres d'Ingénieurs (Commission des Titres d'Ingénieur, 2022), require that students be made aware of the challenges of energy, ecological and societal transition (EEST). In some higher education establishments, a curriculum reform is looming, introducing the issues of sustainable development and social responsibility into scientific and technical education, (IMT, 2021) and some teachers may feel overwhelmed by this requirement. The introduction in these courses of practical projects in which the students manage compostability, has raitthe advantage of providing a solution to the problems of systemic issues in connection with EEST. A “turnkey” solution for teachers who might be forced to comply without having been prepared. It could allow to also instil a dose of pedagogical uniformity in a course.

## Transversal competence

Competency is an ability to mobilize the knowledge, skills and attitudes necessary to solve problems or perform tasks in a given situation. It is defined by the combination of knowledge, know-how and interpersonal skills, and is linked to specific contexts of use (Tardif, 2006). Competence is therefore a complex concept which, to be assessed in the context of training, requires rich, authentic situations, making the student active (Poumay , 2017).

In this context, project composting seems ideal for serving as a rich learning situation since, from a pedagogical point of view:

* It allows a continuous evaluation of the learning during the long time of a project ;
* It gives meaning to teaching activities and motivates students through the practice of sustainable development generally enthusiastically adopted by students;
* It makes it possible to insist on the acquisition of transversal skills: the mastery of project compostability requiring the implementation of transversal skills such as cooperation, openness, transparency or even creative thinking.

It should also be noted that in connection with skills, but in terms of student achievements, project composting is of great interest:

* It allows students to enhance their training course by giving it a practical dimension linked to an innovative approach;
* It improves the employability of students by allowing them to develop skills sought by employers in the fields of EEST, the circular economy, and project management;
* Finally, it gives students the means to meet the major challenges of society in transition.

These remarks allow us to assess the relevance of project compostability within the framework of a skills-based approach. Since the implementation of projects and the management of their compostability are closely linked, the framework of project-based learning is self-evident.

## Project-based learning

### Development process

Introducing project compostability in higher education can only be conceived if students have to carry out projects (and therefore their post-mortem). Of course, it is always possible to teach it in a lecture (for example in a project management course) but we will then regret a lack of practical application. Also, it is within the framework of project based learning (PBL) that project compostability naturally finds its place.

Lebrun (2002) explained a process for developing a training project in four phases: design, structuring, action and evaluation. Within each of these phases, Lebrun details the actions to be taken. He actually uses verbs to characterize these actions. Note that, for the design phase, he chooses the term “time” which clearly expresses the need to take a step back before carrying out the project in order to prepare it well. This is all the more important since the addition of the constraint of making a project compostable results in an additional step back upstream of the project requiring on the part of the pupils a longer preparatory time. In addition, actions specific to compostability are to be carried out by the students throughout the project and impact the other phases. Also, Lebrun's model can be completed by adding these actions (Table 2). In this proposal for the evolution of the model the non-underlined text corresponds to the original model and the underlined text refers to the integration of compostability.

