

1.1 The Up2U project



1.2 A picture with lights and shadows

People always ask the same question: If a student says or does something interesting, we ask: "Where did you learn to do that?"

It is the answer that has changed. It used to be:

"The teacher told us!"

Today:

"I learned it on the Internet!" or "I saw it on social media!"

These answers testify to two changes:

- From formal to informal learning;
- From face-to-face communication (and from "paper and pen" technologies) to the digital world.

This means that if we want to prepare students for university and then for work (in which, in 2020, 90% of places will require digital skills), we must act simultaneously on both levels:

- to integrate formal and informal learning;
- to adopt a teaching method based on innovative pedagogical theories and effectively exploiting digital technologies to stimulate the acquisition of a well-defined set of key competences.



This is the area in which the Up2U project works. In which "up" indicates the leap to be made, and "U" stands for "university". It also contains a "coded message" for students, because "It's up to you" means "It's your responsibility"!

1.3 Origins of the project

The Up2U project is part of the European initiative "Opening Up Education", launched in 2013, which aims to create innovation opportunities for institutions, students and learners, encouraging the free use of open source educational resources and improving infrastructures.

Funding comes from the "Horizon 2020" programme, which funds research and innovation projects in the period 2014-2020.

Up2U is a large-scale project involving nineteen partners from ten countries over three years, including countries outside the European Union. Partners include major research institutes, universities and digital infrastructure managers.

The goals are ambitious...

1.4 The aim

The goals of a complex project like Up2U are many and varied.

To understand them better, we can place them along a logical path divided into steps.

The starting point is the main purpose, which we can consider a veritable "mission" of the Up2U project: to help overcome the skills gap between secondary school and university education.

We call it a "gap", but it is something more: a veritable detachment that hinders both access to university and success in studies and the workplace. A skills gap that turns into rejections, dropouts and extra years of study. This is the first major obstacle for the placement of youngsters in the workplace and in society.

Having established "what" we want to achieve, the next step in our logical path shows the "how".

1.5 Three main paths

To overcome the skills gap between school and university it is necessary to follow three main paths, the second stage of the logical journey we are following:

1. To modernise, sometimes through veritable paradigm shifts, teaching methods adopted in schools.

2. To better integrate formal learning environments, first and foremost schools, and informal settings, i.e. extra-curricular activities, social life (including social settings) and everyday experiences. In this context, integrating also means enhancing and, to an extent, certifying.

3. To adopt excellent and sustainable digital technologies in schools: a robust and effective communication infrastructure, platforms for collaboration, sharing and use of content, tools for advanced processing of multimedia information

Each path will have a set of activities organised around some specific focal points that are key to supporting the overall mission.

1.6 Actions

On the operational front, the Up2U project has defined some actions concerning infrastructure, technological tools and the community that will be called upon to enact them. As always in community projects, special attention is also paid to the question of "sustainability". These constitute the third step of our journey.

To learn more, click on the four actions...

1. **Infrastructure** here means network-related services, making it possible to disseminate information, store data and provide services. And all in the "cloud": a "cloud" of servers, databases, connections and "traffic" management systems.

Here it is important to sort out privacy problems, relating to the personal data of students and teachers, and security issues, as we must avoid the loss of data, their unauthorised handling and respect for intellectual property rights.

There are already cloud infrastructures, both public and private, used in education and research. The project sets out to evaluate their use, integrate them and adapt them to the specific needs of schools.

2. **Technological tools** constitute a "toolbox", made up of integrated applications, which support the creation of dynamic and customised learning paths, guided by students, allowing social interaction and the sharing of activities and contents.

The applications that are part of the toolbox are tested in a series of large-scale pilot projects to be implemented in partner countries.

3. In the various countries we seek to build as many **learning communities, made up of** teachers and students who, with the use of digital technologies:

- o try out innovative teaching methods;
- o→ incorporate informal learning in school activities;
- o→ help with the acquisition of a set of key competences.

4. In the Up2U project **sustainability** means the possibility of a large-scale use, including commercial use, of the significant amount of research and innovation already available. But it also means thinking ahead, seeking to make learning communities "self-supporting", carrying on actions even after the conclusion of the project.

1.7 Three focal points

To achieve the goals of the Up2U project, a large number of organised activities are planned. We can group these activities into three "focal points":

1. The creation of a technological "ecosystem" that includes and integrates the cloud network infrastructure and the set of applications making up the "toolbox".
2. Research activities to identify the key competences to be developed to facilitate the transition from high school to university and to summarise the main theories and operating methods on which to base the creation of learning communities.
3. Educational activities involving initially the teachers of some pilot schools, then a broader group and finally students.

The technologies and methods tried out will converge into a fourth activity: the spread of the ecosystem and communities of the Up2U project at a commercial level.

Let us now look a little more closely at these three focal points, which are closely interrelated...

1.8 The digital ecosystem: effectiveness, comfort, safety

The word "ecosystem" indicates a set of integrated technologies that form an "environment".

In our case it is an environment that supports student-centered learning methods, with the student carrying out concrete activities, building products, working with others and, in so doing, learning curricular contents and transversal skills.

It is an effective, comfortable and safe ecosystem:

- Effective, because it brings together network-based technologies, platforms and a "toolbox" made up of innovative tools.
The design of the ecosystem is guided by teachers as part of continuous experimentation and fine-tuning work in real formative activities.
- Comfortable, because continuous experimentation in "real" contexts and with "real" users allows the utmost usability. The interface, for instance, is multilingual, and only one password is required for all services!