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| **Preparation for learning (from the project)** |
| * *[Design phase]* analysis (of context, needs, problems)
	+ Observation and identification time ( in particular elements of the project that deserve to be composted; e.g.: are we digitizing our written traces ? … )
	+ Time for problematization ( in particular understanding that the final product is not the only objective, but the traces left are just as important as well as the methodology used and the narrative )
	+ Criterization time ( including compostability criteria, e.g. quantity, comment rate , etc.)
* *[Structuring phase]* imagination (possible solutions, strategies to put in place)
	+ List the different methods ( including compostability management methodology, e.g.: archiving rhythm, meetings specific to compostability , etc.)
	+ Identify the means necessary for their implementation ( in particular which central station(s) to choose ).
	+ Choose one of the possible strategies taking into account the means available, the real conditions, the time available, etc. ( including choosing a degree of compostability for the project ).
 |
| **Achievement of learning (from the project)** |
| * *[Action phase]* putting into practice (i.e. executing the plan)
	+ List the different methods that could lead to the desired result (Brainstorming).
	+ Identify the means necessary for their implementation.
	+ Choose one of the possible strategies taking into account the means available, the real conditions, the time available, etc.
	+ Implement the creation, collection and archiving of intermediate works .
	+ Format and document/comment (metadata) intermediate works throughout the project to promote their subsequent reuse.
 |
| **Integration of learning (from the project)** |
| * *[Evaluation phase]* evaluation (of results obtained, achievement of objectives, follow-up planning)
	+ Determine the extent to which objectives have been achieved and to what degree ( including the extent to which compostability criteria have been achieved .)
	+ Check if the procedure has been followed ( in particular if the compostability of the project is well ensured at the level/degree expected ).
	+ Evaluate the choices that have been made: would we do the same thing again, and how?
	+ Identify unexpected results, the unforeseen, new leads...
	+ Check the consistency and accessibility of the intermediate works, paying particular attention to the signs to these works
	+ Learn from experience, achievements, experiences, shortcomings, etc.
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**Table 2: Approach to developing a training project by Lebrun (2002) extended to include compostability**

Alongside these additional actions are added the “rights and duties” of each. The students must carry out the new tasks that are asked of them and symmetrically the supervisors (or the establishment) also have actions to carry out and must ensure that the students have the means to do the work that is asked of them (Table 3). Thus, for example, the introduction of the management of compostability in a training project must be accompanied by additional time and a phase of presentation of this new concept.

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| Pupils | Teachers / Establishment |
| Assimilate compostability | Explain the main principles and the crucial stages of compostability |
| Have time to organize to take into account these additional actions | Allow extra time for students to deal with compostability |
| Getting to know Central Station and using itor provide one | Master the concept of a central station and possibly make one available |
| Cooperate within the group to manage compostability | $É$assess the management of compostability:$⟼$ Evaluation criteria to elaborate and share with students |

**Table 3. Example of student-teacher correspondence** $\leftrightarrow $**on actions to be taken to ensure the compostability of a training project**

Similarly, asking students to use a central station requires the teaching team to indicate or provide one if the students do not offer one, and obliges teachers to master the concept.

### The project composting action seen as a project

Managing the compostability of a project, in other words working to make a project compostable, can be seen as a project in its own right. Also, to enhance this activity from a pedagogical point of view, it is relevant to examine how the management of the compostability of a project meets the expectations of a training project.

Ledent (1996) identified the objectives that a project-based pedagogy should make it possible to achieve and it emerges from this that it must have the following functions:

* function (giving meaning to learning)
* function (the accomplishment of the work takes into account the environment)
* function (students search for information)
* function (helps students open up)
* function (students exercise their individual and collective responsibility)

With regard to the management of the compostability of a project, it can be argued that the formative function of pedagogy by project is fulfilled because the students are immersed in sustainable development actions, which ensures that they are able to understand the challenges of ecological transition.

The economic function of production is also clearly fulfilled because the students produce works that have an impact on an ecosystem .

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| **Functions of a project in the sense of Ledent (1996)** | **Fulfillment of functions through the management of compostability** |
| **formative function**( give meaning to learning) | Understanding of the challenges of ecological transition, resource management and the circular economy |
| **economic and production function** (the accomplishment of the work takes into account the environment) | Production of works that have an impact in a community |
| **didactic function**( students search for information and process new knowledge) | Processing and valorization of all the assets of a project |
| **social function**( helps students open up) | Development of communication and cooperation skills |
| **political office**( students exercise their individual and collective responsibility) | Awareness of one's role and responsibility as a citizen in the ecological transition |

**Table 4. Adequacy of project compostability to the functions of a project as defined by Ledent (1996)**

Similarly, the management of a project's compostability assumes a didactic function since the students handle new concepts and learn to identify, process and enhance the wealth of a project.

The social function is fulfilled by the fact that students work in teams and develop communication and cooperation skills. They are also involved in a sharing process.

Finally, the political function of a project is also affected since the pupils become aware of their role and their responsibility as citizens in the ecological transition. Participating in the composting of a project encourages them to ask questions about environmental policies and to reflect on the actions they can take at their level.

# Outlook

## Skills repository

In each higher education institution where it is implemented, the competency-based approach is based on a competency framework that is specific to the institution. This benchmark is often inspired by proposals from a collective in the same sector (eg CDIO, RNCP, REFERENS III, etc.) or even a global benchmark such as the UN Sustainable Development Goals (UN, 2020). Training establishments are therefore based on a general reference system by adding, modifying or deleting skills to remain in line with the training they provide. However, in the previous sections we noted that project composting can be considered as a set of educational activities mobilizing a particular know-how. In this context, integrating these activities into training requires that the intended learning outcomes be linked to specific skills (Poumay , 2017). This implies that the framework must include the skills related to these learning objectives.

Consequently, it is possible to consider the skills linked to the implementation of the project compost as skills in their own right that can be included in the skills frameworks of an establishment. And, with a view to the widespread adoption of project composting, this would have the merit of giving visibility to this practice and facilitating its integration into higher education training programs.

More specifically, students who learn to manage project compostability develop specific skills such as “knowing how to cut digital productions into more easily recyclable sub-productions” or even “designing a project taking into account the compostability of digital productions”. These skills could, for example, be added to the general transversal skills.

A wide adoption of the management of project compostability would then make it possible to envisage that these skills be considered as new skills specific to sustainable development and added to the skills reference system of the establishments adopting them and echoed in the references and orientations of the systems. training accreditation.

## Go beyond training projects

Project composting is for all types of projects, not just training projects. Everyone can manage their personal projects in a sustainable way through compostability (respecting their sensitive personal data). In training establishments, supervisors have every interest in ensuring the compostability of their professional projects. Thus, motivated teacher-researchers benefit from composting their research projects in order to set an example for students on the one hand and to ensure the sustainability of their work on the other. Such a widespread practice in the research community would develop a community of practice and the students would be followed by experienced supervisors in the field of project composting.

The LPED (Laboratoire Population Environnement Développement) of Marseille, directed by Bénédicte Gastineau , was presented in the first part of this article as being strongly committed to a process of integrating project compostability into the training it provides. The teacher-researchers and doctoral students of this laboratory were pioneers in this approach, and were supported by the management of the establishment to achieve it.

At IMT Atlantique, the coordination of the European DECART project (DECART, 2023) labeled ERASMUS+ is starting. It aims to analyze the agility, interoperability and resilience of training courses. In its project management package, it includes two Sustainable Development components, one of which concerns the management of its compostability.

Thanks : The author would like to warmly thank Laurent Marseault for his availability and the information provided and Siegfried Rouvrais for his comments and wise advice.

This communication has been produced thanks to the support of the program Erasmus+ of the European Commission (DECART project 2022-25, number 2022-1-FR01-KA220-HED-000087657). This communication/publication reflects only the point of view of its author. The commission is not responsible for any use that may be made of the information contained in this communication or publication.

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1. Vecam (vecam.org) is an association which composted all its activities after its dissolution. [↑](#footnote-ref-1)
2. The LPED Laboratory in Marseille, then headed by Bénédicte Gastineau, adopted the management of compostability in research projects (and also in teaching). [↑](#footnote-ref-2)
3. The #LesJoursHeureux association decided to compost its activities when it decided to dissolve ( <https://les-jours-heureux.fr/archipel/fondamentaux/>). The same is true for the Vecam association (vecam.org). [↑](#footnote-ref-3)
4. The archipelago is a vision and a mode of governance promoting cooperation while respecting the identities and values specific to all types of communities (https://la-bascule.org/larchipel/). [↑](#footnote-ref-4)
5. https://interpole.xyz/?LesGaresCentralesToOrganiseAndReturn [↑](#footnote-ref-5)
6. To get an idea of the richness of a wiki, you can consult <https://interpole.xyz/> [↑](#footnote-ref-6)