- Secure, because it meets the requirements of the recent Data Protection Regulation issued by the European Commission. This means that no one can enter the system without due authorisation, to "spy on" activities or seize data and products.

1.9 The digital ecosystem: architecture

Here is the Up2U ecosystem architecture, represented in a map.

At the center, a Moodle platform (by far the most common of "open source" platforms), which is the entry point to the ecosystem. The platform is powered by a series of additional modules (called "plug-ins"). For example:

- discussion forum;
- private messaging services;
- tools to create more complex questionnaires and tasks.

The same platform contains a rich library of educational contents (learning objects).

The platform is connected to some independent but integrated applications which, together with the Moodle plug-ins, constitute the "toolbox" we have spoken about.

Some of these applications are already operational, others will be added by the end of the project.

Click on the names to learn more.

1.10 The digital ecosystem: design choices

The Up2U digital ecosystem is open source, interoperable, portable, scalable, modular.

But what do these terms mean in practice?

Let us consider them one by one:

- Open source means that the source code is available to everyone via the Github platform. Anyone can see it, download it, use it and, if they want, improve it.
- Interoperable means that data are recorded in open formats with no secrets. You will never find yourself in the unpleasant condition of discovering that your data, managed by a certain programme, cannot be read by other programmes.
- Portable means that the entire project, if necessary, can be transferred to other systems.
- Scalable means that if the number of users rises, the potential of the system can easily be expanded ("scaled up").
- Modular means that each component of the system is interchangeable. It can easily be

replaced with a component that performs better and has similar functions.

These are the best possible design choices for an ecosystem designed to last over time and be adapted to the most diverse situations.

1.11 Research activities

Research activities, started in the first year of the project, are performed in three main areas:

- A survey of technologies currently available and suitable for achieving the project's goals.
- An in-depth analysis of learning-related literature.
- A survey of national and international educational policies.
- A survey to appreciate the stance of school and university teachers on the skills a student should possess today to successfully move from upper secondary education to university.

Overall, research has made it possible to identify a set of skills to work on in order to fulfil the "mission" of the Up2U project.

There are six basic skills:

- Collaboration;
- Creativity
- Use and understanding of language;
- information management
- motivation and autonomy;
- critical approach to information.

1.12 Educational activities in detail

Educational activities can involve many people.

For this reason, activity is of the "cascade" type, following a four-stage sequence:

1. A number of pilot schools in different countries are contacted.
2. Pilot courses are held with teachers to enable them to experience the potential of innovative theoretical approaches and of technology, in order to understand:
 - How, when and why to introduce digital data tools;
 - How technology can help with the acquisition of specific skills.
3. The data collected during pilot courses make it possible to fine-tune the method and resolve any critical issues for a second round of training with a larger number of participants. At this point new multimedia paths are introduced, including the one you are participating in

right now, which offer an even richer experience than the previous one.

4. At the end of the training course, teachers are called upon to plan and carry out teaching initiatives in their own classes, with the methodological and technological support of staff. This amounts to a veritable design laboratory for teaching, in which to put into practice everything learned.

In this transition from theory to practice, we wish to stress an important methodological aspect...

1.13 Educational activities: methods

All educational activities are permeated by an innovative approach to teaching. A two-tier constructivist approach:

- in terms of content, being part of the knowledge and skills that the teachers involved in the project need to acquire;
- in terms of method, being used in educational activities aimed firstly at teachers and then at their students.

This is a "project-based learning" approach in which knowledge and competences are acquired by working on concrete projects, within a group that shares experiences, ideas, doubts and reflections.

In other words, teachers learn and experience the same principles, methods and techniques that they will then pass on when teaching their students.

1.14 The partners

A project like Up2U requires a considerable deployment of forces. To complete this overview of the Up2U project, let us get to know the 18 partners, who have very different roles and competences.

Coordination is entrusted to the Géant network, based in the Netherlands, specialising in advanced network services for research and education. Géant brings project management skills and relations with dozens of institutions and businesses in Europe and the Middle East.

Partners include numerous major universities, bringing their wealth of research on methods and tools for formal and informal learning...

- *The Open University (UK)*
- *Sapienza, University of Rome (Italy)*
- *National Technical University of Athens (Greece)*
- *Universidad de Vigo (Spain)*
- *Instituto Superior de Engenharia do Porto (Portugal)*

Tel Aviv University (Israel)

·Kauno Technologijos Universitetas (Lithuania)]

... as well as leading research institutes that bring tools and services (the same used by their researchers), including powerful cloud computing infrastructures.

·CERN - European Organization for Nuclear Research (Switzerland)

·Gesellschaft fuer Wissenschaftliche Datenverarbeitung (Germany)]

The network infrastructure includes a number of specialist operators, who also make an important contribution to IT security and the development of educational applications.

·GARR Consortium (Italy)

·GRNET - Greek Research and Technology Network SA (Greece)

·Fundação para a Ciência and Tecnologia (Portugal)

·MACHBA - Interuniveristy Computation Center (Israel)

·Nemzeti Informacios Infrastruktura Fejlesztési Iroda (Hungary)

·Instytut Chemii Bioorganicznej Polskiej Akademii Nauk (Poland)]

Finally, two companies specialising in software development and the marketing of digital services and tools.

·TELTEK Video Research SL (Spain)

·OwnCloud GmbH (Germany)]